Shared Use Mobility, Transportation Technology and Intercity Transit Services

A Field Guide to How These Issues Are Being Addressed in the Metropolitan Planning Process and How Public Transit Agencies Are Adapting to an Evolving Mobility Landscape

An informational research assignment conducted for:

Federal Transit Administration
REGION IV

June 2018
This document represents the final deliverable of a detail assignment conducted by the author for the Federal Transit Administration’s Region IV office in Atlanta, Georgia. It provides an overview of the current state of the practice in addressing these issues in the metropolitan planning process, highlights of notable initiatives in shared mobility, and a summary of reference resources available for use by FTA Region IV staff in responding to inquiries from local, regional and state planning and implementation partners. It is not intended for use as policy guidance or direction by FTA, other federal agencies or any local, regional and state transportation planning agencies. All viewpoints expressed herein are solely mine as the author and do not constitute the position or express the intent of FTA or USDOT.

All source files, data, plans and resource documents used in the preparation of this document have been downloaded and saved for future use by FTA Region IV staff as necessary. They can be found at:

O: > TR04 > >9000 GRT (Capital and Operational Assistance Program) > 2018 Shared Use Mobility > Research (David Haynes - 2018)

To quickly move between various sections of the document, utilize embedded links in the Table of Contents. From within the document, return to the Table of Contents by clicking the TOC icon in the upper right corner of the page.

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June 2018
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BACKGROUND
The Region IV office of the Federal Transit Administration (FTA) serves eight states (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee), plus the Commonwealth of Puerto Rico and the US Virgin Islands. In late 2017, the Regional Administrator approached the Atlanta Regional Commission (ARC) about the possibility of assigning an ARC staff member to FTA for a temporary detail assignment. ARC is the Metropolitan Planning Organization (MPO) for a 20-county region of nearly five million people and is responsible for fulfilling federal long range metropolitan transportation planning requirements. David Haynes was nominated to complete the detail assignment, which began in October 2017 and concluded in June 2018.
FTA’S original interest in securing the assistance of an individual with MPO experience was to research and address five core questions.

1. What is the state of the practice on shared use mobility services within Region IV?

2. How are shared use mobility services changing the role of traditional public transit services in the region?

3. What partnerships have been formed between private sector mobility entities and transit operators?

4. What lessons have been learned from those partnerships, both positive and negative?

5. Are there opportunities for FTA Region IV to improve the services it provides to operators and strengthen the planning process?
BACKGROUND > Relevance to MPOs

The questions asked by FTA Region IV have direct relevance to the metropolitan planning process and its outcomes, yet to date have not received the same level of attention in discussions with the public, planning partners and policy officials as other transportation issues such as congestion and safety. It seemed likely that the knowledge and insight gained from the research could provide a useful benchmark for ARC in identifying areas for improving future iterations of its long range transportation plan. The next federally mandated update cycle for ARC occurs in early 2020, so the outcomes of this assignment were tailored and expanded to ensure that it could also prove useful in that process. This primarily involved the inclusion of transportation services and issues indirectly related to shared use mobility, such as connected/autonomous vehicles and electric vehicles. It also included a review of how various agencies are incorporating intercity bus and intercity rail services into their long range transportation plans, a recent federal requirement.
BACKGROUND > Shared Use Mobility Modes

Shared use mobility is a term used to describe transportation services that are shared among multiple users. This can include traditional transit services such as buses and trains, but is more commonly used when discussing more recent mobility options such as bikeshare programs and ridesourcing services such as Uber and Lyft. This report focuses on the more commonly used definition involving the modes of travel shown below, although as noted on the previous page it also considers intercity bus and intercity rail services.
METHODOLOGY
METHODOLOGY > Overview of Approach

The first step involved identifying and downloading the most current version of each metropolitan area’s long-range transportation plan. A keyword search was conducted on each document to determine whether or not the official planning product referenced the various topics of interest and to what degree the topic was covered. From this, it was possible to identify a smaller subset of agencies which appear to be on the leading edge of addressing shared use mobility within the formal planning process. Additional web research and a national literature review was conducted, focused on that subset of metro areas, to identify partnerships and pilot programs appropriate for highlighting in this document. Those selected for inclusion focus on the relationship of technology enabled shared use mobility services with transit agencies and the services they provide. It does not attempt to capture the rapidly changing status of indirectly related technologies, such as autonomous and connected vehicles, since the interface between transit agencies and the field tests of those technologies currently being conducted by various private companies has been very limited to date.
Research for this project was organized into eight primary topic areas. The four on the left cover the main shared mobility concepts of primary interest to FTA Region IV. The four on the right are the indirect topics included in the work scope to leverage this effort and increase the usefulness of the final document in improving the Atlanta region’s long range transportation planning process.
METHODOLOGY > Keyword Search Terms

To identify notable practices, an automated keyword search was conducted on Metropolitan Transportation Plans using the following terms, grouped by theme and including a number of possible variations. In a small number of cases, the plan was not readily available in a format conducive to the automated search, so a manual review of relevant sections (based on the table of contents) was conducted.

In some cases these terms include private sector companies which are highly visible in that particular market segment and have a nationwide market base. Their inclusion in this analysis should not be interpreted as an endorsement of their services.

**SHARED MOBILITY SERVICES**

- Shared Mobility / Shared Use Mobility
- Sharing Culture / Sharing Economy
- Mobility on Demand
- Mobility as a Service
- Integrator of Mobility / Integrators of Mobility
- Mobility Hub
- First Mile / Last Mile / Final Mile

- Bikeshare / Bike Share / Bikesharing / Bikepool
- Scootershare / Scooter Share / Scootersharing / Scooterpool

- Rideshare / Ride Share / Ridesharing / Carpool / Ridematch
- Microtransit / Micro-Transit / Ridesplitting / Dynamic Carpooling
- Carshare / Car Share / Carsharing
- Zipcar
- ReachNow
- Car2Go

- Ridehail / Ride hail / Ridehailing / Ridesourcing / Private Ridesharing
- Transportation Network Company / TNC
- Uber
- Lyft
- Vehicle for Hire / For Hire Service / For Hire Vehicle
- Taxi / Taxicab
METHODOLOGY > Keyword Search Terms

TRANSPORTATION TECHNOLOGY

Much of the future potential of shared use mobility services will be based on the availability of certain transportation technologies.

- Connected / Connected Vehicle / Connected Car / Vehicle to Vehicle (V2V) / Vehicle to Infrastructure (V2I) / Dedicated Short Range Communications (DSRC)
- Google / Waymo
- Electrification
- Charging Station / Charge Station
- Electric Vehicle / Electric Car
- Electric Bus

INTERCITY TRANSIT

These are also important “shared use” services, even if they are not normally associated with many of the newer mobility options previously discussed. So although only indirectly related to the initial research purpose, the keyword search was expanded to include the following terms.

- Intercity Bus / Inter-City Bus
- Trailways
- Greyhound
- Megabus
- Passenger Rail / Rail Passenger / Commuter Rail / Intercity Rail / Inter-City Rail / Regional Rail / Interregional Rail
- High Speed Rail / High Speed Train / Higher Speed Rail / Higher Speed Train
- Amtrak
No automated keyword search on such a large number of documents, prepared by different organizations with different approaches to the planning process, can be expected to yield perfect results. Below are the primary ways in which minor errors are most likely to have occurred and which may have impacted the results presented in this document.

**Format of online documentation**

Virtually all MPOs develop plan documentation which is very technical in nature and lengthy. Some, however, also develop a user-friendly shortened document embodying only the key concepts and recommendations, with more detailed information available elsewhere online in separate technical appendices and supplements. In such situations, these “executive summary” versions are the ones branded as the final plan document and published online for public consumption. Efforts were made to use whatever document was represented on the agency’s website as being the official plan, without respect to page length. It was assumed that the concepts being researched were sufficiently important that they would merit mention in the plan whether it was the full technical version or the short user-friendly version.

**Project lists**

Related to the caveat above, the approach which MPOs take to presenting the detailed project funding recommendations varies considerably. Some embed the full list within the primary document, while others present only highlights and make the full list available elsewhere. Regardless, this analysis generally excluded “hits” which only pointed to a project title in the list and did not include any accompanying narrative.

**Non-searchable graphics**

Embedded graphics imported into the document using certain formats (such as JPG, GIF, BMP and PNG) did not produce keyword search hits. To the extent possible, a visual scan of key sections of the documents occurred in an effort to identify and reference relevant graphics.
MTP ANALYSIS > Caveats to the Keyword Search Analysis

No automated keyword search on such a large number of documents, prepared by different organizations with different approaches to the planning process, can be expected to yield perfect results. Below are the primary ways in which minor errors are most likely to have occurred and which may have impacted the results presented in this document.

More recent initiatives not referenced in the official plan document

As would be expected considering the four to five year cycle between most major MTP updates, many plans found online were two to three years old. With the rapid changes in technology and its impacts on shared use mobility services, it is likely that many planning agencies are working diligently “behind the scenes” on these issues as part of their plan update processes. However, to keep the work scope manageable, the keyword analysis was restricted to the officially adopted and published long-range plan document. It is likely that concurrent planning efforts will be incorporated into future MTP updates, meaning this analysis will rapidly become outdated if not refreshed on a regular basis.

Less common terms

Terminology continues to evolve when referencing many of the research concepts. It is possible that a less common term has gained traction in a certain region of the country which this analysis overlooked.

Public comments

A keyword search “hit” was eliminated if the relevant term was found only within the context of a comment or statement from the general public, committee member or other stakeholder on that particular subject. A positive hit was only recorded if the main narrative of the plan referenced a project, program or policy issue associated with the topic.
MTP ANALYSIS > Caveats to the Keyword Search Analysis

No automated keyword search on such a large number of documents, prepared by different organizations with different approaches to the planning process, can be expected to yield perfect results. Below are the primary ways in which minor errors are most likely to have occurred and which may have impacted the results presented in this document.

**Duplicative terminology**

Some terms included in the keyword search are used in different contexts within the transportation planning profession. For example “last mile” is variously used to describe the short distance from the main portion of a long haul trip to the front door of the destination. It is commonly used in association with freight, transit, bicycling and walking trips. For purposes of this analysis, references to “last mile” connectivity regarding the delivery of freight were excluded, while those associated with transit, bicycling and walking trips were included. Where other terms frequently resulted in hits not relevant to this research included, a brief discussion of the rejected keyword search hits is provided in the introductory narrative of that section of the document.

**Search threshold**

No other restraints were set for what constituted a positive hit during the initial keyword search. The intent of the initial review was not to assess the quantity or quality of information found on the topic, but simply to determine whether or not it is even acknowledged in the plan. A more rigorous review of the substance of each reference followed later during the process of identifying and extracting notable practices.
METHODOLOGY > USDOT Recognized Definitions

To better understand how various concepts are presented in plans and initiatives around the country, a scan was first conducted to establish whether or not USDOT had defined any of the keyword search terms employed during this research. If a definition were found either on a website, in a research document, or some other deliverable produced or sponsored by USDOT, it is included on the following pages.

It should be noted that some terms are likely considered common enough in the public realm that no definition could be found, while others may have been coined so recently that they are not yet formally defined. In a few instances, multiple definitions were found.

**Shared-Use Mobility / Shared Mobility**

*TCRP Research Report 188: Shared Mobility and the Transformation of Public Transport (2016)*

Transportation services that are shared among users, including public transit; taxis and limos; bikesharing; carsharing (round-trip, one-way, and personal vehicle sharing); ridesharing (car-pooling, van-pooling); ridesourcing; scooter sharing; shuttle services; neighborhood jitneys; and commercial delivery vehicles providing flexible goods movement.

**Sharing Culture / Sharing Economy**

*Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)*

Advancements in social networking, location-based services, the Internet, and mobile technologies have contributed to a sharing economy (also referred to as peer-to-peer sharing, the mesh economy, and collaborative consumption). The sharing economy is a developing phenomenon based on renting and borrowing goods and services, rather than owning them. This sharing can occur among peers (e.g., community drivers, peer-to-peer carsharing, or bikesharing) or through businesses (e.g., a carsharing operator). The sharing economy can improve efficiency, provide cost savings, monetize underused resources, and offer social and environmental benefits.

**Mobility on Demand**

*FTA Office of Research, Demonstration and Innovation; Mobility on Demand Webinar (2016)*

*TRB Circular; U.S. Department of Transportation’s Mobility on Demand Initiative (2018)*

An integrated and connected multi-modal network of safe, affordable, and reliable transportation options that are available and accessible to all travelers.
**METHODOLOGY > USDOT Recognized Definitions**

*Mobility on Demand Fact Sheet #1 (USDOT Intelligent Transportation Systems Joint Program Office)*
An innovative, user-focused approach which leverages emerging mobility services, integrated transit networks and operations, real-time data, connected travelers, and cooperative Intelligent Transportation Systems (ITS) to allow for a more traveler-centric, transportation system-of-systems approach, providing improved mobility options to all travelers and users of the system in an efficient and safe manner.

**Mobility as a Service**

*Mobility as a Service: Concept and Practice (National Center for Mobility Management; March 2018)*
MaaS is essentially the next step in the progression from isolated agency-by-agency information and operations to a one-call/one-click/one-pay transportation network. The philosophy behind MaaS is to direct people to their most appropriate mobility options, in real time, through a single, unified trip planning and payment application. This term is frequently confused and misused, and it is important to understand what it means. ERTICO, Europe’s Intelligent Transportation Systems partnership, describes MaaS as “putting users, both travelers and goods, at the core of transport services, offering them tailor-made mobility solutions based on their individual needs. This means that, for the first time, easy access to the most appropriate transport mode or service will be included in a bundle of flexible travel service options for end users.”

**Mobility Hub**
No established definition found.

**Integrator of Mobility / Integrators of Mobility**
No established definition found.

**First Mile / Last Mile / Final Mile**
No established definition found.
**Rideshare / Ride Share / Ridesharing / Carpool / Ridematch**

*TCRP Research Report 188: Shared Mobility and the Transformation of Public Transport (2016)*

Involves adding passengers to a private trip in which driver and passengers share a destination. Such an arrangement provides additional transportation options for riders while allowing drivers to fill otherwise empty seats in their vehicles. Traditional forms of ridesharing include carpooling and vanpooling. This term is sometimes used to refer to ridesourcing.

*Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)*

A formal or informal arrangement where commuters share a vehicle for trips from either a common origin, destination, or both, reducing the number of vehicles on the road.

**Note**

Although used interchangeably by many agencies, for purposes of this research paper a distinction is made between ridesharing and ridesourcing, with the latter being associated specifically with the type of service provided by a Transportation Network Company (TNC) such as Uber or Lyft.

**Ridesplitting / Dynamic Carpooling**

*TCRP Research Report 188: Shared Mobility and the Transformation of Public Transport (2016)*

A type of ridesourcing that allow customers requesting a ride for one or two passengers to be paired in real time with others traveling along a similar route.

*Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)*

A form of ridesourcing where riders with similar origins and destinations are matched to the same ridesourcing driver and vehicle in real time, and the ride and costs are split among users.
Microtransit

IT-enabled private multi-passenger transportation services, such as Bridj, Chariot, Split, and Via, that serve passengers using dynamically generated routes, and may expect passengers to make their way to and from common pick-up or drop-off points. Vehicles can range from large SUVs to vans to shuttle buses. Because they provide transit-like service but on a smaller, more flexible scale, these new services have been referred to as microtransit.

**Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)**
A privately owned and operated shared transportation system that can offer fixed routes and schedules, as well as flexible routes and on-demand scheduling. The vehicles generally include vans and buses.

Carsharing / Car Share / Carsharing

Service that provides members with access to an automobile for intervals of less than a day. Major carsharing business models include traditional or round-trip, which requires users to borrow and return vehicles at the same location; one-way or free-floating, which allows users to pick up a vehicle at one location and drop it off at another; and peer-to-peer (p2p), which allows car owners to earn money at times when they are not using their vehicles by making them available for rental to other carshare members.

**Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)**
A program where individuals have temporary access to a vehicle without the costs and responsibilities of ownership. Individuals typically access vehicles by joining an organization that maintains a fleet of cars and light trucks deployed in lots located within neighborhoods, public transit stations, employment centers, and colleges/universities. Typically, the carsharing operator provides insurance, gasoline, parking, and maintenance. Generally, participants pay a fee each time they use a vehicle.

Zipcar

Zipcar is a private sector company active in the carsharing market, hence there is no USDOT definition.
ReachNow
ReachNow is a private sector company active in the carsharing market, hence there is no USDOT definition.

car2go
Car2go is a private sector company active in the carsharing market, hence there is no USDOT definition.
Bikeshare / Bike Share / Bikesharing / Bikepool

*TCRP Research Report 188: Shared Mobility and the Transformation of Public Transport (2016)*
Short-term bike rental, usually for individual periods of an hour or less over the course of a membership (periods which can range from a single ride, to several days, to an annual membership). Information technology-enabled public bikesharing provides real-time information about the location and demand for bikes at docking stations throughout a community.

*Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)*
Users access bicycles on an as-needed basis for one-way (point-to-point) or roundtrip use. Station-based bikesharing kiosks are typically unattended, concentrated in urban settings, and offer one-way station-based access (bicycles can be returned to any kiosk). Free-floating bikesharing offers users the ability to check-out a bicycle and return it to any location within a predefined geographic region. Bikesharing provides a variety of pickup and drop-off locations. The majority of bikesharing operators cover the costs of bicycle maintenance, storage, and parking. Generally, trips of less than 30 minutes are included within the membership fees. Users join the bikesharing organization on an annual, monthly, daily, or per-trip basis.

*Frequently Asked Questions on Bike Sharing (USDOT; 2015)*
Bike sharing is an innovative transportation solution, ideal for short-distance, point-to-point trips. These systems provide users the ability to pick up a bicycle at any self-serve bike station and return it to any other bike station located within the service area.

Scootershare / Scooter Share / Scootersharing / Scooterpool

*Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)*
Users gain the benefits of a private scooter without the costs and responsibilities of ownership. Individuals typically access scooters by joining an organization that maintains a fleet of scooters at various locations. Typically, the scooter operator provides gasoline, parking, and maintenance. Generally, participants pay a fee each time they use a scooter. They can be roundtrip, one-way, or both.
METHODOLOGY > USDOT Recognized Definitions

Ridehail / Ride Hail / Ridehailing / Ridesourcing / Private Ridesharing

*TCRP Research Report 188: Shared Mobility and the Transformation of Public Transport (2016)*
Use of online platforms to connect passengers with drivers and automate reservations, payments, and customer feedback. Riders can choose from a variety of service classes, including drivers who use personal, non-commercial, vehicles; traditional taxicabs dispatched via the providers’ apps, and premium services with professional livery drivers and vehicles. Ridesourcing has become one of the most ubiquitous forms of shared mobility.

Ridesourcing services (also known as transportation network companies (TNCs) or ride-hailing) provide prearranged and on-demand transportation services for compensation, which connect drivers of personal vehicles with passengers. Smartphone mobile applications are used for booking, ratings (for both drivers and passengers), and electronic payment. There are a variety of vehicle types that can be offered by these services including: sedans, sports utility vehicles, vehicles with car seats, wheelchair accessible vehicles, and vehicles where the driver can assist older or disabled passengers.

*ITS Joint Program Office Website > Communications*
Dynamic ridesharing is automated carpooling where all of the hard work in matching departure times, destinations, and user authentications is seamlessly accomplished by an in-vehicle computer program.

Transportation Network Company / TNC
This term is generally presented in USDOT resources as being synonymous with ridehailing and ridesourcing.

Uber
Uber is a private sector company active in the ridehailing market, hence there is no USDOT definition.
Lyft

Lyft is a private sector company active in the ridehailing market, hence there is no USDOT definition.

Vehicle for Hire / For Hire Service / For Hire Vehicle

*FHWA Planning Glossary*
Carrier that provides transportation service to the public on a fee basis.

*TCRP Report 75 - The Role of the Private-for-Hire Vehicle Industry in Public Transit (2002)*
Any vehicle operated by a private, for-profit company and included in any of the following definitions:

- Ambulette - a vehicle used for nonemergency medical transportation.
- Black Car or Premium Sedan or Executive Sedan—a premium sedan providing prearranged, on-demand service and usually paid for by corporate vouchers.
- Car Service - identical to Livery.
- Jitney - a vehicle operating on a fixed-route, nonscheduled basis.
- Limousine - a luxury vehicle providing prearranged service to a party of one or more persons.
- Livery - a taxi-like service operated on a prearranged basis.
- Shuttle - a vehicle, usually a van, providing service to and from a fixed location, such as an airport, a shopping center, or a transit terminal.
- Taxicab - a vehicle providing point-to-point, on-demand, passenger service.
Taxi / Taxicab

**National Transit Database Glossary**
A private for-profit company where passenger vehicles are for hire by the riding public.

**Shared Mobility: Current Practices and Guiding Principles (USDOT; 2016)**
A type of for-hire vehicle service with a driver used by a single or multiple passengers. Taxi services may be either pre-arranged or on-demand. Taxis can be reserved or dispatched through street hailing, a phone operator, or an “e-Hail” Internet or phone application maintained either by the taxi company or a third-party provider.

A vehicle providing point-to-point, on-demand, passenger service.

*Automated Driving Systems 2.0: A Vision for Safety (NHTSA; September 2017)*

**SAE Automation Levels**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Automation</td>
</tr>
<tr>
<td>1</td>
<td>Driver Assistance</td>
</tr>
<tr>
<td>2</td>
<td>Partial Automation</td>
</tr>
<tr>
<td>3</td>
<td>Conditional Automation</td>
</tr>
<tr>
<td>4</td>
<td>High Automation</td>
</tr>
<tr>
<td>5</td>
<td>Full Automation</td>
</tr>
</tbody>
</table>

- **Level 0 (No Automation)**: Zero autonomy; the driver performs all driving tasks.
- **Level 1 (Driver Assistance)**: Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.
- **Level 2 (Partial Automation)**: Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.
- **Level 3 (Conditional Automation)**: Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.
- **Level 4 (High Automation)**: The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.
- **Level 5 (Full Automation)**: The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.
There are multiple definitions for various levels of automation and for some time there has been need for standardization to aid clarity and consistency. Therefore, this Policy adopts the SAE International (SAE) definitions for levels of automation. The SAE definitions divide vehicles into levels based on “who does what, when.” Generally:

- At SAE Level 0, the human driver does everything;
- At SAE Level 1, an automated system on the vehicle can sometimes assist the human driver conduct some parts of the driving task;
- At SAE Level 2, an automated system on the vehicle can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;
- At SAE Level 3, an automated system can both actually conduct some parts of the driving task and monitor the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests;
- At SAE Level 4, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and
- At SAE Level 5, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.

Using the SAE levels, DOT draws a distinction between Levels 0-2 and 3-5 based on whether the human operator or the automated system is primarily responsible for monitoring the driving environment. Throughout this Policy the term “highly automated vehicle” (HAV) represents SAE Levels 3-5 vehicles with automated systems that are responsible for monitoring the driving environment.

An automated vehicle system is a combination of hardware and software (both remote and on-board) that performs a driving function, with or without a human actively monitoring the driving environment. A vehicle has a separate automated vehicle system for each Operational Design Domain such that a SAE Level 2, 3 or 4 vehicle could have one or multiple systems, one for each ODD (e.g., freeway driving, self-parking, geofenced urban driving). SAE Level 5 vehicles have a single automated vehicle system that performs under all conditions. This Policy defines “HAV systems” as automated vehicle systems that are capable of monitoring the driving environment as defined by SAE J3016. HAV systems are SAE Level 3 and higher by definition.
Connected / Connected Vehicle (CV) / Connected Car

**ITS Joint Program Office Website > Connected Vehicles Basics**
Connected vehicles enable safe, interoperable networked wireless communications among vehicles, the infrastructure, and passengers’ personal communications devices.

**Strategies to Advance Automated and Connected Vehicles Briefing Document (TRB: 2017)**
A connected vehicle has internal devices that connect to other vehicles, as in vehicle-to-vehicle (V2V) communication, or a back-end infrastructure system, as in vehicle-to-infrastructure (V2I) communication. V2V applications enable crash prevention, and V2I applications enable telecommunication, safety, mobility, and environmental benefits. Their foundation of data communications enables real-time driver advisories and warnings of imminent threats and roadway hazards.

Vehicle to Vehicle (V2V) / Vehicle to Infrastructure (V2I) / Dedicated Short Range Communications (DSRC)

**NHTSA Website > Vehicle to Vehicle Communication**
Vehicle-to-vehicle (V2V) communication enables vehicles to wirelessly exchange information about their speed, location, and heading. The technology behind V2V communication allows vehicles to broadcast and receive omni-directional messages (up to 10 times per second), creating a 360-degree “awareness” of other vehicles in proximity. Vehicles equipped with appropriate software (or safety applications) can use the messages from surrounding vehicles to determine potential crash threats as they develop. The technology can then employ visual, tactile, and audible alerts—or, a combination of these alerts—to warn drivers. These alerts allow drivers the ability to take action to avoid crashes. These V2V communication messages have a range of more than 300 meters and can detect dangers obscured by traffic, terrain, or weather. V2V communication extends and enhances currently available crash avoidance systems that use radars and cameras to detect collision threats. This new technology doesn’t just help drivers survive a crash—it helps them avoid the crash altogether.

**Strategies to Advance Automated and Connected Vehicles Briefing Document (TRB: 2017)**
The two-way, short-to-medium-range wireless communications capability that permits very high data transmission
ITS Joint Program Office Website > Communications
DSRC (Dedicated Short Range Communications) is a two-way short- to- medium-range wireless communications capability that permits very high data transmission critical in communications-based active safety applications. In Report and Order FCC-03-324, the Federal Communications Commission (FCC) allocated 75 MHz of spectrum in the 5.9 GHz band for use by Intelligent Transportations Systems (ITS) vehicle safety and mobility applications.

Google / Waymo
Google / Waymo is a private sector company active in the autonomous vehicle market, hence there is no USDOT definition.
METHODOLOGY > USDOT Recognized Definitions

**Electrification**
No established definition found.

**Charging Station / Charge Station**
No established definition found.

**Electric Vehicle / Electric Car**

*49 CFR 571.135 - Light Vehicle Brake Systems*
Electric vehicle or EV means a motor vehicle that is powered by an electric motor drawing current from rechargeable storage batteries, fuel cells, or other portable sources of electrical current, and which may include a nonelectrical source of power designed to charge batteries and components thereof.

*49 CFR 571.141 - Minimum Sound Requirements for Hybrid and Electric Vehicles*
Electric vehicle means a motor vehicle with an electric motor as its sole means of propulsion.

**Electric Bus**
No established definition found for electric bus. It can be presumed that an acceptable definition would be a means of transportation which satisfies the above definition of an electric vehicle, as well as the following definition of a bus:

*49 CFR 37.3 - Definitions*
Bus means any of several types of self-propelled vehicles, generally rubber-tired, intended for use on city streets, highways, and busways, including but not limited to minibuses, forty- and thirty-foot buses, articulated buses, double-deck buses, and electrically powered trolley buses, used by public entities to provide designated public transportation service and by private entities to provide transportation service including, but not limited to, specified public transportation services. Self-propelled, rubber-tired vehicles designed to look like antique or vintage trolleys are considered buses.
Intercity Bus / Inter-City Bus

*National Transit Database Glossary*
Regularly scheduled public service using an over-the-road bus that operates with limited stops between two urbanized areas or that connects rural areas to an urbanized area.

*Note: FTA’s definition of public transportation explicitly excludes intercity bus services.*

Trailways

Trailways is a private sector company active in the intercity bus market, hence there is no USDOT definition.

Greyhound

Greyhound is a private sector company active in the intercity bus market, hence there is no USDOT definition.

Megabus

Megabus is a private sector company active in the intercity bus market, hence there is no USDOT definition.
Passenger Rail / Commuter Rail / Intercity Rail / Interregional Rail

National Transit Database Glossary
An electric or diesel propelled railway for urban passenger train service consisting of local travel which operates between a central city and outlying areas. Service must be operated on a regular basis by or under contract with a transit operator for the purpose of transporting passengers within urbanized areas (UZAs), or between urbanized areas and outlying areas. Commuter rail is generally characterized by multi-trip tickets, specific station-to-station fares, railroad employment practices, relatively long distance between stops, and only 1-2 stations in the central business district.

Note: Intercity rail service is excluded from Commuter Rail, except for that portion of such service that is operated by or under contract with a public transit agency for predominantly commuter services for which more than 50 percent of the average daily ridership makes a return trip on the same day.

49 CFR 37.3 - Definitions
Commuter rail transportation means short-haul rail passenger service operating in metropolitan and suburban areas, whether within or across the geographical boundaries of a state, usually characterized by reduced fare, multiple ride, and commutation tickets and by morning and evening peak period operations. This term does not include light or rapid rail transportation.

49 CFR 37.3 - Definitions
Intercity rail transportation means transportation provided by Amtrak.

Note: For purposes of this research, intercity rail was interpreted to mean any fixed guideway rail transportation provided between two or more metropolitan areas, regardless of operator.

High Speed Rail / High Speed Train

49 CFR 37.3 - Definitions
High speed rail means a rail service having the characteristics of intercity rail service which operates primarily on a dedicated guideway or track not used, for the most part, by freight, including, but not limited to, trains on welded rail, magnetically levitated (maglev) vehicles on a special guideway, or other advanced technology vehicles, designed to travel at speeds in excess of those possible on other types of railroads.
Amtrak

The National Railroad Passenger Corporation, more commonly known as Amtrak, is a quasi-public corporation active in the intercity rail market, hence there is no USDOT definition. On its website, Amtrak defines itself as follows:

Amtrak Website
Amtrak, the national rail operator, connects America in safer, greener and healthier ways. With 21,000 route miles in 46 states, the District of Columbia and three Canadian provinces, Amtrak operates more than 300 trains each day — at speeds up to 150 mph — to more than 500 destinations. Amtrak is the operator of choice for state-supported corridor services in 15 states and for four commuter rail agencies.
MTP ANALYSIS
A total of 102 metropolitan areas are located within the jurisdiction of FTA Region IV. A metro area is defined by the United States Census as a center city and its surrounding suburban areas that collectively have more than a population of 50,000. In each area, a designated Metropolitan Planning Organization (MPO) is responsible for a long range transportation plan spanning at least a 20-year horizon.

Plans were located online and downloaded in early 2018 for all 101 of the 102 metro areas within FTA Region IV. The San Juan, Puerto Rico plan was not available online during the initial data compilation phase of this effort, presumably due to recovery activities following Hurricane Maria. Near the conclusion of the preparation of this report, the plan was obtained and included in the set of deliverables provided to FTA, but the analysis was not refreshed to reflect the availability of that additional plan.

Maps and tables providing basic information on the name of the planning organization, the adoption date of the most recently published plan, and its horizon year, are provided on the following pages.
POPULATION

- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000
MTP ANALYSIS > FTA Region IV Metro Areas > Florida

POPULATION

- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000

<table>
<thead>
<tr>
<th>Metropolitan Planning Organization</th>
<th>Population (2010 Census)</th>
<th>RTP Horizon</th>
<th>Adopted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay County TPO</td>
<td>168,852</td>
<td>2040</td>
<td>June 2016</td>
</tr>
<tr>
<td>Broward MPO</td>
<td>1,748,066</td>
<td>2040</td>
<td>July 2017</td>
</tr>
<tr>
<td>Capital Region TPA</td>
<td>367,384</td>
<td>2040</td>
<td>Feb. 2016</td>
</tr>
<tr>
<td>Charlotte County MPO</td>
<td>161,230</td>
<td>2040</td>
<td>Oct. 2015</td>
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<tr>
<td>Florida-Alabama TPO</td>
<td>434,625</td>
<td>2040</td>
<td>Nov. 2015</td>
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<tr>
<td>Forward Pinellas</td>
<td>915,810</td>
<td>2040</td>
<td>Dec. 2014</td>
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<tr>
<td>Gainesville TPA</td>
<td>198,376</td>
<td>2040</td>
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<tr>
<td>Heartland Regional TPO</td>
<td>252,109</td>
<td>2040</td>
<td>June 2016</td>
</tr>
<tr>
<td>Hernando/Citrus MPO</td>
<td>313,992</td>
<td>2040</td>
<td>Mar. 2015</td>
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<tr>
<td>Hillsborough County MPO</td>
<td>1,228,761</td>
<td>2040</td>
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<tr>
<td>Indian River County MPO</td>
<td>136,368</td>
<td>2040</td>
<td>Dec. 2015</td>
</tr>
<tr>
<td>Lake-Sumter MPO</td>
<td>290,298</td>
<td>2040</td>
<td>Apr. 2017</td>
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<tr>
<td>Lee County MPO</td>
<td>616,576</td>
<td>2040</td>
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</tr>
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<td>Martin MPO</td>
<td>146,846</td>
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<tr>
<td>METROPLAN Orlando</td>
<td>1,837,385</td>
<td>2040</td>
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<tr>
<td>Miami-Dade MPO</td>
<td>2,569,420</td>
<td>2040</td>
<td>Oct. 2014</td>
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<td>North Florida TPO</td>
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<td>2040</td>
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<tr>
<td>Ocala / Marion County TPO</td>
<td>331,558</td>
<td>2040</td>
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<tr>
<td>Okaloosa-Walton TPO</td>
<td>214,967</td>
<td>2040</td>
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<td>Palm Beach TPA</td>
<td>1,320,134</td>
<td>2040</td>
<td>July 2017</td>
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<tr>
<td>Pasco County MPO</td>
<td>465,394</td>
<td>2040</td>
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<tr>
<td>Polk County TPO</td>
<td>602,278</td>
<td>2040</td>
<td>June 2016</td>
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<tr>
<td>River to Sea TPO</td>
<td>581,923</td>
<td>2040</td>
<td>May 2016</td>
</tr>
<tr>
<td>Sarasota-Manatee MPO</td>
<td>700,837</td>
<td>2040</td>
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<tr>
<td>Space Coast TPO</td>
<td>514,274</td>
<td>2040</td>
<td>May 2016</td>
</tr>
<tr>
<td>St. Lucie TPO</td>
<td>277,097</td>
<td>2040</td>
<td>Feb. 2016</td>
</tr>
</tbody>
</table>
POPULATION
- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000
MTP ANALYSIS > FTA Region IV Metro Areas > Kentucky

<table>
<thead>
<tr>
<th>Metropolitan Planning Organization</th>
<th>Population (2010 Census)</th>
<th>Notes</th>
<th>RTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowling Green-Warren County MPO</td>
<td>113,792</td>
<td>MPO housed within Warren County</td>
<td>2040 Nov. 2015</td>
</tr>
<tr>
<td>Lexington Area MPO</td>
<td>345,521</td>
<td></td>
<td>2040 Apr. 2014</td>
</tr>
<tr>
<td>Louisville Area MPO</td>
<td>1,062,346</td>
<td>MPO housed within Kentuckiana Regional Planning and Development Agency</td>
<td>2035 Aug. 2014</td>
</tr>
<tr>
<td>Owensboro-Daviess County MPO</td>
<td>96,636</td>
<td>MPO housed within Green River Area Development District</td>
<td>2040 Sept. 2015</td>
</tr>
<tr>
<td>Radcliff-Elizabethtown MPO</td>
<td>134,153</td>
<td>MPO housed within Lincoln Trail Area Development District</td>
<td>2040 Jan. 2015</td>
</tr>
</tbody>
</table>

POPULATION

- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000
MTP ANALYSIS > FTA Region IV Metro Areas > Mississippi

<table>
<thead>
<tr>
<th>Metropolitan Planning Organization</th>
<th>Population (2010 Census)</th>
<th>RTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Mississippi Planning &amp; Development District</td>
<td>461,430</td>
<td>2040 Nov. 2015</td>
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<tr>
<td>Gulf Regional Planning Commission</td>
<td>370,692</td>
<td>2040 Dec. 2015</td>
</tr>
<tr>
<td>Hattiesburg-Petal-Forrest-Lamar MPO</td>
<td>106,413</td>
<td>2040 Dec. 2015</td>
</tr>
</tbody>
</table>

**POPULATION**
- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000
### POPULATION

- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000

### Metropolitan Planning Organizations

<table>
<thead>
<tr>
<th>Name</th>
<th>Primary City</th>
<th>Notes</th>
<th>Population (2010 Census)</th>
<th>RTP Horizon</th>
<th>Adopted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington-Graham MPO</td>
<td>Burlington</td>
<td>MPO housed within the City of Burlington</td>
<td>161,793</td>
<td>2040</td>
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<tr>
<td>Cabarrus-Rowan MPO</td>
<td>Concord</td>
<td></td>
<td>316,427</td>
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<tr>
<td>Capital Area MPO</td>
<td>Raleigh</td>
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<td>1,074,420</td>
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<tr>
<td>Charlotte Regional TPO</td>
<td>Charlotte</td>
<td></td>
<td>1,262,842</td>
<td>2040</td>
<td>Apr. 2014</td>
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<tr>
<td>Durham-Chapel Hill-Carrboro MPO</td>
<td>Durham</td>
<td></td>
<td>397,989</td>
<td>2040</td>
<td>May 2013</td>
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<tr>
<td>Fayetteville Area MPO</td>
<td>Fayetteville</td>
<td></td>
<td>373,351</td>
<td>2040</td>
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<tr>
<td>French Broad River MPO</td>
<td>Asheville</td>
<td></td>
<td>397,589</td>
<td>2040</td>
<td>Sept. 2015</td>
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<tr>
<td>Gaston Cleveland-Lincoln MPO</td>
<td>Gastonia</td>
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<tr>
<td>Goldsboro Urban Area MPO</td>
<td>Goldsboro</td>
<td>MPO housed within the City of Goldsboro</td>
<td>92,964</td>
<td>2040</td>
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<tr>
<td>Greater Hickory MPO</td>
<td>Hickory</td>
<td>MPO housed within Western Piedmont Council of Governments</td>
<td>365,651</td>
<td>2040</td>
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<tr>
<td>Greensboro Urban Area MPO</td>
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<tr>
<td>Greenville Urban Area MPO</td>
<td>Greenville</td>
<td>MPO housed within the City of Greenville</td>
<td>134,966</td>
<td>2040</td>
<td>Aug. 2014</td>
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<tr>
<td>High Point Urban Area MPO</td>
<td>High Point</td>
<td>MPO housed within the City of High Point</td>
<td>283,307</td>
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<td>Jacksonville Urban Area MPO</td>
<td>Jacksonville</td>
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<td>141,613</td>
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<tr>
<td>New Bern Area MPO</td>
<td>New Bern</td>
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<td>56,878</td>
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<tr>
<td>Rocky Mount Urban Area MPO</td>
<td>Rocky Mount</td>
<td>MPO housed within the City of Rocky Mount</td>
<td>85,305</td>
<td>2040</td>
<td>May 2013</td>
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<tr>
<td>Wilmington Urban Area MPO</td>
<td>Wilmington</td>
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<td>253,077</td>
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<tr>
<td>Winston-Salem Urban Area MPO</td>
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<td>MPO housed within the City of Winston-Salem</td>
<td>408,451</td>
<td>2040</td>
<td>Sept. 2015</td>
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</tbody>
</table>
POPULATION

- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000

<table>
<thead>
<tr>
<th>Metropolitan Planning Organization</th>
<th>Population (2010 Census)</th>
<th>RTP</th>
<th>Horizon</th>
<th>Adopted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puerto Rico MPO</td>
<td>3,725,789</td>
<td>2040</td>
<td>Dec. 2013</td>
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</tbody>
</table>

Notes: MPO housed within Department of Transportation and Public Works.
MTP ANALYSIS > FTA Region IV Metro Areas > South Carolina

**Population**
- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000

### Metropolitan Planning Organization

<table>
<thead>
<tr>
<th>Name</th>
<th>Primary City</th>
<th>Notes</th>
<th>Population (2010 Census)</th>
<th>Horizon</th>
<th>Adopted</th>
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<tbody>
<tr>
<td>Anderson Area Transportation Study</td>
<td>Anderson</td>
<td>MPO housed within the City of Anderson</td>
<td>94,673</td>
<td>2040</td>
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<tr>
<td>Berkeley Charleston Dorchester COG</td>
<td>Charleston</td>
<td></td>
<td>569,000</td>
<td>2035</td>
<td>Unknown</td>
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<tr>
<td>Central Midlands COG</td>
<td>Columbia</td>
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<td>621,308</td>
<td>2040</td>
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<tr>
<td>Florence Area Transportation Study</td>
<td>Florence</td>
<td>MPO housed within Florence County</td>
<td>96,084</td>
<td>2035</td>
<td>July 2012</td>
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<tr>
<td>Grand-Strand Area Transportation Study</td>
<td>Georgetown / Myrtle Beach</td>
<td></td>
<td>296,758</td>
<td>2040</td>
<td>Oct. 2017</td>
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<tr>
<td>Greenville-Pickens Area Transportation Study</td>
<td>Greenville</td>
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<td>547,397</td>
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<tr>
<td>Lowcountry Area Transportation Study</td>
<td>Hilton Head Island</td>
<td>MPO housed within Lowcountry COG</td>
<td>156,894</td>
<td>2040</td>
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<tr>
<td>Rock Hill-Fort Mill Area Transportation Study</td>
<td>Rock Hill</td>
<td></td>
<td>174,406</td>
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<tr>
<td>Spartanburg Area Transportation Study</td>
<td>Spartanburg</td>
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<td>222,968</td>
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<tr>
<td>Sumter Urban Area Transportation Study</td>
<td>Sumter</td>
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<td>85,365</td>
<td>2040</td>
<td>May 2013</td>
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MTP ANALYSIS > FTA Region IV Metro Areas > Tennessee

<table>
<thead>
<tr>
<th>Name</th>
<th>Primary City</th>
<th>Notes</th>
<th>Population (2010 Census)</th>
<th>Horizon</th>
<th>Adopted</th>
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<tbody>
<tr>
<td>Bristol MPO</td>
<td>Bristol</td>
<td>MPO housed within the City of Bristol</td>
<td>83,167</td>
<td>2040</td>
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<tr>
<td>Chattanooga-Hamilton County/North Georgia TPO</td>
<td>Chattanooga</td>
<td>MPO housed with Chattanooga - Hamilton County Regional Planning Agency</td>
<td>436,669</td>
<td>2040</td>
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<td>Clarksville Urbanized Area MPO</td>
<td>Clarksville</td>
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<td>193,971</td>
<td>2040</td>
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<tr>
<td>Cleveland Urban Area MPO</td>
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<td>May 2016</td>
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<td>Jackson Urban Area MPO</td>
<td>Jackson</td>
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<td>98,294</td>
<td>2040</td>
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<td>Johnson City MPO</td>
<td>Johnson City</td>
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<td>Knoxvile Regional TPO</td>
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<td>Lakeway MPO</td>
<td>Morristown</td>
<td></td>
<td>81,648</td>
<td>2040</td>
<td>May 2017</td>
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</tbody>
</table>

**POPULATION**

- Less than 200,000
- 200,000 to 1,000,000
- Greater than 1,000,000
Because of the nature of the topics being researched, major metropolitan areas were determined to be more likely to be at the forefront in addressing them in their plans. For this reason, all metro areas with a population greater than one million from throughout the country were also included in the analysis, with the exception of San Juan, PR as previously discussed. Of the 53 large metros, 13 are represented within FTA Region IV (13), so this resulted in a net expansion of 40 additional plans which were downloaded and reviewed.
## MTP ANALYSIS > Metro Areas Greater than 1M Population*

<table>
<thead>
<tr>
<th>Population Rank</th>
<th>Metropolitan Area</th>
<th>Population (2016)</th>
<th>MPO Name</th>
<th>Regional Transportation Plan</th>
<th>Horizon</th>
<th>Last Update</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>New York City, NY</td>
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<td>June 2015</td>
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<tr>
<td>2</td>
<td>Los Angeles, CA</td>
<td>13,315,447</td>
<td>Southern California Association of Governments</td>
<td>2040</td>
<td>April 2016</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Chicago, IL</td>
<td>9,512,999</td>
<td>Chicago Metropolitan Area for Planning</td>
<td>2040</td>
<td>Oct. 2014</td>
<td></td>
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<tr>
<td>4</td>
<td>Dallas / Fort Worth, TX</td>
<td>7,233,323</td>
<td>North Central Texas Council of Governments</td>
<td>2040</td>
<td>Mar. 2016</td>
<td></td>
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<tr>
<td>5</td>
<td>Houston, TX</td>
<td>6,772,470</td>
<td>Houston Galveston Area Council</td>
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<td>Mar. 2016</td>
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<td>7</td>
<td>Philadelphia, PA</td>
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<td>Oct. 2017</td>
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<td>8</td>
<td>Miami, FL</td>
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<td>Miami-Dade Metropolitan Planning Organization</td>
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<td>9</td>
<td>Atlanta, GA</td>
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<td>10</td>
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<td>11</td>
<td>San Francisco, CA</td>
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<td>13</td>
<td>Riverside, CA</td>
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<td>Southern California Association of Governments</td>
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<tr>
<td>14</td>
<td>Detroit, MI</td>
<td>4,297,617</td>
<td>Southeast Michigan Council of Governments</td>
<td>2040</td>
<td>July 2017</td>
<td></td>
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<tr>
<td>15</td>
<td>Seattle, WA</td>
<td>3,798,902</td>
<td>Puget Sound Regional Council</td>
<td>2040</td>
<td>Oct. 2015</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Minneapolis / St. Paul, MN</td>
<td>3,551,036</td>
<td>Metropolitan Council</td>
<td>2040</td>
<td>Jan. 2015</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Tampa / St. Petersburg, FL</td>
<td>3,032,171</td>
<td>Hillsborough County MPO</td>
<td>2040</td>
<td>Oct. 2017</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Denver, CO</td>
<td>2,853,077</td>
<td>Denver Regional Council of Governments</td>
<td>2040</td>
<td>Apr. 2017</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>St. Louis, MO</td>
<td>2,807,002</td>
<td>East-West Gateway Council of Governments</td>
<td>2045</td>
<td>June 2015</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Baltimore, MD</td>
<td>2,798,866</td>
<td>Baltimore Metropolitan Council</td>
<td>2040</td>
<td>Nov. 2015</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Charlotte, NC</td>
<td>2,474,314</td>
<td>Charlotte Regional TPO</td>
<td>2040</td>
<td>Apr. 2014</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>San Antonio, TX</td>
<td>2,429,609</td>
<td>Alamo Area MPO</td>
<td>2040</td>
<td>Dec. 2014</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Portland, OR</td>
<td>2,424,955</td>
<td>Portland METRO</td>
<td>2040</td>
<td>July 2014</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Pittsburgh, PA</td>
<td>2,342,299</td>
<td>Southwestern Pennsylvania Commission</td>
<td>2040</td>
<td>June 2016</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Cincinnati, OH</td>
<td>2,165,139</td>
<td>Ohio Kentucky Indiana Regional Council of Governments</td>
<td>2040</td>
<td>June 2016 (online only)</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Las Vegas, NV</td>
<td>2,155,664</td>
<td>Regional Transportation Commission</td>
<td>2040</td>
<td>Feb. 2017</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Kansas City, MO</td>
<td>2,104,509</td>
<td>Mid-America Regional Council</td>
<td>2040</td>
<td>May 2015</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Austin, TX</td>
<td>2,056,405</td>
<td>Capital Area MPO</td>
<td>2040</td>
<td>May 2015</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Cleveland, OH</td>
<td>2,055,612</td>
<td>Northeast Ohio Areawide Coordinating Agency</td>
<td>2040</td>
<td>June 2017</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Columbus, OH</td>
<td>2,041,520</td>
<td>Mid-Ohio Regional Planning Commission</td>
<td>2040</td>
<td>May 2016</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Indianapolis, IN</td>
<td>2,004,230</td>
<td>Indianapolis MPO</td>
<td>2045</td>
<td>Dec. 2017</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>San Jose, CA</td>
<td>1,978,816</td>
<td>Metropolitan Transportation Commission</td>
<td>2040</td>
<td>July 2017</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Norfolk / Virginia Beach, VA</td>
<td>1,726,907</td>
<td>Hampton Roads Transportation Planning Organization</td>
<td>2040</td>
<td>July 2016</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Providence, RI</td>
<td>1,614,750</td>
<td>State of Rhode Island</td>
<td>2037</td>
<td>Dec. 2017</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Milwaukee, WI</td>
<td>1,572,482</td>
<td>Southeastern Wisconsin Regional Planning Council</td>
<td>2050</td>
<td>July 2017</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Jacksonville, FL</td>
<td>1,476,212</td>
<td>North Florida TPO</td>
<td>2040</td>
<td>Nov. 2018</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Oklahoma City, OK</td>
<td>1,373,211</td>
<td>Association of Central Oklahoma Governments</td>
<td>2035</td>
<td>May 2012</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Memphis, TN</td>
<td>1,342,842</td>
<td>Memphis Urban Area MPO</td>
<td>2040</td>
<td>Jan. 2016</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>Raleigh, NC</td>
<td>1,302,946</td>
<td>Capital Area MPO</td>
<td>2040</td>
<td>Apr. 2013</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Louisville, KY</td>
<td>1,283,430</td>
<td>Louisville Area MPO</td>
<td>2040</td>
<td>Aug. 2014</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Richmond, VA</td>
<td>1,281,708</td>
<td>Richmond Regional Transportation Planning Organization</td>
<td>2040</td>
<td>Mar. 2017</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>New Orleans, LA</td>
<td>1,268,883</td>
<td>New Orleans Regional Planning Commission</td>
<td>2044</td>
<td>Jan. 2015</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Hartford, CT</td>
<td>1,206,836</td>
<td>Central Connecticut Regional Planning Agency</td>
<td>2040</td>
<td>Aug. 2013</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>Salt Lake City, UT</td>
<td>1,186,187</td>
<td>Wasatch Front Regional Council</td>
<td>2040</td>
<td>Unknown (2015)</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Birmingham, AL</td>
<td>1,147,417</td>
<td>Birmingham MPO</td>
<td>2040</td>
<td>April 2015</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Buffalo, NY</td>
<td>1,132,804</td>
<td>Greater Buffalo Niagara Regional Transportation Council</td>
<td>2040</td>
<td>Feb. 2014</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Rochester, NY</td>
<td>1,078,879</td>
<td>Genesee Transportation Council</td>
<td>2040</td>
<td>June 2016</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Grand Rapids, MI</td>
<td>1,047,099</td>
<td>Grand Valley Metropolitan Council</td>
<td>2040</td>
<td>Apr. 2015</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Tucson, AZ</td>
<td>1,016,206</td>
<td>Pima Association of Governments</td>
<td>2045</td>
<td>May 2016</td>
<td></td>
</tr>
</tbody>
</table>

* Does not include San Juan, PR due to the unavailability of the MTP at the time of the initial data compilation efforts.
MTP ANALYSIS > Summary of Plans Reviewed

A total of 141 long range plans prepared by Metropolitan Planning Organizations (MPOs) were downloaded and reviewed. The breakdown by size (small, medium and large) was split relatively equally, but it should be noted that the larger MPOs represent the entire country, while all the small and medium sized MPO plans reviewed were from within FTA Region IV.

It should that all plans were downloaded in January 2018. In the interval between that initial data compilation phase and the production of this report, several plans have likely been amended or updated. As a result, the findings which follow should be considered as reflective of the state of the practice as of January 2018, rather than as of the publication date.

LARGE (Greater than 1,000,000)  
52

MEDIUM (200,000 to 1,000,000)  
43

SMALL (Less than 200,000)  
46

All within FTA Region IV

12 within FTA Region IV
MTP FINDINGS
MTP FINDINGS > Structure of Findings

The following pages present the results of the research conducted into each of eight primary topic areas. Each topic has multiple keywords associated with it and the commonality of each term found in long-range Metropolitan Transportation Plan (MTP) documents is presented.

- **Shared Mobility** (as a general concept)
- **Technology** (multiple concepts)
- **Carsharing**
- **Electrification**
- **Bikesharing**
- **Intercity Bus**
- **Ridehailing**
- **Intercity Rail**
MTP FINDINGS > Structure of Findings

Within each topic area, findings are presented in three subsections.

Keyword Search Results

A statistical summary of how many and what percentage of the MTPs reviewed featured each keyword. The data is organized in two ways:

- for the 101 metro areas reviewed within FTA Region IV, both in aggregate and also subdivided into large, medium and small metro areas
- for the 52 large metro areas reviewed nationwide, inclusive of those within FTA Region IV

Highlights

A short narrative summarizing the primary findings from the keyword analysis.

Notable practices

Excerpts from MTP documents (with section references) which represent the spectrum of how each topic is addressed in that region’s planning process. Keywords found within the excerpts are highlighted, but only those which are relevant to that particular topic area. The information is organized by three broad, and occasionally overlapping, areas:

- Defining the Concepts - How are the terms being used?
- Explaining the Issues - What are the issues being discussed or the potential future implications?
- Establishing Policy - What is being done (or should be done) to prepare?

Excerpts from metro areas within FTA Region IV are presented first, in alphabetical order by the name of the Metropolitan Planning Organization, within each of these three subsections. Excerpts from other large MPOs from the rest of the nation follow in each subsection.

Note that a great deal of work currently being conducted by MPOs on these topics may not yet be incorporated into their official plans due to the recent emergence and rapidly evolving nature of shared mobility services.
SHARED MOBILITY
<table>
<thead>
<tr>
<th>SEARCH TERM</th>
<th>NATIONAL</th>
<th>FTA REGION IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large MPOs (More than 1M)</td>
<td>All MPOs</td>
</tr>
<tr>
<td>Shared Mobility / Shared Use Mobility</td>
<td>4 (7.7%)</td>
<td>3 (3.0%)</td>
</tr>
<tr>
<td>Sharing Culture / Sharing Economy</td>
<td>3 (5.8%)</td>
<td>3 (3.0%)</td>
</tr>
<tr>
<td>Mobility on Demand</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Mobility as a Service</td>
<td>3 (5.8%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Mobility Hub</td>
<td>4 (7.7%)</td>
<td>4 (4.0%)</td>
</tr>
<tr>
<td>Integrator of Mobility / Integrators of Mobility</td>
<td>1 (1.9%)</td>
<td>1 (1.0%)</td>
</tr>
<tr>
<td>First Mile / Last Mile / Final Mile</td>
<td>21 (40.4%)</td>
<td>9 (8.9%)</td>
</tr>
</tbody>
</table>
General Observations

- While many plans address specific services included within the definition of shared use mobility, the collective discussion of those services in aggregate under the concept of shared use mobility is still extremely limited. Plans generally tend to treat the services as individual and distinct travel options, not as a variety of services which frequently are paired together to complete trips not made by a single occupant vehicle. Only four of the nation’s largest MPOs use the term in their long-range plans, none of which are within FTA Region IV.

- The few plans which do use these terms will often not provide a definition, assuming the reader will be able to discern its meaning from the general context of the narrative.

- The definition of what constitutes a “mobility hub” is inconsistent. It can vary from a small area in which a high capacity transit station or transfer center station exists to a broader area in which a variety of shared use mobility options are available.

- First mile / last mile connectivity is a term frequently used in the freight and goods movement sector as well. Care should be taken when using these terms within a transportation context to distinguish between those needs and the short distance circulator, walking and bicycling elements required to accomplish a long-distance transit trip.
DEFINING THE CONCEPTS
Our previous plan, *Transformation 2035*, created and defined a *Mobility Hub* concept to serve as transit access points with frequent transit service, as areas of high development potential and as critical points for trip generation or transfers within the transit system. The previous plan identified 103 potential Hub locations in three major categories - Gateway, Anchor and Community Hubs - based on a variety of land use and transit criteria.

As a consequence of the economic downturn and other changes to South Florida over the last five years, the original criteria for selecting and categorizing the Hubs are no longer applicable. As part of the implementation of Commitment 2040, we will be updating the *Mobility Hub* concept, including the typology and screening process for the identification of Hub locations to best leverage these transportation infrastructure investments within a new MPO program to fast track these improvements. This analysis provides the opportunity to revisit not only the location criteria, but also the *Mobility Hub* concept, as we examine how to leverage its investments to maximize a *Mobility Hub*’s economic and transit potential. This concept in now being implemented as an element of plans for the overall Southeast Florida region. An example is the inclusion of the *Mobility Hub* concept in the 2040 Southeast Florida Regional Transit Plan. It is hoped that our experience planning and developing these Hubs will serve as a useful model for our larger region.
MTP FINDINGS > Shared Mobility > Notable Practices

Broward MPO Congestion Management Process Website
Community Mobility Hub

Mobility Hubs are places where a majority of people interacts with the multi-modal transportation system with frequent transit service and high development potential. They are places of connection for walking, biking, park-n-Ride, transit, carpooling, and, depending on the type of Mobility Hub, can also provide direct connections to concentrated activities such as housing, commercial, office, and entertainment.

A Community Hub is a local or neighborhood center served by rapid bus transit and attracts more local trips than regional trips. Scan your mouse across the icons in this panel and in the picture above to learn more about the components of a Community Hub.

Broward MPO Congestion Management Process Website
Gateway Mobility Hub

**Mobility Hubs** are places where a majority of people interacts with the multi-modal transportation system with frequent transit service and high development potential. They are places of connection for walking, biking, park-n-ride, transit, carpooling, and, depending on the type of Mobility Hub, can also provide direct connections to concentrated activities such as housing, commercial, office, and entertainment.

A **Gateway Hub** is an active area with connections to high capacity transit surrounded by higher density mixed use developments including downtown areas and transit-oriented developments (TODs). Hover your mouse across the icons in this panel and in the picture above to learn more about the components of a Gateway Hub.

**Broward MPO Congestion Management Process Website**
As new options emerge to provide added convenience to consumers, a “sharing economy” is beginning to take hold. The most common shared-use transportation options include:

- Bikesharing: This option allows users to access a bicycle at different locations in the service area and rent or borrow the bicycles as needed. Most new bike sharing programs use IT enabled stations or GPS-enabled bikes.

- Carsharing: This service provides members short-term access to an automobile. Depending upon the service, users may be required to bring the automobile back to the pickup location or may pick up the vehicle in one location and drop it off in another, called point-to-point carsharing. Other services offer peer-to-peer carsharing in which car owners allow others to use their vehicles for a charge.

- Ridesourcing: Providers such as Uber and Lyft use online platforms or mobile applications to connect passengers with drivers who use personal, non-commercial vehicles. Using a mobile GPS-enabled application, travelers “hail” a ride from a ridesourcing service. The mobile application shows the rider who the driver is, what type of car the driver is in, where the driver is located, and when they should arrive. Although a newer concept, providers in select cities are also beginning to offer services that combine riders (or “fares”) that are traveling along similar routes to reduce vehicle trips and generate cost savings for the users.

- Ridesharing: This involves adding additional passengers to a pre-existing trip, allowing riders to fill otherwise empty seats. Unlike ridesourcing, ridesharing drivers are not “for hire” but may be compensated for their time and mileage. This is most commonly referred to as carpooling and vanpooling.

It is unknown at this time how this shift in the way consumers interact and travel will affect transportation in the future. However, the CC-PG MPO will continue to monitor the affect of these new strategies as the industries evolve and more information becomes available.
DEFINING THE CONCEPTS

The evolution of the sharing economy has created new markets in transportation with ridesharing services such as Uber and Lyft. These modes of travel capitalize on the growing trend of individuals to borrow or share goods and services rather than use their own resources. In communities across the county, ridesharing companies are finding success by serving as an alternative to the personal car or mass transit with similar convenience, efficiency, flexibility.
First mile for transit – there is a synergy between walking, biking and transit that reinforces their success. Compact, walkable places promote transit because they provide easy access and egress from transit. Transit extends the reach of walking beyond a mile because it is a fast mode of transport when operating in its own right of way, free of congestion, and with infrequent stops.

Multimodal hubs – includes mobility hub, traditional neighborhood and multifamily development types in walkable transit station areas along multimodal corridors with the intensity and mix of land uses that support premium transit.
> Trends, Forecasts and Forces > Networking Transportation

While technology has long played a key role in transforming how people get around, the pace at which innovations are coming to the market seems to be accelerating. There are numerous transformative technologies that have the potential to revolutionize transportation; many come from the Digital Revolution. These technologies have the ability to network various modes together and increase the availability of real-time information in ways that improve both efficiency and safety. In the future, networked transportation may create more mobility-as-a-service arrangements, where individuals can buy a monthly pass with unlimited or a fixed number of trips on a variety of transportation modes. In addition, a variety of new private-market transportation services are emerging thanks to digital technologies, such as the smartphone and the Internet.
The cornerstone of Transportation Demand Management is to provide and promote mobility options to reduce single-occupant vehicle usage through the following avenues:

- ridesharing programs and services (carpool, vanpool, schoolpool);
- transit service and amenities, and fare pass options;
- active transportation programs and infrastructure (walking, bicycling, Bike to Work Day, bikesharing, and bicycle and pedestrian facilities);
- carsharing and transportation network company options (Lyft and Uber) as first and final mile solutions.
DEFINING THE CONCEPTS

Shared mobility refers to transportation services that are shared among users. The private-sector driven advancement of mobile phones and GPS technologies in recent years has been instrumental in the expanded capabilities and growth of shared mobility applications. These applications include ridehailing (e.g. Uber, Lyft), carsharing (e.g., Car2Go, ReachNow), bikesharing (e.g., Limebike, Spin, ofo), micro-transit (e.g., Chariot), and ridesharing (e.g., Scoop, UberPool).
Mobility Hubs

What exactly are mobility hubs? They’re places of connectivity, where different modes of transportation — walking, biking, ridesharing, and transit — come together seamlessly to connect people to their jobs, school, shopping, errands, recreation, and back home. Smart growth areas are excellent places to build mobility hubs, because of their mixture of land uses and transit amenities.

Shared Mobility Services

The Regional Plan promotes shared mobility, which reduces the need to own and drive a private automobile by offering people on-demand access to convenient and affordable transportation options for any type of trip, whether or not these are in mobility hub areas. These options include carsharing, bikesharing, real-time ridesharing, Transportation Network Companies (e.g., Uber, Lyft, Sidecar), neighborhood electric vehicles, scootershare, and shuttle or jitney services. Shared mobility services give people convenient alternatives to driving alone, in addition to the more traditional options such as public transit, carpooling, vanpooling, biking, or walking to work. Shared mobility can even provide people with options for running an errand or going to an off-site meeting in the middle of the workday.
MTP FINDINGS > Shared Mobility > Notable Practices

AGENCY: Southern California Association of Governments
METRO AREA: Los Angeles / Riverside, CA
PLAN TITLE: The 2016-2040 Regional Transportation Plan / Sustainable Communities Strategy
LAST UPDATED: April 2016

> Glossary

Shared Mobility

Refers to a wide variety of new mobility services and encompasses bike share, car share, app-based transit services and ridesourcing. This term refers to the way in which these modes are offered as services brokered by a mobile application and each vehicle is shared amongst multiple users.

First Mile/Last Mile Strategies

Designed to increase transit usage by making it more convenient and safe to walk or bike to transit stations. Includes such strategies as wayfinding, bikeways, sidewalk repair and bike share.
Service coverage refers to the general proximity of transit to homes and businesses and service accessibility, also known as “first / last mile accessibility,” refers to the more enhanced accessibility of each transit stop via foot or bike. The latter takes into account physical barriers between a transit stop and the surrounding neighborhoods.
EXPLAINING THE ISSUES
MTP FINDINGS > Shared Mobility > Notable Practices

AGENCY: Atlanta Regional Commission
METRO AREA: Atlanta, GA
PLAN TITLE: The Atlanta Region’s Plan
LAST UPDATED: May 2018

> Trends > Transportation Assessment Findings

Accessibility issues require more emphasis if we hope to attract and retain millennials and aging adults.

Frequently, it’s not the “mainline” part of the journey which is most problematic, but rather making the short connections at either end of the trip. Bus and rail services can carry somebody across a county, but that may be of little help to an individual in a wheelchair if well designed and maintained sidewalks aren’t available between the station and the front door of a business. A paved path can make a 10 mile commute viable by bicycle, but a potential rider may be discouraged if there is no way to get the last mile between the path and her office except along a busy high-speed road. These first mile / last mile connections are critical if we want to maximize the potential of these other travel options. While important for all generations, their absence can be a major factor for a young adult or retiree considering whether the Atlanta Region is a good place to call home.

> Future > Refining the Unconstrained Vision > Transit

ARC is currently updating the Concept 3 transit vision to reflect the Atlanta Region’s current transit planning and operating environment. In addition to addressing these pragmatic aspects of a vision, the effort is also investigating the impacts which rapid changes in technology are having on how transit services are delivered, and even the very nature of those services. Questions which the new vision will tackle include:

- How can transit operators act as integrators of mobility, facilitating connectivity between fixed route services and other mobility options such as walking, biking, carpooling/vanpooling, taxis and TNCs?
- How can a focus on the total journey experience improve the transit offering? The total journey experience includes elements of the door-to-door transit experience, such as online information, wayfinding on the street, payment processes, and transfers between transit providers or with other modes.
- How can transit agencies balance their role in the changing mobility landscape with broader societal needs for social equity, environmental protection, and economic development?
- How can transit operators invest funding most effectively, partner with others, and adopt technology in such a way that the region’s overall mobility will be enhanced?
- What might the mobility landscape be like in 5, 10, or 20 years? How can transit agencies be active participants in changes over time? How can they look into the future to see trends and interpret what the future holds for passenger service?
The “last mile” of the transit trip is still very difficult and dangerous in many places. Bus stops are often without nearby pedestrian or bicycle infrastructure. Crossings - especially across corridors that emphasize faster motor vehicle travel - put transit users in perilous situations. While much of this is stated in safety and bike/pedestrian chapters, it is worth re-stating and contextualizing to transit. Providing people with safe and convenient access to bus stops can help improve riders’ comfort level and transit ridership.
Unfortunately, transit services are usually unable to drop riders off at the front door of their destinations, creating something called the "last mile" problem. Transit riders rely on a good network of sidewalks, trails, and bike ways to be able to move between transit services and their final destinations. The sidewalk network in the GPATS region is dilapidated, disjointed and disconnected. In many places where sidewalks do exist, there is often adjacent traffic moving so fast it discourages use. Therefore, planning for active transportation infrastructure in tandem with transit routes is a critical part of the system’s success.
Of particular importance to making transit work in suburban areas is solving the “last mile” problem, or the challenge of connecting transit passengers to their ultimate destination, which is often not directly adjacent to the transit facility; this can be accomplished through local shuttle or circulator services, improved walkability, car-sharing programs, or land use planning that allows higher densities near transit facilities. To make any new service as attractive to potential riders as possible, the technological improvements described above should be incorporated and high-quality stations, appropriate vehicles, and supportive local infrastructure should all be included. In many cases, bus service can test the market for transit, helping to determine whether a major capital investment in infrastructure is justified.
Our region needs a connected, multimodal transportation system in order to make connections that increase access and travel choices. Our region continues to make significant investments in transit, such as the Regional Transportation District’s FasTracks rapid transit system while also envisioning future intra- and inter-regional transit connections. Although the completed portions of the FasTracks program have expanded regional mobility, such improvements cannot be fully realized without easier connections for those walking, biking, driving, sharing a ride, or riding a bus to first- or final-mile connections to transit. Our region and local jurisdictions continue to increase the viability of walking and bicycling by expanding the bicycle and pedestrian network and providing additional supportive infrastructure. Providing all of these travel choices can help reduce vehicle miles traveled, ground-level ozone and other air pollutants, which can lead to improved individual and environmental health. A transportation system that serves users of all modes of travel also helps ensure that people of all ages, income levels and abilities remain connected to their communities and have the means to access services, amenities and employment opportunities.

The sharing economy, which includes several concepts, continues to rapidly evolve. For example, Uber and Lyft rides can be booked directly from the Google maps app. In 2016, Uber launched its “Uber Eats” food delivery service. Locally, RTD and Lyft started testing in 2016 a first/last mile pilot project to provide free Lyft rides within a defined service area to the Dry Creek light rail station in Centennial. These and many other examples illustrate the rapid changes in personal mobility options. The region’s Transportation Demand Management program will continue to work with partners to incorporate these concepts as feasible. However, it is important to distinguish between travel choice options and single-occupant vehicle trip reduction strategies. The former, as important as they are, do not necessarily lead to the latter.
There are a growing number of employment centers in Central Ohio outside of Downtown Columbus. In an effort to connect inner-city residents to suburban job opportunities, COTA offers several reverse-commute express lines that travel from Downtown Columbus to outlying areas. Because these lines often end at transit centers or Park & Rides, they do not directly connect employees to their job sites. In an effort to address this gap in “last-mile” service, COTA has partnered with local municipalities, employers, and MORPC to offer shuttle service from COTA facilities to employment centers. In 2014, COTA partnered with the City of New Albany to launch the SmartRide shuttle. Funded by New Albany, the service connects COTA’s New Albany Park & Ride to all employers in the New Albany International Business Park, which boasts more than 12,000 jobs.

In 2015, MORPC and COTA partnered with the City of Groveport to launch the GREAT shuttle service funded by Groveport with additional assistance from the Village of Obetz. This service provides safe last-mile trips in the Rickenbacker area to over 34 large employer job sites in a low-density industrial area of Franklin County without safe pedestrian or bicycle infrastructure.

The shuttle service is free for employees. This service is being provided with the working goal for the employers to contribute. DATABus has identified not being able to connect people to job sites as an issue to address.
Last-mile transit connections include fixed-route bus and rail transportation or people movers that enable travelers to reach regional transit facilities or to reach their final destination after using regional transit. Communities can implement these last-mile transit services in addition to providing facilities that allow travelers to make their last-mile connection by walking or biking.

- Streetcars, circulators, and trolleys are fixed-route rail transit services that operate within a limited area such as a downtown, regional activity center, or transit-oriented development. These services focus on destinations such as housing, employment, or entertainment in a district within a five-minute walk.
- Last-mile services can provide access to neighborhoods or help people travel to areas where parking is limited or is already at capacity. Like these services, rail services in the form of people movers, monorails, and automated guideways serve areas of concentrated activity that experience congestion. People movers are discussed in more detail below.
- Buses also can provide last-mile services. Local bus service that operates on fixed routes is central to robust transit systems. In lower density areas, buses provide multiple options for last-mile connections. Flex bus service can include some stops with fixed locations and times and some stops that vary based on demand.
- Feeder buses or site-specific shuttles can also connect passengers in lower density areas to nearby hubs of activity.
Access to transit is a key ingredient of a mobility hub. We all recognize that getting to and from transit stations can sometimes be challenging, and those first and last steps often end up being deterrents to using public transit. Mobility hubs can solve that problem. They promote options like carsharing, bikesharing, and neighborhood electric vehicles – for short trips within the neighborhood or to connect to the transit station for longer trips outside the area.

Meanwhile, mobility hubs include several features onsite that make using public transit easier. These include bike and pedestrian improvements, signs or apps that help people find their way (akin to “You Are Here” maps at shopping malls), urban design enhancements, real-time traveler information, parking spots for shared mobility services, and a universal payment system. Figure 2.17 provides an example of what elements could be included in a mobility hub. A near-term action of the Regional Plan is to develop a “Regional Mobility Hub Implementation Strategy” to further define the mobility hub concept for the San Diego region and to identify opportunities for pilot projects (See Chapter 5). Mobility hubs will play a big role in the lives of many people. By 2050, 87 percent of the region’s new housing and 79 percent of new jobs will be situated within a half-mile of public transit – making mobility hubs increasingly useful and accessible to all travelers including persons with disabilities and seniors.

The idea of shared mobility is becoming more popular in our region. Carsharing and bikesharing have experienced unprecedented growth. As of 2014, more than 33,000 people had access to more than 400 carshare vehicles regionwide. Early research shows that people who carshare drive less and use public transit more because shared mobility options complement public transit. As a result, opportunities to pair up shared mobility and mobility hubs provide great potential to influence our transportation choices and patterns.
Figure 2.17

**Mobility Hub Concept**

1. Bike parking
2. Real-time transit info
3. Informational kiosk
4. On-demand rideshare
5. Shared mobility services
6. Smart intersection
7. Electric vehicle charger
8. Smart parking
9. Package delivery
10. Pedestrian facilities
11. Protected bikeway
12. Universal transportation account
13. Mixed-use development

San Diego Association of Governments
Implement First/Last Mile Strategies to Extend the Effective Reach of Transit: This is an area of study with recent focus. Making transit more accessible for biking or walking that **first mile** to a transit station, or from a transit station, or both, will encourage more transit use and reduce air pollution and greenhouse gas emissions.

In Los Angeles County, Metro has proposed an extensive active transportation network to support **first/last mile** access, including pathways that extend one half mile around each of the Metro stations. The pathways are envisioned to provide facilities and design elements that are consistent across the transit system, enabling seamless and intuitive door-to-door journeys. Pathways will be established along the most heavily traveled routes to transit stations, connecting riders to and from population and employment centers and other major destinations. They will improve and shorten the time it takes to access transit, enhancing the overall transit experience. The pathways will also facilitate transfers between modes, including traditional modes such as buses and park and ride lots, as well as new mobility options such as bike share and car share that can be integrated throughout active transportation networks.
Service coverage and accessibility is embodied in UTA’s strategy to “find and attract new markets for ridership” and to “develop a fully integrated first/last mile strategy.”

- Currently approximately 85 percent of the population and 96 percent of the employment in the WFRC area are within a half mile of a bus route or rail station. Nonetheless, areas without transit coverage continue to exist. Efforts to find and serve appropriate markets within areas without transit coverage should continue.

- Community design in the latter half of the last century frequently resulted in people and jobs being located in lower-density, effectively walled subdivisions and business parks that limit people’s access to goods, services and each other. This has also created huge barriers to transit use and has fostered greater dependence on personal vehicles. More dependence upon autos has in turn resulted in wider, more heavily trafficked, and polluted roads, which become disincentives to transit use in a vicious cycle. The WFRC and UTA seek to develop a fully integrated first/last mile strategy to allow greater access between transit and adjacent communities by first integrating first/last mile strategies into the siting of new major transit investments and opening up access to existing high frequency bus and rail lines.
ESTABLISHING POLICY
AGENCY: French Broad River MPO
METRO AREA: Asheville, NC
PLAN TITLE: Metropolitan Transportation Plan 2015-2040
LAST UPDATED: September 2015

> Accessibility and Connectivity > Public Transit > Recommendations

• Increase fixed-routes with frequent headway (15 minutes or fewer) on high demand corridors
• Coordinate efforts between transit providers to improve regional transit service
• Targeted projects to increase safe pedestrian and bicycle access for the “last mile” trips
• Maintain or improve existing transit service levels
• Conduct a feasibility study to explore regional transit options
Prioritize and modernize public transit

The role of transit will evolve as AVs and shared mobility become widespread. Transit agencies should focus on high-frequency, high-capacity services in dense urban corridors (such as rail or bus rapid transit), provide first and last-mile connections through driverless shuttles, and expand kiss-and-rides/mobility hubs.
AGENCY: Boston Region Metropolitan Planning Organization
METRO AREA: Boston, MA
PLAN TITLE: Long-Range Transportation Plan
LAST UPDATED: July 2015

> Process for Developing Charting Progress to 2040 > Analyzing Future Transportation Scenarios > Programs for Addressing Transportation Needs

[The Community Transportation/Parking/Clean Air and Mobility Program] provides funding to launch locally developed transit services that support **first-mile/last-mile** connections to existing transit services and other destinations by purchasing shuttle buses and/or funding operating costs.
Prepare for the increased provision of private-market shared mobility services.

- Reduce barriers to entry and allow for the formation of new transportation services and innovation.
- Provide public oversight of new shared mobility services in advance of regulations.
- Encourage mobility-as-a-service multimodal travel pass or ticket options that combine different modes and services onto a single payment platform.
- Revise zoning and regulations to offer density bonuses for developments that incorporate shared mobility infrastructure.
- Avoid exclusive agreements with singular service providers.
- Determine where technology and data sharing can complement customer protection regulations.
- Clearly define the process for licensing and regulating new private-market transportation services.
- Review taxi regulations in light of the rules developed to govern TNCs.

Work with shared mobility companies, taxis, TNCs, and transit agencies to enhance service in low-income and EJ communities, and provide increased accessible-vehicle service.

Collaborate to develop pilot projects, awareness of options, and subsidies to increase access for low-income individuals to shared mobility services.
Continue to pursue opportunities to expand shared mobility services near Smart Growth Opportunity Areas in the region. Examples of shared mobility services include carsharing, bikesharing, real-time ridesharing, Transportation Network Companies (e.g., Uber, Lyft, Sidecar), neighborhood electric vehicles, scootershare, and on-demand shuttle and jitney services.

> Ensuring Performance > Actions to Implement the Plan > Near-Term Actions

Develop a Regional Mobility Hub Implementation Strategy.
CARSHEARING
### FINDINGS > Carsharing > MTP Keyword Search Results

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General Observations

- Traditional forms of ridesharing such as carpooling and vanpooling are addressed almost universally in plans for large metro areas, and even in a sizeable majority of the small and medium metro areas examined within the Southeast US. These services are frequently sponsored and/or managed by public sector entities and have existed for decades. They also form the foundation for the work of organizations within major activity centers to mitigate congestion by reducing the number of single occupant vehicles. Because of the prevalence and long history of such programs, there is little that this research could add to the existing body of knowledge related to these forms of ridesharing, so it was not a point of emphasis during the investigation.

- Carsharing as the technology based service we currently recognize first appeared on the scene in the United States with the launch of ZipCar in 2000. Several other competitors have emerged since then, particularly in the past few years as peer-to-peer sharing has an option. While carsharing is addressed in about one-half of plans for large metro areas nationwide, it is not commonly referenced in plans in the Southeast US.

- As of early 2018, one or more carsharing services were in operation in 64 of the 141 metro areas reviewed. Yet only 38 of those 64 plans made referenced this travel option.

- Of the 38 MTPs which discussed carsharing, 10 of those plans were in communities where none of the three major carsharing companies examined (ZipCar, car2go and ReachNow) currently provide service.

- Six plans identified one or more of the companies by name, while the majority of plans described carsharing as a concept rather than mentioning specific business enterprises.

- Only a single plan provided any details on the number and types of carsharing vehicles which were available for rent and the exact locations they could be located. The larger the metropolitan area, the greater the challenge of presenting such detailed information and keeping it current would be.
DEFINING THE CONCEPTS
Car share is a model of car rental where people rent cars for short periods of time, often by the hour. One can pay by the hour to use a car as needed then return the car according to the car share program’s operating area layout. The simplest car share programs have only one or two pick-up points, but more advanced systems allow cars to be picked up and dropped off at any available public parking space within a designated operating area. Car share programs differ in their objectives, size, business models, levels of ambition, technology, and target markets but they do share many features. The more established operations usually require a check of past driving records and a monthly or annual fee in order to become a member. The total cost and maximum time a car may be used also varies. Reservations can be made online, by phone, by text, and some companies have an app that will allow you to make a reservation. Users are members and have been pre-approved to drive (background driving checks and payment method established). Many car sharing companies only provide the state minimum liability insurance. Some companies provide comprehensive and collision insurance. Some do not provide uninsured or under-insured insurance nor do they provide personal injury protection insurance.
Carsharing allows an individual to rent a car on an hourly or daily basis. Reservations are usually made in advance but often can be done with very short (30 minutes or less) notice. Each carsharing vehicle is estimated to replace 9–13 personally owned vehicles.

Ridesplitting combines aspects of ridesourcing and microtransit. These services may use larger vehicles, which are owned by independent contractor drivers, to simultaneously pick up and drop off multiple passengers for a discounted price. This may increase vehicle occupancy rates and help to alleviate congestion.

Microtransit services generally combine trips to move multiple passengers simultaneously on demand. These services often create partnerships with charter bus companies, which supply the vehicles, drivers, and insurance.
Buffalo CarShare is a service that offers the peace-of-mind of the automobile without the up-front costs, hassles, or environmental impacts of private vehicle ownership. Members rent vehicles on an hourly basis for errands or irregular trips, while relying on other modes of transportation (such as walking, bicycling, public transit, or carpooling) for their daily commute.
Car sharing is an emerging service where people have on-demand access to a fleet of vehicles so that they may rent a car for short periods of time, often by the hour. This service is attractive to people who only require the use of a vehicle occasionally and may allow people to more easily utilize bicycling, walking and transit for regular trips, foregoing regular, day-to-day use of a private vehicle.
Carshare can provide first mile/last mile connections to transit or fill gaps in the region’s transit services by providing an efficient transportation alternative for commute and non-commute trips. A carshare service provides members with access to a vehicle for short-term use, such as Car2Go and Zipcar. Shared vehicles are distributed across a network of locations (or specified service area) within urban communities. Members can access the vehicles at any time with a reservation and are charged by time or by mile. Carshare provides some of the benefits of a personal vehicle without the costs associated with owning one.
> Glossary

**Car Share**

An integrated network of passenger vehicles available for short-term rental in heavily urbanized areas. **Car share** can take the form of return systems in which a vehicle must be returned to the parking space from which it was rented. Alternatively, it can take the form of point-to-point systems in which the car can be returned to another space, or left anywhere within a pre-determined geographic zone.
EXPLAINING THE ISSUES
There are many variations of each service, but the intent is to provide convenience when one does not have access to a private vehicle. In urban areas where many trips can be made by walking, biking, or public transit, bikesharing and carsharing are filling in the gaps for destinations not easily accessible by these modes. In this manner, these rental services are making car ownership less important for urban residents. If these services become more widespread, VMT per capita, and perhaps overall VMT would decline in many urban areas.
> Introduction > Current Trends Affecting Transportation Planning > Changing Technology

Bikesharing and carsharing are both essentially rental services whereby a person pays for temporary use of a vehicle (bike or automobile, respectively). There are many variations of each service, but the intent is to provide convenience when one does not have access to a private vehicle. In urban areas where many trips can be made by walking, biking, or public transit, bikesharing and carsharing is filling in the gap for destinations not easily accessible by these modes. In this manner, these rental services are making car ownership less important for urban residents. If these services become more widespread, VMT per capita, and perhaps overall VMT, would decline in many urban areas.
Benefits

- Reduced parking demand
- Increases the flexibility during the work day for alternative mode commuters
- Popular alternative to Millenials
- Reduces the cost and responsibilities of car ownership
- Reduces vehicle miles traveled (VMT)
- Not limited by office hours
- Flexible – vehicles can be rented by the minute, hour, and day
- Helps mitigate growth in traffic congestion and pollution

Potential for Application

Successful car sharing development tends to be associated mainly with densely populated areas such as city centers, universities and other campuses. Car share could be a feasible option for the UNCW area and in Downtown Wilmington. Working with parking managers could provide opportunities for designating car share parking in parking decks.
FINDINGS > Carsharing > MTP Notable Practices

AGENCY: Capital Area Metropolitan Planning Organization
METRO AREA: Austin, TX
PLAN TITLE: CAMPO 2040 Regional Transportation Plan
LAST UPDATED: September 2015

> Mobility Strategies > Travel Demand Management Strategies > TDM Programs in the CAMPO Region > Austin Community College District

Car Sharing: There are Zipcar and car2go vehicles available at select campuses with discounted membership for faculty, staff, and students.
Stability and Sustainability
Flat rate fees can be difficult to raise but would need occasional increases to keep up with inflation. Although vehicle ownership rates have outpaced population growth over the past several decades, future vehicle technologies, such as driverless cars, may revolutionize the vehicle ownership model. In a future with more carsharing, there may be fewer cars in the region to pay vehicle registration fees.
According to The Economist, carsharing can reduce car ownership at an estimated rate of one rental car replacing 15 owned vehicles. The University of Kentucky currently operates a small car sharing program with a fleet of 2 vehicles. Car sharing opportunities for greater Lexington are currently in the exploratory phase.
Car-sharing services substitute for private vehicle ownership, enabling households that only occasionally need a vehicle to save on ownership costs and also reducing the overall demand for parking spaces and the vehicle ownership rate.
In 2011, the University of Cincinnati became the first institution in the region to provide Zipcar services. Zipcar provides a reliable transportation option by renting out a vehicle per hour or by day. The rates range between $7 and $8 per hour and $66 per day. Rates include gas, insurance and 180 miles free per day. There are two locations on the University of Cincinnati campus, one off Jefferson Avenue with a Ford Focus and Honda Insight Hybrid, and the second location in front of McMicken Hall including another Ford Focus and a Mazda 3. Members are given a Zipcard which provides access to any Zipcar around the world. Most locations use a reservation system for Zipcar usage.
Past research on traditional (or round-trip) carshare models has demonstrated that between 10 percent and 13 percent of the eligible population is expected to join a carshare service. In the San Diego region, the eligible population is defined as anyone age 18 or older, the current minimum age requirement for a carshare membership. Additionally, a residential density threshold was established for each milestone year to determine which portions of the San Diego region are most suited for carshare investment through 2050. In 2020, the assumed minimum residential density is 69 persons per acre or higher and in 2035 and 2050 the assumed minimum residential density is 55 persons per acre or higher. In line with past research coupled with the recent introduction of one-way and peer-to-peer carshare in the San Diego region, a conservative proportion of the region’s eligible population living in communities that meet these residential density thresholds was considered to estimate the adoption of carshare in the region over time:

- 2020 – 15% of the eligible population, or approximately 52,791 people
- 2035 – 20% of the eligible population, or approximately 146,914 people
- 2050—25% of the eligible population, or approximately 227,615 people
Car sharing companies are growing rapidly in cities where the cost of car ownership is exacerbated by high insurance rates and parking fees, and are especially effective at replacing personal automobile ownership in areas with robust rapid transit. A report by AlixPartners states that the average car sharing service had about 66 members for every car in its fleet in 2013, but predicts that this number will grow to 81 members per car by 2050. According to the report, 48 percent of car sharing service members have chosen to forego the purchase of a replacement vehicle, resulting in 500,000 fewer new car sales since 2006 in the U.S. than there would have been if car sharing services were not available. As Zipcar and other car sharing companies continue to expand services, this number may increase to 1.2 million fewer car sales by 2020. The reduction in personal vehicle ownership expected under Alternative Plans I and II could be enhanced by increased availability of car share, helping to increase transit ridership and reduce GHG emissions if overall VMT is reduced.
ESTABLISHING POLICY
Strategy Implementation

A feasibility study should be conducted to best determine how to start a car share program in the Cape Fear Region. There are a variety of options, including campus car share at UNCW, expanding car share beyond UNCW to local businesses and multi-family residential areas, and a car share program in downtown Wilmington. There should be coordination with parking managers to determine if and where there is available existing parking for car share vehicles.
Support travel demand management techniques that reduce single occupancy vehicle trips and vehicle miles of travel throughout the system, including ride share/\textit{car share}, parking pricing/policies, land use policies, and employer trip reduction programs.

**Design Strategies**

- Provide more options for transportation network users by developing safe, efficient, and multimodal street networks.
  - Build multimodal transportation hubs combining transit stations and stops with *carsharing*, bikesharing, and pickup/drop-off zones. Improve scheduling and operations to accommodate intermodal movements.
Investigate establishing a single payment system for multiple transportation-related mobility options – Long-Term

Consider implementing a single payment system that provides users with the option of paying for access to multiple modes and services (e.g., transit fares, parking, tolls, bike share, and car share). Implementation of such a system would have to be coordinated on the national and state level as well as locally among multiple stakeholders and facility operators, but could potentially provide a seamless user experience among multiple modes and increase access to a range of transportation services.
On-street parking approaches include spaces that are timed, metered, designated for certain uses or have no restriction. Examples of these different approaches include charging long-term or short-term fees, limiting the length of time a vehicle can park, and designating on-street spaces for preferential parking for electric vehicles, car share vehicles, carpools, vanpools, bikes, public use (events or café “Street Seats” and freight truck loading/unloading areas.
FINDINGS > Carsharing > MTP Notable Practices

AGENCY: Mid-America Regional Council
METRO AREA: Kansas City, MO
PLAN TITLE: Transportation Outlook 2040
LAST UPDATED: June 2015

> Air Quality > Strategies

Promote options that are pedestrian-, bike- and transit friendly for communities, including incentives for compact development

- Near term (five years): Increase carsharing participation to 5,000 participants.
- Long term (10 years): Increase carsharing to 12,000 participants.
**FINDINGS > Carsharing > MTP Notable Practices**

**AGENCY:** New York Metropolitan Transportation Council  
**URBAN AREA:** New York, NY  
**PLAN TITLE:** Plan 2045  
**LAST UPDATED:** June 2017

> Transportation System Management & Operations > Transportation Systems Management & Transportation Demand Management > TDM Strategies > Programs Promoting Alternatives to SOV Travel

New York City adopted a **car share** zoning text amendment that allows car share vehicles to park in off-street parking facilities in appropriate locations.
Incorporate regional transportation model enhancements to provide more robust data regarding bike and pedestrian travel, carpools, vanpools, carshare, and public health.
BIKESHARING
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|      | 52 | 101 | 46 | 43 | 12 |
Supplemental Caveats to the Keyword Analysis

- Scooters are mentioned in many plans, but most describe it as either: 1) a motorized vehicle that you sit on and is intended for use on the roadway similar to a motorcycle, or 2) a slow moving cart intended for use by people with disabilities. In the world of share use mobility, a scooter is similar in form to a child’s toy. These and other keyword search results not directly synonymous with this new form of shared mobility were excluded from the analysis.

General Observations

- The relatively low percentage of references to bikesharing programs within the plans for smaller MPOs is likely due to the unavailability of that mobility option in many of those metro area.

- While it is likely that the vast majority, if not all, of the 52 large metro areas have bikesharing programs available, only 31 (59.6%) of the plans include any discussion of that mobility option.

- Only one plan made any reference to a scooter share program, and even then it was only mentioned in passing in conjunction with other sharing services for bikes and cars.
DEFINING THE CONCEPTS
Bikesharing and carsharing, ridesharing initiatives that apply relatively new and still evolving technologies, are already affecting travel demand, especially in urban areas. Both are essentially rental services that enable a traveler to pay for temporary use of a vehicle (bicycle or automobile respectively). There are numerous variants of each, but the common intent is to provide the convenience of a readily available means of transportation when one otherwise would not have access to a private vehicle. In urban areas where many trips can be made by walking, biking or riding public transit, bikesharing and carsharing are helping to meet the demand for transportation by means other than the privately owned and operated motor vehicle. As a result, these innovative rental services are making car-ownership less important for urban residents. If these services become more widespread, VMT per capita, and perhaps overall VMT, might decline in many urban areas.
Bikesharing and Carsharing are both essentially rental services whereby a person pays for temporary use of a vehicle (bike or automobile, respectively). There are many variations of each service, but the intent is to provide convenience when one does not have access to a private vehicle. In urban areas where many trips can be made by walking, biking, or public transit, bikesharing and carsharing is filling in the gap for destinations not easily accessible by these modes. In this manner, these rental services are making car ownership less important for urban residents. If these services become more widespread, VMT per capita, and perhaps overall VMT, would decline in many urban areas.
Bike share is a service in which bicycles are made available for individuals to rent on a very short term basis. One can pay by the hour to use a bicycle as needed then return the bicycle to any one of the bike share hubs. A bike share program consists of several components including a hub with a payment center, information tracking, instructions for use, information about other hubs, bike racks, and the bicycles. Another component is management of the bicycles. Sometimes bicycles need to be redistributed more evenly to all the hubs. A vehicle with a trailer is required to do this. Maintenance is another component. Bicycles need to be serviced regularly along with the information kiosk and payment center.
Bikesharing services set up publicly accessible bicycles for short-term use. They can fill in gaps in transit service and can accommodate overflow of peak-period transit ridership. Bikesharing programs are often operated municipally through a Public-Private Partnership (P3), but can be found on corporate and university campuses, on residential properties, and in hotels. Removing dock infrastructure can reduce costs and expand service areas, allowing bikesharing to be more financially feasible for public and private operators.
FINDINGS > Bikesharing > MTP Notable Practices

AGENCY: Greater Buffalo Niagara Regional Transportation Council
METRO AREA: Buffalo, NY
PLAN TITLE: 2040 Metropolitan Transportation Plan
LAST UPDATED: May 2014

> The Region’s Transportation System > Bicycle and Pedestrian Activities

Buffalo BikeShare is a new program in Buffalo which rents GPS trackable bikes to help travelers get around Buffalo conveniently and affordably. Bikes can be reserved on the spot or online. A bike can be taken wherever the traveler needs to go, and simply locked up when they’re done. For more information on Buffalo BikeShare visit http://www.buffalobikeshare.org/
Bike share is a point-to-point service combining the convenience of a bicycle with the accessibility of public transportation. Using closely packed bike rental kiosks in heavily urbanized areas, bike share is designed to replace short-distance motor vehicle trips, reduce parking demand and complement local bus services such as DASH in the City of Los Angeles.

> Glossary

**Bike Share**
An integrated network of bicycle rental kiosks in heavily urbanized areas. The bike share network is intended to reduce short-distance driving by providing low-cost bicycle rentals at regular intervals (200 yards apart) throughout the heavily urbanized area.
Another innovative program that is taking off around the country is BikeShare. These programs encourage active transportation as an element of public transit by allowing people to rent bicycles in one location and return them to another location. Many operate on a subscription basis and make the first 30 minutes to an hour inexpensive in order to encourage use for short point-to-point trips, thereby reducing the need to make these trips via automobile.
EXPLAINING THE ISSUES
An important part of bike and pedestrian planning is focusing on how these modes of travel can serve as feeder modes for an area's fixed route transit network. A safe and accessible pedestrian network is key to an effective transit network and vice versa. Without accessible pedestrian connectivity to stops, the effective transit network is greatly reduced; and a strong transit network can greatly expand the effective range of someone heading to a destination by foot. Likewise, an accessible bike network can expand the range of transit significantly. If a transit station is a 20 minute walk from someone's origin, but only a 5 minute bike ride, this may be the difference in choosing to take a car or take transit. The key to encouraging people to bike to transit is to make it convenient, comfortable and safe. For example, installing separated bike facilities to the transit stop, providing end-of-trip facilities such as secure bike parking at the stop, or planning bike share station placement around transit lines.
Vallocycle Bikeshare Program (Vallocycle) - Started in 2011, Vallocycle is the first city-wide bike sharing program in the State of Alabama. A collaborative effort between the University of Montevallo and the City of Montevallo, the bike-share program serves both a functional transportation purpose, helping university students and city residents to travel around the City of Montevallo and a recreational need, enabling cyclists to access local trails and bike paths. The City of Montevallo has plans to expand existing trails and develop new on-road and off-road facilities, including bike lanes, parallel paths, and greenway trails.
**Benefits**

- Increases the flexibility during the work day for alternative mode commuters
- Lowers air pollution and greenhouse gas emission from cars
- Reduces peak hour congestion
- Mitigates congestion throughout the day, specifically in urban cores
- Adds character to a city
- Provides an option for college students who need to cross campus quickly
- Provides an opportunity for exercise (health and wellness benefits)
- Will provide green jobs or a green business opportunity
- Popular alternative to Millennials
- Attractive to tourists
- Creates an opportunity for exercise while providing a transportation option
- Complements the one-mile radius policy at UNCW – students who live within one mile of campus cannot park on campus

**Potential for Application**

UNCW would likely start a bike share program before any other area. UNCW has a one-mile policy that does not allow students who live within a one-mile radius to obtain a parking pass on campus. That creates an ideal bike share opportunity on campus as it increases demand for on-campus transportation options. It also creates an opportunity for bike share to expand to the apartment complexes and shopping centers within the one-mile radius. The opportunity to expand bike share should be explored to consider downtown Wilmington and at strategic locations across the City of Wilmington such as Mayfaire, along the Cross-City Trail, etc.
Bikesharing systems are enjoying popularity in major cities worldwide (e.g., Paris, London, Washington, D.C.). They provide simple, short-term bicycle rentals/returns at multiple kiosk locations. The bicycles are widely used by both tourists and residents. Bikesharing systems help with the “last mile” challenge of getting transit users from their arrival stations to their final destinations. The non-profit Austin B-cycle company began its bikesharing operations in Austin with a handful of stations in December 2013. It broke national records for bicycle check outs during the March 2014 SXSW Festival, and has more than 40 stations operating in downtown, south, and east Austin as of early 2015.
Shared mobility providers offer service through digital networks, which are typically accessed through a smartphone app that uses real-time data to match supply and demand. Services that include vehicle sharing can vary by whether they are one way (meaning the vehicle can be picked up in one location and dropped off at another) or round trip (meaning the trip must end at the same location where it started). In Greater Philadelphia, Indego Bikesharing is an example of a one-way trip, which generally ends at a different station from where it started. Typically, carsharing providers require round-trips, where the vehicle must be returned to the same location where it was picked up. Free-floating or dockless systems break away from station infrastructure altogether and aim to move vehicles and bicycle pick-up and drop-off locations closer to trip origins and destinations. In peer-to-peer networks, an individual rents their personal vehicle (or bike, scooter, etc.) to someone else.
An Update: Where We’ve Been > From 2035 to 2045 > Arrival of Shared Transportation

Several active transportation options launched around the region during this period. BlueIndy, the car sharing service serving Marion County debuted in 2014. The service offers members an opportunity to rent electric vehicles from stations throughout Indianapolis.

Another shared service is the Pacers Bikeshare. Funded partially through a federal grant, the Pacers Bikeshare provides a similar service as the BlueIndy service, but its stations are located primarily on the Indianapolis Cultural Trail in downtown Indianapolis. Both function as opportunities for individuals to reduce or abandon the use of a private automobile. Other communities in Central Indiana also embraced shared transportation, including Carmel and Greenwood.
Nice Ride Minnesota was formed through the Twin Cities Bike Share Project, an initiative started in 2008. This public bike-sharing system, designed to complement the transit system and to provide short connections between activity centers, became operational in 2010. Between 2010 and 2013 riders have taken nearly 900,000 rides on the 1,550 bicycles at 170 stations located mainly in Minneapolis and Saint Paul. Annual rentals have grown from 101,000 to about 305,000 in that time period, an increase of more than 200%.
The City of Columbus introduced its “CoGo” bikeshare system in 2013 and has since grown to over 40 stations. Bikeshare is also available on The Ohio State University campus and at Easton Town Centre. As demand for bikeshare grows, so will the desire of Central Ohio communities to incorporate some form of bikeshare within their jurisdictions. In an effort to build upon existing linkages, MORPC will be available as a resource to communities who wish to implement some sort of bikeshare system. Keeping in alignment with the MTP theme of collaboration, MORPC will work with communities to help guide bikeshare expansion in a way that capitalizes upon existing and planned biking infrastructure, promotes bikeable communities, and is accessible to the diverse populations of Central Ohio.
> Glossary

**Enabling Technology**

This term refers to a technological innovation which lays the foundation or creates a platform that allows a separate unrelated technology to achieve commercialization. For example, car share and bike share systems have been under development since the early 1970s. However the explosion of smart phone usage and the convergence of mobile banking and GPS location services have made these systems viable for a larger portion of the population.

**First Mile/Last Mile**

Strategies designed to increase transit usage by making it more convenient and safe to walk or bike to transit stations. Includes such strategies as wayfinding, bikeways, sidewalk repair and bike share.

**Shared Mobility Services**

Refers to a wide variety of new mobility services and encompasses bike share, car share, app-based transit services and ridesourcing. This term refers to the way in which these modes are offered as services brokered by a mobile application and each vehicle is shared amongst multiple users.
Bike sharing programs tend to attract people who would not typically consider riding a bicycle—short-distance commuters, people running errands, and tourists—as well as those who would prefer to commute via bicycle without worrying about maintaining and securing their own bicycle. Potential benefits of bike sharing programs include a reduction in personal automobile trips and an increase in transit trips, leading to reductions in traffic congestion and an improvement in public health. Successful programs, like Denver’s B-Cycle sharing program, attracted 102,000 rides in the first 7 months, with 43 percent of those riders reporting that they were replacing car trips with bicycle trips. The British Medical Journal studied the health impacts of London’s Santander Cycle Hire program, showing that members of the program experienced a reduction in obesity, heart disease, type II diabetes, and other diseases typically caused by sedentary lifestyles. Alternative Plans I and II envision developing enhanced bicycle facilities, which would aid in addressing the needs of the growing bike sharing industry. The envisioned land development patterns under Alternatives I and II are at higher densities in the urban areas of the Region than under the Trend, with the urban areas in the Region envisioned as being more walkable and bicycle-friendly.
FINDINGS > Bikesharing > MTP Notable Practices

AGENCY: Southwestern Pennsylvania Commission
METRO AREA: Pittsburgh, PA
PLAN TITLE: Mapping the Future: The Southwestern PA Plan
LAST UPDATED: Adopted June 2015; Amended June 2016

Regional Geography > Existing Conditions > Pedestrian and Bicycle Network

HealthyRide

Pittsburgh’s BikeShare program launch in Spring 2015 has 500 bicycles in 50 locations around the City. This public-private partnership was assisted with $1.9 million from SPC’s regional Transportation Improvement Program and includes support from Highmark and the Allegheny Health Network. The result is a unique project that provides both transportation and health benefits for users of the program, as well as air quality benefits.
ESTABLISHING POLICY
FINDINGS > Bikesharing > MTP Notable Practices

AGENCY: Wilmington Urban Area Metropolitan Planning Organization
METRO AREA: Wilmington, NC
PLAN TITLE: Cape Fear Transportation 2040
LAST UPDATED: November 2015

> Bicycle and Pedestrian Element > Goals and Objectives > Bicycle

Goal B: Transportation Choice

- Support the creation of a bike share program that is integrated with the fixed-route mass transportation network.

> Ferry and Water Transportation Element > Goals and Objectives

Goal D: Increased Ridership Modal Integration

- Prioritize projects that allow for bike share at ferry terminals.
AGENCY: Delaware Valley Regional Planning Commission
METRO AREA: Philadelphia, PA
PLAN TITLE: Connections 2045
LAST UPDATED: October 2017


**Design Strategies**

- Provide more options for transportation network users by developing safe, efficient, and multimodal street networks.

- Build multimodal transportation hubs combining transit stations and stops with carsharing, bikesharing, and pickup/drop-off zones. Improve scheduling and operations to accommodate intermodal movements.
In the 2040 Long Range Transportation Plan for the Genesee—Finger Lakes Region, Genesee Transportation Council recommends investigating establishing a single payment system for multiple transportation-related mobility options—Long-Term. This system could potentially provide a seamless user experience among multiple modes and increase access to a range of transportation services.

Consider implementing a single payment system that provides users with the option of paying for access to multiple modes and services (e.g., transit fares, parking, tolls, bike share, and car share). Implementation of such a system would have to be coordinated on the national and state level as well as locally among multiple stakeholders and facility operators, but could potentially provide a seamless user experience among multiple modes and increase access to a range of transportation services.
SACOG has recently begun the development of a bike share program. Bike share is a membership program where anyone can pick up a bike from a bike station and return it to another, making trips on bike fast and easy. Bike share provides people with easy access to bikes. Currently, the project proposes to install and operate a pilot system of 88 stations and 616 bikes serving the cities of Sacramento, West Sacramento, and Davis.

Policy: Use the best information available to implement strategies and projects that lead to reduced Greenhouse Gas (GHG) emissions

Strategy: Adopt a transportation pricing policy, expand public access to travel information through 511 program, integrate the Connect Card into other modes of transportation, and support the implementation of a regional bike share and complete streets programs.

Policy: SACOG should work with transit operators to pursue improvements to transit access, security, comfort, schedules and information whenever opportunities arise.

Strategy: Support strategies that integrate transit considerations into the implementation of a regional complete streets program that improves transit access, via safe and pleasant sidewalks and walkways around transit stops, designated bike routes and directional signage, accessibility for the disabled, on-board bike racks, better signs for transit access, shelters and improved transfer points, integration with future bike share infrastructure, and secure bike storage facilities at park-and-ride locations.
Continue to pursue opportunities to expand shared mobility services near Smart Growth Opportunity Areas in the region. Examples of shared mobility services include carsharing, bikesharing, real-time ridesharing, Transportation Network Companies (e.g., Uber, Lyft, Sidecar), neighborhood electric vehicles, scootershare, and on-demand shuttle and jitney services.
Recommendation: Expand bike share program implementation

**Bike share** programs provide residents and visitors with options to use bicycles for short trips within and between downtown areas and adjacent neighborhoods. They offer opportunities for people to use a bicycle from designated stations for the purpose of traveling to and from home, work, or school, running errands, or for social activities. **Bike share** users often register for this service and pay an annual or monthly membership fee, although many programs also offer single or multi-day ride options for the service. **Bike share** has been shown to be effective at providing a travel option for short trips and for reducing trips by automobile. It can also function as a feeder service to transit systems, which often encourages an increase in trips using both of these modes.

The Preliminary Plan proposes the expansion of **bike share** program implementation to encourage bicycling as a viable mode of travel for short distance trips. **Bike share** is operated in the City of Milwaukee, and is expanding to additional locations in the City and to other communities. **Bike share** programs can reduce the number of vehicle trips and are often most effective in serving high-density areas with a mix of residential and commercial uses. **Bike share** programs can attract people who would not typically consider riding a bicycle—short-distance commuters, people running errands, and tourists—as well as those who prefer to commute via bicycle without maintaining and securing their own bicycle.
### Performance Measures and Objectives

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>MEASURE</th>
<th>DEFINITION</th>
<th>OBJECTIVE</th>
<th>CATEGORY</th>
<th>2040 BASELINE</th>
<th>2040 PLAN</th>
<th>INDICATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety and Health</strong></td>
<td>Collision rates by severity by mode (per 100 million vehicle miles)**</td>
<td>Collision rate per 100 million vehicle miles by mode and number of fatalities and serious injuries by mode (all, bicyclist/pedestrian)</td>
<td>Improvement (decrease) over No Protect Baseline</td>
<td>Serious injuries</td>
<td>N/A</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fatalities</td>
<td>N/A</td>
<td>0.31</td>
<td></td>
</tr>
</tbody>
</table>
|  | Criteria pollutants emissions (tons per day) | CO, NOx, PM 2.5, PM 10 and VOC | Meet Federal air quality conformity requirements (NR) | Reactive organic gases (ROGs) | 48.1 tons | 45.0 tons | ↓  
|  |  |  |  | Carbon monoxide (CO) | 333.6 tons | 307.7 tons | ↓  
|  |  |  |  | Oxides of nitrogen (NOx) | 96.4 tons | 88.2 tons | ↓  
|  |  |  |  | Particulate matter (PM 2.5) | 13.3 tons | 12.8 tons | ↓  
|  |  |  |  | Particulate matter (PM 10) | 32.0 tons | 30.8 tons | ↓  
|  |  |  |  | Nitrogen dioxide (NO2) | 9.46 tons | 8.65 tons | ↓  
|  | Air pollution-related health measures | Pollution-related respiratory disease incidence and cost | Improvement (decrease) over No Protect Baseline | Daily per capita walking | 12.1 mins | 10.0 mins | ↓  
|  |  |  |  | Daily per capita biking | 18 mins | 2.0 mins | ↓  
|  |  |  |  | Daily per capita driving | 64.8 mins | 61.0 mins | ↓  
|  | Physical activity-related health measures | Physical activity/weight-related health issues and costs | Improvement over No Protect baseline | Obesity population (%)** | 26.3% | 25.6% | ↓  
|  |  |  |  | High blood pressure (%)** | 21.5% | 20.6% | ↓  
|  |  |  |  | Heart disease (%)** | 4.4% | 4.2% | ↓  
|  |  |  |  | Diabetes Type 2 (%)** | 6.3% | 6.0% | ↓  
|  | Mode share of walking and bicycling | Mode share of walking and biking for work trips, non-work trips and all trips | Improvement (increase) over No Protect Baseline | Walk share (Work) | 4.4% | 5.6% | ↑  
|  |  |  |  | Bike share (Work) | 0.5% | 0.7% | ↑  
|  |  |  |  | Walk share (Non-Work) | 12.0% | 15.0% | ↑  
|  |  |  |  | Bike share (Non-Work) | 1.9% | 2.5% | ↑  
|  |  |  |  | Walk share (All Trips) | 10.7% | 13.5% | ↑  
|  |  |  |  | Bike share (All Trips) | 1.6% | 2.2% | ↑  

*Note: The table continues on the next page.*
Bike share acts as a first/last mile strategy and it will be closely integrated with high quality transit stations. Los Angeles Metro, Santa Monica and Long Beach are currently implementing bike share within Los Angeles County. Bike share is anticipated to grow beyond these initial areas over the course of the Plan. A pilot program was recently completed in the City of Fullerton, in Orange County. The University of California, Irvine already has a bike share system in place for students and faculty. The regional bike share system will be comprised of about 8,800 bikes and 880 stations/kiosks.
RIDEHAILING
# Findings > Ridehailing > MTP Keyword Search Results

<table>
<thead>
<tr>
<th>SEARCH TERM</th>
<th>National (Large MPOs (More than 1M))</th>
<th>National (All MPOs)</th>
<th>FTA Region IV (Small MPOs (50K to 200K))</th>
<th>FTA Region IV (Medium MPOs (200K to 1M))</th>
<th>FTA Region IV (Large MPOs (More than 1M))</th>
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<tbody>
<tr>
<td>Ridehail / Ride Hail / Ridehailing / Ridesourcing / Private Ridesharing</td>
<td>9 (17.3%)</td>
<td>4 (4.0%)</td>
<td>1 (2.2%)</td>
<td>2 (4.7%)</td>
<td>1 (8.3%)</td>
</tr>
<tr>
<td>Transportation Network Company / TNC</td>
<td>11 (21.2%)</td>
<td>1 (1.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>1 (8.3%)</td>
</tr>
<tr>
<td>Uber</td>
<td>20 (38.5%)</td>
<td>9 (8.9%)</td>
<td>3 (6.5%)</td>
<td>4 (9.3%)</td>
<td>2 (16.7%)</td>
</tr>
<tr>
<td>Lyft</td>
<td>20 (38.5%)</td>
<td>7 (6.9%)</td>
<td>2 (4.3%)</td>
<td>3 (7.0%)</td>
<td>2 (16.7%)</td>
</tr>
<tr>
<td>Vehicle for Hire / For Hire Service / For Hire Vehicle</td>
<td>3 (5.8%)</td>
<td>2 (3.8%)</td>
<td>0 (0.0%)</td>
<td>1 (2.3%)</td>
<td>1 (8.3%)</td>
</tr>
<tr>
<td>Taxi / Taxicab</td>
<td>21 (40.4%)</td>
<td>33 (32.7%)</td>
<td>17 (37.0%)</td>
<td>14 (32.6%)</td>
<td>2 (16.7%)</td>
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<tr>
<td>Totals</td>
<td>52</td>
<td>101</td>
<td>46</td>
<td>43</td>
<td>12</td>
</tr>
</tbody>
</table>
Supplemental Caveats to the Keyword Analysis

- The term “taxi” appears frequently in plans in reference to water taxi and ferry services, as well as airport taking and landing operations. These and other keyword search results not directly synonymous with for hire vehicle were excluded from the analysis.

General Observations

- Ridehailing services are a new frontier for many MPOs and very few have found a meaningful way to integrate this relatively new mobility option into their plans. Many of the plans which do reference them simply acknowledge their existence but provide no substantive discussion of their impacts on congestion, transit ridership, urban form, equity of accessibility or other issues which are gaining increased attention in the national dialogue.

- There is a great deal of inconsistency in what term to use to describe the type of mobility service provided by companies such as Uber and Lyft. Some agencies refer to them as ridesharing, which is problematic. That term has been used for decades as being synonymous with traditional ridematching and carpooling services.

- Co-opting a commonly used term such as ridesharing for a fundamentally new type of service can be misleading and confusing. Of particular importance to FTA is the determination of whether those services could ultimately qualify for inclusion in data used for federal funding apportionments. Many TNC trips would not qualify as “shared” since the rider has exclusive access to the driver and the vehicle throughout the duration of the trip. UberPool and Lyft Line trips, however, would be considered shared rides because the rider has expressed a willingness for the driver to accept other passengers along the way (even if another passenger never materializes).

- Uber and Lyft services are available in 136 of the 141 metropolitan areas for which MTPs were reviewed. Of those 136 plans, 27 (19.8%) make direct reference to Uber, while 25 (18.4%) reference Lyft.

- While it is likely that the vast majority, if not all, of the 141 metro areas have traditional taxi services available, only 52 (36.8%) of the plans include any discussion of that mobility option.
DEFINING THE CONCEPTS
Ridesourcing

Providers such as Uber and Lyft use online platforms or mobile applications to connect passengers with drivers who use personal, non-commercial vehicles. Using a mobile GPS-enabled application, travelers “hail” a ride from a ridesourcing service. The mobile application shows the rider who the driver is, what type of car the driver is in, where the driver is located, and when they should arrive. Although a newer concept, providers in select cities are also beginning to offer services that combine riders (or “fares”) that are traveling along similar routes to reduce vehicle trips and generate cost savings for the users.
In recent years, additional mobility options have emerged as potential services for individuals, such as Uber and Lyft. These private ridesharing companies allow individuals who possess a smartphone to hail a person to pick them up and take them to their destination. While this service is similar to taxis, they have grown in recent years for a multitude of reasons and are a viable option for many individuals.
Ridesourcing

Providers such as Uber and Lyft use online platforms or mobile applications to connect passengers with drivers who use personal, non-commercial vehicles. Using a mobile GPS-enabled application, travelers “hail” a ride from a ridesourcing service. The mobile application shows the rider who the driver is, what type of car the driver is in, where the driver is located, and when they should arrive. Although a newer concept, providers in select cities are also beginning to offer services that combine riders (or “fares”) that are traveling along similar routes to reduce vehicle trips and generate cost savings for the users.
Transportation Network Companies (TNCs) use smartphone technology to connect passengers with drivers who use their personal, non-commercial vehicles to provide rides for a fee.
Ridesourcing uses an app to electronically hail a driver, who “contracts” with the service. The cost of the trip is indicated before the request is finalized. The app guides the driver to pick up the passenger and then take them to their desired destination. Payment is handled electronically within the app, so the driver has no need to carry cash.
Transportation network companies, more commonly known as ridesharing or ride-hailing services, such as Uber and Lyft, also operate within the region, and it is expected that additional such services will also enter the marketplace in coming years. All of these services and providers emphasize an on-demand, location-specific “app-based” approach where a user can use their smart phone to request a ride or reserve a carshare vehicle with real-time, location-based availability. Particularly promising for the potential to reduce congestion are enhancements to these platforms which will facilitate multi-passenger trips, dynamically or in a coordinated fashion from pick-up and drop-off points.
FINDINGS > Ridehailing > MTP Notable Practices

AGENCY: Southern California Association of Governments
METRO AREA: Los Angeles / Riverside, CA
PLAN TITLE: The 2016-2040 Regional Transportation Plan / Sustainable Communities Strategy
LAST UPDATED: April 2016

> Glossary

**Ridesourcing** - A generic term coined by researchers at University of California, Berkeley for the act of using a **Transportation Network Company** such as Lyft or Uber. The term distinguishes this mode from car sharing and from taxi use. A user is “sourcing” a ride from an online community, in exchange for a brokered payment.

**TNC / Transportation Network Companies** – This is the technical term for ridesourcing companies used by the California Public Utilities Commission in order to create a new class of mobility provider distinguished from taxi companies and limousines.
EXPLAINING THE ISSUES
EXPLAINING THE ISSUES

> Process > Specialized Needs

Human Services Transportation (HST) entails understanding the transportation needs of target populations, specifically those affected by disability and lower income. Disability and lower income both limit access to some transportation options (such as personally owned and operated vehicles) while increasing the usage of other transportation options such as public transit, carpool/vanpool, specialized curb-to-curb services, pedestrian trips, cycling, and taxis/transportation network companies.

Transportation options are limited for HST populations, and each person makes a decision based on what is personally accessible. At each step of the decision making process, some options are eliminated and others become more prominent. As they consider options such as public transit, carpool/vanpool, specialized curb-to-curb services, pedestrian trips, cycling, and taxis/transportation network companies, they ask themselves the following questions to make individual decisions:

- Is the option available when I leave my home?
- Is the option available to get me to my destination (for purposes such as work, school, errands, medical/health, social, worship, etc.)?
- Does the option accommodate my disability (if applicable)?
- Can I afford the option (does it place an undue burden on my budget)?
- Of the available options, what barriers exist (such as schedule, frequency, safety, etc.)?
- What will happen if none of the options meet my need or if they all present barriers that are too great?
Future > Refining the Unconstrained Vision > Transit

ARC is currently updating the Concept 3 transit vision to reflect the Atlanta Region’s current transit planning and operating environment. Major areas of emphasis for this effort could include:

- Evaluating existing and emerging corridors in which high capacity transit options can operate competitively
- Identifying opportunities to implement initiatives which increase transit service efficiency and passenger utility
- Incorporating project delivery risk assessment into the process of project identification and selection
- Establishing candidate capital improvement projects to be implemented by newly available local funding sources
- Aligning transit project recommendations with The Atlanta Region’s Plan Policy Framework

In addition to addressing these pragmatic aspects of a vision, the effort is also investigating the impacts which rapid changes in technology are having on how transit services are delivered, and even the very nature of those services. Questions which the new vision will tackle include:

- How can transit operators act as integrators of mobility, facilitating connectivity between fixed route services and other mobility options such as walking, biking, carpooling/vanpooling, taxis and TNCs?
- How can a focus on the total journey experience improve the transit offering? The total journey experience includes elements of the door-to-door transit experience, such as online information, wayfinding on the street, payment processes, and transfers between transit providers or with other modes.
- How can transit agencies balance their role in the changing mobility landscape with broader societal needs for social equity, environmental protection, and economic development?
- How can transit operators invest funding most effectively, partner with others, and adopt technology in such a way that the region’s overall mobility will be enhanced?
- What might the mobility landscape be like in 5, 10, or 20 years?
- How can transit agencies be active participants in changes over time?
- How can they look into the future to see trends and interpret what the future holds for passenger service?
> Other Transportation Modes > Taxi Services

Passenger vehicle-for-hire services are an integral mode of transportation in the Charlotte region. Under City Code, the City of Charlotte regulates the industry within the corporate limits for safety, fares, and number of approved companies and vehicles. Effective July 2011, the City ordinance was revised to include regulation of not only metered vehicles (taxicabs) but also non-metered vehicles (limousines, shuttle vans, special needs vehicles, and executive cars).

Mecklenburg County

There are presently 11 approved taxicab companies located in Charlotte. These companies provide on-demand services to destinations throughout the Charlotte region. The distribution of vehicles is spread fairly evenly across service providers, with all companies having at least 30 vehicles in their fleet.

Aside from on-call services typically provided by taxi companies, Mecklenburg County’s Social Services has contracted with cab companies to offer reduced fare service to the elderly and disabled within the community. Additionally, CATS contracts with taxi operators to provide free rides home (up to twice a month) to vanpool and express bus riders who have emergencies, medical appointments, or unplanned work schedule changes.

Union County

There are currently seven taxicab companies providing service within Union County, operating 46 vehicles. These companies provide on-demand services in a similar manner to those companies in Mecklenburg County, although due to the more residential and low-density nature of Union County, they almost exclusively provide services on an on-call basis.

Iredell County

There are currently five taxicab companies providing service within Iredell County, operating 43 vehicles. These companies provide on-demand services in a similar manner to those companies in Mecklenburg County, although due to the more residential and low-density nature of Iredell County, they almost exclusively provide services on an on-call basis.
Residents of the Pee Dee region have numerous options for using taxicabs as public transportation. Taxicab companies operating in the region provide service based on drop-off, per-mile, and waiting time rates. While the availability of taxicabs in the region has no direct correlation to the level of anticipated ridership for transit, the presence of these companies does indicate a need throughout the greater Florence area for a means of travel other than privately owned automobiles.
> Other Transportation Modes > Taxi Service

With the cost of owning personal transportation rising, more residents of the GCLMPO Metropolitan Planning Area may turn to taxi service as a major means of transportation. The GCLMPO Metropolitan Planning Area has multiple taxi cab service companies. Rates are regulated by the City of Gastonia and the three County governments. These companies offer local and long distance service. A number of the taxi companies also run shuttle service to the Charlotte Douglas Airport.

**Gaston County**
- Yellow Cab Co of Gastonia - 913 W Franklin Blvd, Gastonia (704) 867-6391
- Metro Cab - 1104 E Ozark Ave, Gastonia (704) 852-4147
- BLUE CABS OF NC - 543 Cox Rd, Gastonia (704) 674-4457
- AAA Taxi - 707 Grover St, Gastonia (704) 861-0855
- AAA Taxi - 815 E Park Ave, Gastonia (704) 861-0855
- Cook’s Cab Company - 217 Allison Ave, Gastonia (704) 868-8181
- City Cab Company - Gastonia (704) 867-4620
- City Cab Company - 720 W Airline Ave, Gastonia (704) 867-4620

**Cleveland County**
- Weaver’s Taxi - (704) 487-9193 521 Carolina Ave, Shelby, NC
- Your City Taxi Company - (704) 487-9158 518 Carolina Ave, Shelby, NC
- AA United Cab - (704) 482-7000 220 S Washington St, Shelby, NC
- East Marion Cab Company - (704) 487-6200 211 E Marion St, Shelby, NC

**Lincoln County**
- Yellow Cab of Lincolnton - 2380 Industrial Park Rd, Lincolnton (704) 748-1313
- Specialized Transport - 2380 Industrial Park Rd, Lincolnton (704) 735-5676
Residents in Gastonia who chose taxi service as a means of transportation are protected under municipal codes which state:

a) No person owning or operating a taxi cab within the city limits may charge fares in excess of those prescribed in the schedule of taxi cab fares adopted by resolution of the council, a copy of which shall be on file in the clerk’s office and shall also be available from the administrator.

In order to better prepare for future growth projections, providing additional access for residents to taxi service will need to be addressed. Providing taxi cab vouchers for qualifying residents may be an option looked into for the future.
EXPLAINING THE ISSUES

> Public Transportation

The role of transit is changing in recent years with technological advances and demographic trends. Services such as Uber and Lyft allow those without vehicles to call for a ride that takes them from door to door. The popularity of these services may decrease traditional transit ridership over the coming years but it also has the potential to increase the number of urban dwellers who live without vehicles, potentially increasing the total ridership pool. Additionally, current trends suggest that fewer young people are getting drivers licenses than in the past, potentially increasing the future role of transit in our communities. Future LRTPs will more closely deal with this issue as the services develop and have a broader effect on transit.
Once defined singularly as the ability to freely move or be moved – mobility is now interpreted in a more complex and personal way. Today, personal mobility implies freedom. This is different than just moving from point A to B; people expect a transportation system which offers convenience, efficiency, flexibility, reflects their values, and enhances quality of life.

Recent studies have identified a connection between personal values and travel behavior. This was acknowledged by the 2014 Mobility Attitudes Survey conducted by the TransitCenter. This national study determined that a person’s values toward productivity, connection, privacy, community, and the environment all shaped attitudes toward transit or auto travel. Understanding the basic values and preferences of existing or potential riders allows for the development of a transit system which reflects the individuality and culture of the community it serves.

The evolution of the sharing economy has created new markets in transportation with ridesharing services such as Uber and Lyft. These modes of travel capitalize on the growing trend of individuals to borrow or share goods and services rather than use their own resources. In communities across the county, ridesharing companies are finding success by serving as an alternative to the personal car or mass transit with similar convenience, efficiency, flexibility.
Vehicle for hire (taxi cab and limousine) service is an integral part of urban transportation in Winston-Salem. The City of Winston-Salem regulates the industry with regard to safety, service levels, fares, and the number of cabs authorized. The City of Winston-Salem grants franchise agreements to companies that agree to operate according to the rules and regulations published in the City Code. The City also conducts periodic assessments of the number of vehicles for hire and the service levels they provide in an effort to determine the optimum number of vehicles for the marketplace.

There are currently 39 authorized companies operating in Winston-Salem; 24 limousine companies, 12 taxi cab companies, two horse carriage companies and a golf cart company. At the present time there are 168 cabs authorized to operate in the City of Winston-Salem.

Safety, cleanliness and customer service are the main areas the City closely monitors. When the City updated the code, part of the focus was to improve public safety. This was accomplished through regulation of the taxi drivers, requiring all taxi drivers to have a City issued taxi driver permit, and requiring all taxicabs to be inspected by the Taxi Inspector and having a color coded seal placed on the right lower corner of the front windshield after passing the safety inspection.

To be issued a taxi driver permit, an applicant must pass a five panel drug screening, statewide criminal background check and a DMV license check. Even though this system is not perfect, it has reduced the convicted felons and bad drivers that were driving taxicab unmonitored and often without the knowledge of the company owner. To be issued the City decal, a vehicle must be clean, in good repair (interior and exterior), a valid North Carolina state inspection, current license tag and a meter sealed with the City meter lock/seal. At the time of inspection by the Taxi Inspector, any vehicle receiving this decal has been deemed in compliance with the City code. Later site inspections are randomly done to insure compliance. Vehicles that fail any inspection will have the city issued meter lock cut and will be reported to police as “put out of service by the City for safety reason”. There is a $15.00 charge for having the vehicle re-inspected and meter sealed.

Customer service is monitored by customer complaints and the time from request for service until the customer is actually picked up. The time for service is difficult to monitor without a computerized dispatch system. Currently, there is not a computerized dispatch system in operation. In reference to customer complaints, the City strongly
FINDINGS > Ridehailing > MTP Notable Practices

recommends that all company owners process any customer complaints. In this process, the owners are encouraged to report any documented complaints, including the driver's name and type of complaint. This information will be placed in the driver's file for future reference in the permit renewal process.

Because the City views vehicle for hire service as an important urban transportation need, it will continue to monitor and regulate various aspects of the industry to assure this element meets the transportation needs of its constituents.

Mobile App Innovation in Transportation

Uber, Lyft and other ridesharing companies can provide taxi services at a lower cost than traditional taxi services by utilizing mobile app technology to rapidly connect freelance drivers to potential consumers. The mobile app allows users to request a ride by entering their intended destination and payment information into the app. Users are then shown a map indicating the number and location of drivers in the area, a profile of the driver, the driver’s approval rating, a picture of the driver’s vehicle, and the estimated arrival time. The mobile app technology tends to result in a more efficient taxi system, utilizing drivers only when needed and providing drivers with the flexibility to work when they want.

Uber and Lyft have also started carpooling programs in select cities, such as San Francisco, New York, and Los Angeles. Uber Pool and Lyft Line utilize mobile app technology to connect passengers who are traveling a similar route. When there is a match, the passengers split the ride fare. As of January 2015, one-third of Lyft rides in San Francisco were carpools.

The expansion of ridesharing services in the United States has sometimes encountered opposition. A number of communities have deemed ridesharing services as deceptive and unsafe for consumers because ridesharing companies operate outside of established local regulations by labeling themselves as “technology” companies and not “transportation” companies. They further evade local regulations by maintaining that their employees are not employees, but rather, independent contractors. Traditional taxi services are required to insure their fleet, perform background checks on drivers, and have their vehicles inspected on a regular basis. In contrast, ridesharing companies only require drivers to meet their minimum age requirement, maintain a regular driver’s license, and have a fully functional vehicle. Local regulations require transportation companies to adhere to a strict pricing model and driver pay-scale. However, the misclassifications used by ridesharing companies provide the freedom to base their pricing model according to the demand for drivers, make the drivers responsible for their own insurance, and not comply with established pay-scales for transportation workers. Legal battles are playing out across the country in an attempt to bring the ridesharing companies into compliance with local regulations, making the future form of ridesharing uncertain.
Some experts believe that, if ridesharing companies can continue to expand, ridesharing technology will serve as a solution to transit's “last mile” problem and result in an increase in transit ridership. Others hypothesize that Uber and Lyft could replace low-ridership transit routes in the future. Alternatives I and II would accommodate emerging mobile app technology in transportation by providing flexibility in mode choice with significantly greater options for transit use, increasing the likelihood some individuals may choose to replace private automobile ownership with Uber or Lyft in combination with relying more on public transit.

**Autonomous Cars**

Some experts foresee a merging of autonomous cars and the mobile app technologies used by Uber and Lyft to create a low-cost, self-driving taxi service, making independent car ownership and low-ridership transit routes virtually obsolete. Currently, the average car remains idle approximately 96 percent of the day. The reduction in personal car ownership through sharing of self-driving cars could increase the time an average vehicle is in use from 4 percent to approximately 75 percent. Some experts think this collective ownership model will reduce the number of vehicles in the nation by as much as 30 percent as the amount of time a vehicle is in use is increased. This model would reduce congestion only if some portion of trips would be shared, similar to Lyft Line and UberPool.
In October 2014, the Austin City Council passed an interim ordinance legalizing TNCs as legal ground transportation service providers in Austin. Two TNCs, Uber Technologies Inc. and Lyft Inc., operate in the greater-Austin area.
Most recently, the region has seen trends of reduced car ownership among younger people; the rise of on-demand transportation, such as carsharing and Transportation Network Companies (TNC) services like Uber and Lyft; and revitalization of transit-friendly communities. While these trends seem to have solidified the resurgence of transit use in the region, there are some concerns. TNCs are growing quickly and may be replacing some transit trips, particularly for choice users. From 2016 to 2017, SEPTA ridership declined by 5.5 percent, which was primarily due to low gas prices, regional rail reliability issues when 115 Silverliner V cars had to be pulled out of service for emergency repairs, a six-day transit strike, and increased competition. Declining transit ridership has been occurring across the nation over the past few years.

Beyond Intelligent Transportation Systems (ITS) infrastructure, this phase [refers to Third Industrial Revolution in graphic on subsequent page] did not have significant impacts on regional and local transportation until recently. TNCs, such as Uber and Lyft, use smartphones, digital mapping and routing, and real-time information to connect drivers and passengers for on-demand trip making. Between July and September 2016, Uber and Lyft were averaging 59,000 rides per day in the City of Philadelphia alone, according to The Philadelphia Inquirer. TNCs are creating new options for how to get around while providing last mile-to-transit solutions, and reducing the need for car ownership and parking. In addition to TNCs, smartphone apps and other sources of realtime information allow individuals to quickly and conveniently identify the best option that meets their specific needs in each circumstance.

As public funding for transportation infrastructure continues to stagnate, the private market seems poised to take more of a lead in developing the digital transportation infrastructure of the future. This may mean a new world of financing infrastructure, one that might rely more heavily on public-private partnerships. Partnerships between TNCs, transit agencies, and local governments have sought to improve transportation all over the country. These
partnerships can help to grow services and promote more efficient transportation and car-free or car-lite lifestyles. For instance, paratransit services can partner with TNC app technologies, and provide an opportunity to vastly improve dial-a-ride programs for seniors and persons with disabilities. The existing programs often require individuals to make requests up to 24 hours in advance. Real-time, app-based technology can allow requests to be made as needed and reduce wait times and missed appointments.

> Taking Action > Moving Forward

Technology does not overcome inefficient design, and it should not dictate how we develop our built environment. Rather, it should be a tool we leverage to build more people-centric communities. As the Digital Revolution continues to build network effects in the physical world, large and dense communities that enable the flow of ideas and interactions will be the places best suited to thrive. This requires transportation to be space efficient, which is consistent with the vision for Centers-based development. Centers are the linchpin of the Plan. Focusing growth preserves open space and agricultural land; helps to build agglomeration economies and save money on infrastructure provision; and makes walking, biking, and transit use more feasible. These are also the types of communities where new and emerging transportation technologies and services - TNCs, car sharing, bike sharing, and eventually shared HAVs - will be most successful.

> Taking Action > Actions to Advance Equity and Promote Diversity > DVRPC Spotlight

In February 2017, DVRPC staff led a regional Paratransit Coordination Workshop for human service transportation providers from Mercer County and neighboring counties as part of the ongoing ETA project. The workshop was requested by Mercer County, which was concerned that mobility-restricted populations lacked adequate information about their transportation options and that a general lack of communication between local providers was causing service requests to go unfulfilled.

This workshop brought together representatives from human service transportation providers, TMAs, and TNCs to discuss existing mobility issues in the region and develop coordination strategies to help solve them. Workshop activities included presentations on regional best practice examples of transportation coordination, opportunities for collaboration between human service transportation providers and TNCs, identifying existing service overlaps and potential service transfer points, and a brainstorming session to identify current issues facing service providers and ways to collaborate to meet the existing need. Attendees identified a need for agencies to improve data sharing practices, for human service transportation operators to better coordinate among themselves and with TNCs to redirect customers that they cannot serve, and for agencies and TNCs to collaborate on ways to work through regulatory limitations related to driver and vehicle qualifications.
FINDINGS > Ridehailing > MTP Notable Practices

Figure 19: The Four Industrial Revolutions

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<thead>
<tr>
<th>FIRST (1770s)</th>
<th>SECOND (1870s)</th>
<th>THIRD (1960s)</th>
<th>FOURTH (2010s)</th>
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<tbody>
<tr>
<td>TECHNOLOGY</td>
<td>URBAN FORM</td>
<td>THE DIGITAL REVOLUTION</td>
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<td>Steam Power</td>
<td>Factories</td>
<td>Source: DVRPC, 2017. Adapted from World Economic Forum</td>
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<td>Mechanical Production</td>
<td>Town &amp; City Growth</td>
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<td>Interchangeable Parts</td>
<td>Skyscrapers &amp; Elevators</td>
<td>Electronics &amp; Computers</td>
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<td>Electricity &amp; Lighting</td>
<td>Zoning/Seperation of Uses Urban Growth/Streetcar Suburbs</td>
<td>Automated Production</td>
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<td>Mass Production</td>
<td>Globalization/Deindustrialization</td>
<td>Integrated Circuits</td>
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<td>Electric Circuits</td>
<td>Internet and e-Commerce</td>
<td>Robotics &amp; AI</td>
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<td>Auto-Oriented Suburbs</td>
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<td>TRANSPORTATION</td>
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<td>Canals</td>
<td>Subways and Trolleys</td>
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<td>Railroads</td>
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<td>Airplanes</td>
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<td>Connected &amp; Automated Vehicles</td>
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<td></td>
<td>Unmanned Aerial Systems</td>
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Source: DVRPC, 2017. Adapted from World Economic Forum
The sharing economy, which includes several concepts, continues to rapidly evolve. For example, Uber and Lyft rides can be booked directly from the Google maps app. In 2016, Uber launched its “Uber Eats” food delivery service. Locally, RTD and Lyft started testing in 2016 a first/last mile pilot project to provide free Lyft rides within a defined service area to the Dry Creek light rail station in Centennial. These and many other examples illustrate the rapid changes in personal mobility options. The region's Transportation Demand Management program will continue to work with partners to incorporate these concepts as feasible. However, it is important to distinguish between travel choice options and single-occupant vehicle trip reduction strategies. The former, as important as they are, do not necessarily lead to the latter.
Taxicabs provide for travel convenience when a vehicle or driver is not available, when public transit is not in operation (after-hours) or when an origin or destination is not served by the public transit system. The availability of on-call taxicab service can make it easier for people to forego car ownership and provides an alternative to impaired driving which enhances public safety.

There are three major taxicab companies and approximately 170+ vehicles registered in the Lexington MPO Area. In 2013, Yellow Cab was awarded Jobs Access & Reverse Commute (JARC) FTA funds to equip a number of vehicles in their fleet with wheelchair lifts to better serve the disabled community. Accessible transportation services, particularly during the hours when transit and paratransit services are not in operation, was often cited as a barrier to independence for people who use wheelchairs in the Lexington Area.
One area that the region has improved is the trend for crashes for alcohol-impaired fatalities, which have decreased three percent from 2014 to 2015, compared to the statewide increase of 36 percent. Ride hailing services such as Uber™ and Lyft™ available in many large metropolitan areas, including the MAG region, may be contributing to the decrease in alcohol impaired crashes.
Ride-hailing services provided by Lyft, Uber and other firms may continue to grow in popularity and could provide significant competition for traditional taxi and limousine services, ride-sharing, public transportation and private auto-ownership, in a way that impacts future travel behavior and land-use decisions. These services, in combination with automated vehicle technologies, could create many unpredictable positive or negative impacts to the regional transportation system.
Generational changes will also likely impact the acceptance and use of new technologies, which in turn can impact travel patterns. The future development of app-based, demand-responsive transportation services will likely be influenced by their acceptance by younger generational cohorts, such as the Millennials and the generation which follows. Young Americans have readily adopted new technology-enabled transportation services, such as smartphone application (app)-based peer-to-peer ride-hailing, car sharing and bike sharing networks, real-time transportation information, on-demand ride services, and other transportation network services. For example, app-based, for-hire ride-hailing services such as Uber and Lyft, allow consumers with smartphones to submit a trip request to find the nearest available drivers and pay their fare digitally. These demand-responsive transportation services can eliminate barriers that limit personal mobility, and reduce the need for households to own private vehicles. At the same time, the convenience offered by these technologies could replace transit or non-motorized trips, resulting in higher VMT and traffic congestion. Nevertheless, as a whole, these technologies are gradually changing Americans’ travel behavior as an increasing number of people adopt them, although as the aforementioned Volpe report notes, the overall impacts of these services are yet to be determined and for this reason have not been included in the forecast assumptions for this Plan.

Taxis and livery vehicles are an important component of the region’s transportation network. In Manhattan, they are a primary mode of transportation for many people, and in more outlying areas, they provide links to the rail network and greater mobility for residents who cannot or do not wish to drive. Aside from New York City’s iconic yellow taxicabs, taxi services are found throughout the NYMTC planning area. Several taxi services exist in the counties outside of New York City, for example there are nine taxi companies available in Putnam County, and 33 in Suffolk County.

The yellow taxicab is present in great numbers throughout New York City, especially Manhattan, and is a vital mode of intra-city transportation. In 2015, there were 13,587 taxi medallions in New York City, 87,867 vehicles (yellow, “medallion” taxis, green street hail liveries, and for-hire vehicles) and approximately 140,000 licensed drivers.
In 2011, as part of former mayor Bloomberg’s push to create a “greener” city, the New York City Taxi and Limousine Commission (TLC) awarded Nissan a contract to replace the city’s aging taxi fleet with the Taxi of Tomorrow - a fuel-efficient vehicle with improved passenger safety features. The new taxi was to be rolled out beginning in 2013, but was delayed until September 2015 due to a court appeal brought by an interest group. While the Taxi of Tomorrow plan was upheld, a revised agreement allows drivers with certain medallions to buy other fuel hybrid or wheelchair accessible vehicles in lieu of a Taxi of Tomorrow from Nissan. Even still, the Taxi of Tomorrow could account for a significant portion of the city’s taxi fleet.

In summer of 2013, the TLC introduced the Boro Taxi. To improve taxi service in areas of New York that are not commonly served by medallion (yellow) cabs, the TLC licensed thousands of livery cabs to pick up passengers hailing a cab, which was not previously permitted. These new cabs are uniformly green, are inspected by the TLC as with all other cabs, and are equipped with standard fare meters, credit card readers, and cameras or partitions. Within months of the program’s launch, it became clear that there was more ridership demand for Boro Taxis than the initially-issued permits could accommodate. The TLC plans to monitor this new market but acknowledges the need to meet both rider and driver demand for permits.

In recent years, a new segment of the for-hire-vehicle segment has emerged in the form of app-based ride-hailing services such as Uber and Lyft. These companies offer the convenience of quickly hailing a car directly from the user’s smart phone, as well as other features like ridesharing, driver ratings, and included tip. Uber in particular has been extremely successful, making more than 100,000 trips on an average day in July 2015, a fourfold increase from the previous year. The popularity and success of these services has sparked debate about the current regulatory structure of the taxi industry in New York City, as well as concern for the impacts Uber’s growth may have on traffic congestion in the region.

Bee-Line ParaTransit service operates on two different types of schedules. Core service is available Monday through Friday from 6:00am to 7:00pm and Saturday from 8:00am to 7:00pm. However, ParaTransit users whose trips begin and end within three-quarters of a mile of a Bee-Line System bus route have expanded service hours corresponding to the parallel routes. In May of 2012, Bee-Line Para-Transit launched a ParaTaxi program to help reduce costs and make service more convenient for users. ParaTransit riders can opt to use a taxi service for trips within White Plains, New Rochelle and Peekskill. Westchester County is pursuing opportunities to expand the ParaTaxi program to other parts of the county and expand service to more closely “mirror” regular Bee-Line System service.
In transit authority service areas, the public transportation network is supplemented by other transportation services. Regional and national bus and rail carriers link the region to outside destinations with services operated by Amtrak and private intercity bus companies. For-hire services, such as taxis and limousines, provide individual, personalized transportation service to the general public and, in many cases, do not require advance reservations. Transportation network providers, like Uber or Lyft, facilitate connections between individual riders and drivers that operate their own personal vehicles. Uber has partnered with DART so travelers can request an Uber ride via the transit authority’s GoPass mobile ticketing application. DART, the T, and DCTA each facilitate vanpools that begin or end in their service areas.
Additionally, ride sharing service companies, such as Uber and Lyft, are showing a willingness to participate in greater mobility for specialized populations. Collaboration between these private companies, public transit, and nonprofit agencies has the potential to offer on-demand service for lower costs.
Numerous taxicab companies serve the OKI region. In 2009, it was reported that 439 taxicab and limousine firms operated in the OKI region.

At the time of this plan’s update, Cincinnati was proposing a number of changes to the city of Cincinnati’s taxicab regulations. Changes proposed include amending the fare schedule, increasing the number of permanent and temporary/part-time taxi stands in the city, requiring more handicap accessible vehicles, accepting credit card/electronic payments, and changing the city’s administrative structure for increased insurance and inspection requirements. The city’s goal is to put into place “a framework to improve taxicab service in Cincinnati [that will serve as] more than just a means [to get] from point A to point B, [but also make] taxicabs readily accessible for all who want to take advantage of them, including the increasing number of [people] with limited mobility.”
Transportation Network Companies (TNCs) such as Uber and Lyft are currently impacting traditional models of procuring transportation from third parties. TNCs are based on a software platform which creates an online marketplace in which a driver registered with the company may offer their own labor and car to people who request a ride. TNCs maintain the platform, vet drivers to ensure regulatory compliance, and process financial transactions. It is important to note that this model differs from traditional taxi services because in Virginia, TNCs did not have a regulatory framework or legal authority to operate in the state until February 2015. The regulations developed by lawmakers, the Virginia Department of Motor Vehicles, and TNCs require the following:

- Pay $100,000 for a license to operate in the state
- Drivers must be at least 21 years old and properly licensed to drive
- Drivers must undergo a background check including a comprehensive review of history of felonies and a search of the sex offender and crimes against minors registry
- The company or the driver must have insurance that covers up to $1 million in accident damage and they must abide by a zero-tolerance policy regarding use of drugs and alcohol

Potential Impact of TNCs on the Richmond Region’s Transportation System

- Reduced car ownership, increase in car-sharing models
- Competition with existing taxi companies and impact on pricing
- Competition with public transit
- Integration of TNC-like applications by public transit agencies
Uber, Lyft and other ridesharing companies can provide taxi services at a lower cost than traditional taxi services by utilizing mobile app technology to rapidly connect freelance drivers to potential consumers. The mobile app allows users to request a ride by entering their intended destination and payment information into the app. Users are then shown a map indicating the number and location of drivers in the area, a profile of the driver, the driver’s approval rating, a picture of the driver’s vehicle, and the estimated arrival time. The mobile app technology tends to result in a more efficient taxi system, utilizing drivers only when needed and providing drivers with the flexibility to work when they want.

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> Appendix H-4: Preliminary Recommended Plan Evaluation for Mobility > Impacts of Technology Changes

The alternatives evaluation discussed a number of emerging technologies that have the potential to affect future land use patterns and transportation infrastructure in the Region, acknowledging that their precise impacts are difficult to predict. The technologies discussed included car and bike sharing, mobile app innovation, autonomous cars, and vehicle fuel efficiency.

As the alternatives evaluation noted, mobile app technology (used by ridesharing services like Uber and Lyft) and car/bike sharing may increase transit use, reduce greenhouse gas emissions and, due to increased bike share usage, improve public health. The Preliminary Plan would accommodate emerging mobile app technology in transportation by providing flexibility in mode choice with significantly greater options for transit use, increasing the likelihood some individuals may choose to replace private automobile ownership with Uber or Lyft in combination with relying more on public transit. The Preliminary Plan, like Alternatives I and II, proposes increasing the availability of car share and bike share facilities and services in the Region, and would support the growth of car and bike sharing by improving transit service, enhancing bicycle facilities, and creating denser, more walkable areas in the Region. Increased availability of car share could serve to enhance the Preliminary Plan proposals, as car sharing is especially effective at replacing personal automobile ownership in areas with robust rapid transit.
EXPLAINING THE ISSUES

Shared Mobility refers to new mobility paradigms as well as old models that are finding new markets and methods of delivery, thanks to new technology platforms. Shared Mobility encompasses a wide range of services including:

- Return Trip Car Sharing
- Point-to-Point Car Sharing
- Peer-to-Peer Car Sharing
- Ridesourcing (also known as Transportation Network Companies)
- Dynamic On-Demand Private Transit
- Vanpool and Private Employer Charters

For all these services, mobile computing and payment systems are reducing transaction costs and opening up traditional mobility services to a wider population of producers and consumers. The net effect of these services on transportation mode choices and per capita VMT is still to be determined. However, preliminary research shows that the availability and use of these services correlates with a reduction in individual vehicle ownership. This reduction in ownership, meanwhile, results in an increase in non-motor vehicle modes for discretionary trips. In other words, people who no longer own a car will be more selective in their car trips. In developing the 2016 RTP/SCS, SCAG looked at areas in which shared mobility services are expected to increase. The Plan anticipates robust growth in car sharing and ridesourcing. Ridesourcing is a term coined by researchers to refer to mobile phone-based applications that put riders in touch with drivers for a fee. Some drivers on one platform are professionals, while many other drivers are non-professionals earning income from giving rides. Policies to increase the use of car sharing and ridesourcing would result in a combined reduction of 0.9 percent greenhouse gas emissions.

> Executive Summary > Challenges We Face

Technology is transforming transportation: Mobility innovations including electric cars, the availability of real-time traveler information, the expansion of car sharing and ridesourcing due to smart phones and other technological advances will require updated planning to smoothly integrate these new travel options into the overall transportation system.
ESTABLISHING POLICY
> Transit Element > System Recommendations

Improve the quality of taxicab services. The presence of taxi companies is indicative of the need to give residents and visitors a means of travel other than privately owned automobiles. However, compared to other South Carolina metropolitan areas the taxi companies in Sumter provide a lower quality of service, which adversely could impact customer service as well as the image Sumter is trying to create for the area. City and County officials should investigate how other metropolitan areas have been able to improve the quality of their taxicab services without causing undue financial hardships on this industry.
To accommodate several modes of transportation, including intercity rail service and some or all of the following: intercity bus, commuter rail, intra-city rail transit and bus transportation, airport limousine service, bicycle and pedestrian facilities, airline ticket offices, rent-a-car facilities, **taxicabs**, private parking, and other transportation services.

Strategy: Work with shared mobility companies, taxis, TNCs, and transit agencies to enhance service in low-income and EJ communities, and provide increased accessible-vehicle service.

> Planning for the Future > Principle: Create an Integrated, Multimodal Transportation Network > Goal: Integrate Existing and New Modes Into an Accessible Multimodal Network

The region’s transportation network is an ecosystem consisting of a variety of modes: walking, biking, bikesharing, transit, paratransit, intercity buses and rail, ridesourcing, microtransit, personal vehicles, freight, and aviation. Each of these modes must become more accessible, which is the ability to reach desired destinations within the region. Seamless connections that enable easy transfer between modes are critical to promoting transit, biking, and walking, and to achieving a more sustainable future. Creating multimodal transportation hubs that combine a transit station with carsharing, bikesharing, and TNC and taxi pick-up and drop-off areas can enhance connections. Pick-up/drop-off areas will become more important than parking lots for accessing destinations, and transit stations will need to improve kiss-and-ride access.

> Planning for the Future > Principle: Create an Integrated, Multimodal Transportation Network > Goal: Improve Transportation Systems Management and Operations

Market-Based Strategies

- Prepare for the increased provision of private-market shared mobility services
- Review taxi regulations in light of the rules developed to govern TNCs
- Build partnerships with the private-market and nonprofits
- Seek mutually beneficial partnerships between local governments and transit agencies with TNCs and other digital transportation service providers
Transportation Network Companies and autonomous vehicles could drive down public transit operating costs and lead to changes in how transit is provided. RTC analysis of available data already shows that TNC ridership as a share of passengers at McCarran International Airport has doubled over a 6-month period. New ways of travel and vehicle ownership could change land use patterns, transportation revenue, and public transit preferences. With the actual impacts still unknown, the appropriate actions by the RTC (to avoid inefficient uses of resources for projects that may become unnecessary, avoid putting drivers, pedestrians, and bicyclists at risk, and accommodate these new trends and technologies) are difficult to determine until these technologies are more extensively adopted. To make smart decisions, some emerging planning-related questions may become:

- What infrastructure changes may be needed?
- When (or if) it will be appropriate to start changing how or what types of infrastructure or capacity are provided?
- How will these trends influence how and how much people travel, and how freight and household goods move?

The RTC is initiating a number of ACCESS2040 related actions over the next few years that will help identify and develop these innovative planning methods to manage the transition to new technologies and maximize the positive benefits for Southern Nevadans.
FINDINGS > Ridehailing > MTP Notable Practices

AGENCY: Southern California Association of Governments
METRO AREA: Los Angeles / Riverside, CA
PLAN TITLE: The 2016-2040 Regional Transportation Plan / Sustainable Communities Strategy
LAST UPDATED: April 2016

> On the Road to Greater Mobility & Sustainable Growth > Meeting Airport Demand

Los Angeles International Airport

- Support ability of ride-hailing services to pick up passengers, to reduce deadhead trips in the central terminal area.
TECHNOLOGY
<table>
<thead>
<tr>
<th>SEARCH TERM</th>
<th>NATIONAL</th>
<th>FTA REGION IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous / Autonomous Vehicle (AV) / Autonomous Car / Automated / Automated Vehicle (AV) / Automated Car / Automation / Self Driving / Self Driving Vehicle / Self Driving Car / Driverless / Driverless Vehicle / Driverless Car / Highly Automated Vehicle (HAV)</td>
<td>27 (51.9%)</td>
<td>22 (21.8%)</td>
</tr>
<tr>
<td>Connected / Connected Vehicle (CV) / Connected Car / Vehicle to Vehicle (V2V) / Vehicle to Infrastructure (V2I) / Dedicated Short Range Communications (DSRC)</td>
<td>25 (48.1%)</td>
<td>17 (16.8%)</td>
</tr>
<tr>
<td>Google / Waymo</td>
<td>5 (9.6%)</td>
<td>0 (0.0%)</td>
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<tr>
<th></th>
<th>Large MPOs (More than 1M)</th>
<th>All MPOs</th>
<th>Small MPOs (50K to 200K)</th>
<th>Medium MPOs (200K to 1M)</th>
<th>Large MPOs (More than 1M)</th>
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<td>52</td>
<td>101</td>
<td>46</td>
<td>43</td>
<td>12</td>
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</table>
Supplemental Caveats to the Keyword Analysis

- The term “automated” is used in many contexts in the plans reviewed, including automated vehicle locators, automated traffic recorders, automated fare collection, automated enforcement, automated payment, automated people movers, automated data collection, automated incident detection, etc. These and other keyword search results not directly synonymous with autonomous vehicles were excluded from the analysis.

- In the plans analyzed, the term “automation” is most commonly used in discussions related to goods manufacturing and delivery. These keyword search results were excluded from the analysis.

- The analysis excluded references to autonomous trucks because there is not a direct nexus with transit.

- Only those references to the Google/Waymo autonomous vehicle development and testing program were included in this analysis. The keyword search produced many results for other Google products, such as Google Maps, Google Earth, Google Analytics and Google Transit.

General Observations

- Specific transportation technology concepts are frequently embedded within a much broader discussion of technology and the changes it is causing on society. As a result, the notable practice excerpts provided in this section may not always include the entire text of a particular section of the plan. Attempts were made to preserve the general context of the relevant extracted text, however.

- There is an extremely wide variety of terminology being used for the technological concepts analyzed. Often, the terms are applied inconsistently between plans and some plans use multiple terms interchangeably. The lack of standard terminology reinforces the rapidly evolving nature of the concepts.
- Nearly a third of plans which reference autonomous/automated/connected vehicles simply acknowledge recent advancements and that the technology could have significant impacts in the future which warrant monitoring and potential additional analysis in future plan updates.

- Many plans provide short illustrative lists of potential impacts of these technologies. There is great uncertainty in the magnitude of the impacts and in some cases even whether the impact will be in a positive (desirable) direction or a negative (undesirable) direction within the context of regional goals and objectives.

- A few plans provide information on recent developments or announcements at the time of adoption. Because of the rapidly evolving landscape, this information becomes almost immediately outdated.

- There is a wide divergence of sources and statistics cited regarding implementation timelines of autonomous/automated vehicles.

- Because of uncertainties of impacts and timelines, policy statements which attempt to address these technologies tend to be vague and mostly of a “monitor and support” nature.
DEFINING THE CONCEPTS
Automated Vehicle (AV) and Highly Automated Vehicle (HAV) systems comprise hardware and software, both remote and on-board, which perform the functions needed to drive a vehicle. The key hardware components include an on-board computer that makes decisions; a global positioning system (GPS) signal system; an inertial measurement unit for when the GPS is out of signal; radar sensors that detect nearby vehicles; ultrasonic sensors that detect other vehicles and objects alongside the AV; LiDAR that identifies lane markings; and video cameras that read traffic signals, road signs, and watch for pedestrians and obstructions.

The National Highway and Traffic Safety Administration (NHTSA) has adopted the Society of Automotive Engineers International vehicle automation level definitions in an attempt to standardize them. These definitions classify vehicles based on “who does what, when:”

- Level 0 No Automation - A human driver does everything.
- Level 1 Driver Assistance - An automated system can sometimes assist the human driver in conducting parts of a driving task.
- Level 2 Partial Automation - An automated system can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task.
- Level 3 Conditional Automation - An automated system both actually conducts some parts of the driving task and monitors the driving environment in some instances, but the human driver must be ready to take back control when the automated system requests.
- Level 4 High Automation - An automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can only operate in certain environments and under certain conditions.
- Level 5 Full Automation - An automated system can perform all driving tasks under all conditions that a human driver could.
DEFINING THE CONCEPTS

> Transportation System > Transportation System Management and Operations > Connected and Automated Vehicles

**Connected** and **automated** Vehicle technologies have the potential to fundamentally transform the nation’s transportation system. These emerging technologies are expected to be deployed within the timeframe of this plan, so it is important for transportation management agencies to begin planning for their impacts on the regional transportation system.

**Connected** vehicles are vehicles that use wireless technology to interface with other vehicles and roadside infrastructure. These wireless interfaces relay information regarding vehicle speed, heading, and position between vehicles (**vehicle-to-vehicle** or **V2V**) and infrastructure (**vehicle-to-infrastructure** or **V2I**). This allows vehicles to maintain situational awareness of surrounding traffic conditions at all times and alert motorists of potential hazards.

**Automated** vehicles are vehicles with safety features that function automatically (i.e., without driver input). For example, **automated** vehicles may be equipped with sensors that detect when other vehicles ahead of them in traffic brake. If the driver of the **automated** vehicle does not brake within specified parameters, the **automated** braking function will stop the vehicle before it collides with the vehicle in front of it. **Automated** vehicles do not need to be **connected** to other vehicles or infrastructure; they simply monitor traffic conditions and automatically respond to changes in those conditions.
Defining the concepts

National Agency: North Central Texas Council of Governments
Metro Area: Dallas / Fort Worth, TX
Plan Title: Mobility 2040
Last Updated: March 2016

Operational Efficiency > Transportation System Management > Emerging Technology Investment Program
Connected Vehicle

Connected Vehicle technologies use wireless communication to connect vehicles with one another and the surrounding infrastructure, such as cell towers or roadside communication equipment. This connectivity is classified into three types:

1) vehicle-to-vehicle,
2) vehicle-to-infrastructure, and
3) vehicle-to-others (including personal devices, bicyclists, and pedestrians)

Connected Vehicle technologies allow secure, interoperable, networked wireless communications between vehicles, the roadway infrastructure, and personal communication devices. The devices collect and share data about important safety and mobility information such as vehicle position, speed, size, traffic signal information, and weather conditions.
Autonomous vehicles, also known as self-driving cars, are vehicles that are able to navigate the roadway with no or limited human interaction. They use an array of in-vehicle technologies to process their surroundings and identify various obstacles (including other cars), detect road signage and markings, and determine the most suitable navigation path.

Connected vehicles employ technology that allows vehicles to transmit and receive important mobility, safety and other information in real time. Communication can occur with other vehicles, traffic lights and other infrastructure, pedestrians and bicyclists, and any entity that may interact with the vehicle.
DEFINING THE CONCEPTS

The National Highway Transportation Safety Administration (NHTSA) defines vehicle automation as having five levels:

- **No Automation** (Level 0): The driver is in complete and sole control of the primary vehicle controls – brake, steering, throttle, and motive power – at all times.

- **Function-specific Automation** (Level 1): Automation at this level involves one or more specific control functions. Examples include electronic stability control or pre-charged brakes, where the vehicle automatically assists with braking to enable the driver to regain control of the vehicle or stop faster than possible by acting alone.

- **Combined Function Automation** (Level 2): This level involves automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions. An example of combined functions enabling a Level 2 system is adaptive cruise control in combination with lane centering or traffic jam assist.

- **Limited Self-Driving Automation** (Level 3): Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions and in those conditions to rely heavily on the vehicle to monitor for changes in those conditions requiring transition back to driver control. The driver is expected to be available for occasional control, but with sufficiently comfortable transition time. The Google car is an example of limited self-driving automation. Examples of combined functions include traffic jam pilot, automated parking, and highway autopilot systems.

- **Full Self-Driving Automation** (Level 4): The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. Such a design anticipates that the driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip. This includes both occupied and unoccupied vehicles such as closed campus driverless shuttles, valet parking in garages, and ‘full automation’ in certain conditions.

- **Driverless Automation** (Level 5): The vehicle is able to operate without any driver present. Functions may include automated taxi services and car-share reposition systems.


> Glossary

**Automated Vehicle**

U.S. Department of Transportation’s National Highway Traffic Safety Administration (NHTSA) has defined five increasing levels of vehicle *automation* at five levels:

0. **No-Automation**: The driver is in complete and sole control of the primary vehicle controls.
1. **Function-Specific Automation**: Automation at this level involves one or more specific control functions.
2. **Combined Function Automation**: This level involves automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions.
3. **Limited Self-Driving Automation**: Vehicles at this level of automation enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions.
4. **Full Self-Driving Automation**: The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip.

**Autonomous Vehicle**

Vehicles in which operation of the vehicle occurs without direct driver input to control the steering, acceleration and braking and are designed so that the driver is not expected to constantly monitor the roadway while operating in self-driving mode.

**Connected/ Automated Vehicles**

Refers to the interrelated nature of connectivity and *automation* in new vehicle technology. **Connected vehicles** are vehicles that use any of a number of different communication technologies to communicate with the driver, other cars on the road (vehicle-to-vehicle [V2V]), roadside infrastructure (vehicle-to-infrastructure [V2I]) and the “Cloud” to improve safety, user experience and collision avoidance.
EXPLAINING THE ISSUES
> Future > Scenario Planning

During development of The Atlanta Region’s Plan, three scenarios were considered: technological advancement, autonomous vehicles, and transit connected regional centers. The exercise attempted to determine likely or possible outcomes of: 1) advancements in communication technology for work, residential, and transportation decisions of residents, businesses, and transit providers in the Atlanta region; 2) potential effects of new vehicle technology to help revise and prioritize what types of transportation investments are made in the region; and 3) potential outcomes of focusing growth around transit connected regional centers to inform future efforts to revise and prioritize the regional unconstrained vision for transit expansion. Furthermore, in collaboration with the Environmental Protection Agency (EPA), ARC was also able to explore emission reduction strategies that are more difficult to analyze with travel modes, such as pricing strategies, travel demand management strategies, transit efficiency, and land use strategies.

Throughout 2016 and into 2017, leveraging the help of a USDOT SHRP2 grant, ARC undertook a scenario planning process to further explore global and regional drivers of change. This work began with the identification of nine key disruptive influences or “drivers of change” which are most likely to have major implications on our ability to win the future.

The next step in this exploratory scenario process involved identifying plausible relationships between these nine drivers of change and weaving them into four distinct alternate futures, which were then analyzed for transportation

Key drivers of change for the Atlanta Region

1. Autonomous Vehicles
2. Spatial, Racial and Economic Equity
3. Climate Change Regulations
4. Aging of the Population
5. Transportation Finance Structure
6. Water Supply
7. Intelligent Infrastructure & Technology
8. Ridehailing Services
9. Port Traffic
impacts using a variety of modeling tools. The intent was not to attempt to predict a precise future and determine its relative likelihood, but merely to present a set of possibilities to help inform future policy discussions. In addition to the scenario narratives and the analysis results, a key deliverable of the effort was an online gaming tool which will allow individuals to indicate their viewpoints on the likelihood of various trends. After completing the exercise, the user will be informed on which alternate future most closely aligns with their responses and to explore that scenario (as well as the other three) in more detail. This tool, as well as all associated SHRP2 documentation, will be launched concurrent with the community engagement process leading to the next major update of The Atlanta Region’s Plan.

Work under the SHRP2 grant was completed in the summer of 2017. ARC possesses a strong desire to build on the momentum this work has prompted. The level of engagement and interest from committee members and other stakeholders related to drivers of change and alternate futures is at a level rarely seen around any initiative undertaken by the agency. We consider submittal of final SHRP2 documentation to USDOT to be a point of transition, not a conclusion, on our work in these areas. While many questions remain on how to best proceed and where those paths may ultimately lead, there are numerous opportunities available to us moving forward.
Our future infrastructure is poised to achieve significant improvements in the coming decades, including:

- Safer roads - New technologies in cars and on roadways will greatly reduce motor vehicle crashes in the coming decades. Some experts predict that we can virtually eliminate traffic fatalities by using these new technologies in concert with law enforcement, better engineering and education.

- Less congestion - Automated and connected vehicles, operating in platoons or independently, will travel at high speeds and occupy less highway space, as on-board sensors, vehicle-to-vehicle and vehicle-to-infrastructure communications allow for more active traffic management across cities and commuting corridors.

- Greater sustainability - Fewer idling, fuming cars, more efficient vehicles of all kinds (many that burn no fuels), and smoother connections between transportation modes will have a highly positive impact on the environment and air quality.

These outcomes are highly desirable, and ultimately achievable. However, the path forward may require new paradigms for transportation owns from the way they plan, to how they align resources, to how they interact with the public at large.
There is no question that cars are becoming smarter. Autonomous or self-driving vehicles are being tested for eventual private use. Although there are still regulatory and legislative hurdles to overcome, market experts speculate that fully autonomous vehicles could be available for purchase around 2020. Autonomous vehicles could create a driving or commuting atmosphere which provides time savings by allowing drivers to complete other tasks while they would otherwise have been navigating the wheel. The cost of these vehicles will likely hinder widespread ownership in the early years of their availability to the public, but providing a commuter or driving environment where the driver can multi-task rather than focus solely on driving could be a significant attractor to many people.

Figure 3-9 illustrates how forms of vehicle automation are already included and assisting drivers in cars on the road today. Communication between vehicles already benefits drivers with blind spot detection, rearview cameras, automatic parking assistance, GPS, and detection of lane obstructions. Figure 3-10 shows how the five levels of automation, as defined by the National Highway Transportation Safety Administration, are built upon each other in attaining fully automated vehicles. Individual functions like braking assistance or electronic stability control are the elements of level 1 automation. Moving to level 2, multiple components are combined. Moving through level 3 to level 4 requires automobiles to take on more of the decision making and safety-critical driving functions without expecting the driver to take control of the vehicle. Communication between vehicles and the transportation infrastructure, however has not been implemented and will likely be a large investment to realize the benefit of a fully automated vehicle. Detecting cross traffic at intersections, communicating when traffic signals change from green to
red, or detecting the presence of emergency vehicles are all additional policy and funding hurdles that are yet to be overcome. Through an annual statewide summit, FDOT has initiated three research projects to address these challenges:

- transportation policy and long range plans;
- staying mobile and potential market acceptance to address the needs of the transportation disadvantaged; and
- viable transit applications.

More information about FDOT’s automated vehicle program can be found at www.automatedfl.com.
EXPLAINING THE ISSUES

> Corridor Planning > Transportation Strategies > Roadways and Automated Vehicles

A number of sources estimate that automated vehicles, including cars, trucks, buses and trains, will fully saturate the vehicle fleet by 2060. The anticipated benefits of this technology are:

- Increased roadway efficiency – automated vehicles reduce spacing between vehicles thereby increasing roadway capacity. Some estimate automated vehicles will more than double roadway capacities on limited access highways (expressways) and around a 40 to 50 percent increase on reduce wind resistance and fuel consumption, but not to the same extent capacities are improved.

- Improved safety – automated vehicles have the potential to reduce crashes, injuries and fatalities significantly; indeed, even the limited automation in vehicles today, such as collision avoidance/alert systems, improve safety.

- Greater flexibility in vehicle use – because autos are a necessity in Brevard County, those who are able to drive typically purchase a car and cover its operating costs. With automated vehicles, many could schedule pick-ups and drop-offs for daily trips and simply rent the car for those trips. This concept could extend to demand response, or even fixed route transit, where larger vehicles could carry more passengers with common trip origins and destinations, thereby reducing the price per trip.

- Improved parking and land use efficiencies – automated vehicles could change how and where parking is provided, mitigating one of the largest impediments to compact, walkable urban form, which is parking. Vehicles could drop passengers off at the front door at a destination, then self-park at a remote lot or storage facility, then return to the same, or a different door, when summoned.

- Lower transit operating costs – paying drivers is one of the largest expenses for transit operators. Automated transit vehicles can reduce that expense, thereby increasing the feasibility of transit. Furthermore, automated transit vehicles can more efficiently pick up and drop off passengers, both increasing its attractiveness and its operating efficiency.
It is difficult to pinpoint when **automated vehicles** will become the norm and even more difficult to understand how they will influence future travel and development patterns. Many estimate the percentage of **automated** cars, trucks, buses and trains will slowly increase, with a small percentage in use by 2020 and full saturation by 2060. The impacts on travel and land use are less clear, but the interest among Brevard’s residents to walk and bike for daily trips suggests the need for creating compact, walkable places despite the potential of the technology. It is also quite possible, as suggested above, for the technology to support both compact urban forms and multimodal travel.

Of importance to the corridor analysis is the potential impact of **automated vehicles** on roadway capacities and the resulting impact on needed rights of way along multimodal corridors. As noted above, some speculate that **automated vehicles** can more than double existing roadway capacities on limited access roads and half again the capacity on interrupted flow arterials. With all vehicles **automated**, the potential four-lane arterial capacity increases to 60,000 vehicles per day compared to the current capacity of 40,000 vehicles per day. Such capacity increases mitigate the need for dedicated rights of way for private vehicles along multimodal corridors, providing room for other forms of travel, such as sidewalks, bike lanes and BRT. In spite of the efficiency improvements associated with **automated vehicle** technologies, roadway capacity improvements, including widening existing roadways and developing new roadways in some areas, are also needed in some areas that are expected to continue growing with suburban development patterns, particularly in Palm Bay and Viera. The transportation strategies included in both the Metaplan and the Vision Plan thus represent a comprehensive tool set of transportation improvements.

> Scenario Planning > Scenario Results > High-Tech Lifestyle

**Overview**

This scenario explores the potential impacts of high tech on lifestyles and travel, and how planning for technology could support the county’s existing high tech cluster.

**Outcomes**

The scenario anticipates people will rely more heavily on connecting via the internet, thereby work and shop more from home. On those occasions when people travel to work and shop, their destinations will be non-traditional offices and stores that require much less space. People will seek entertainment and recreational connections and prefer those destinations be clustered with other destinations, such as reconfigured work and shopping venues. Those clustered destinations will form high tech hubs. Compact and multi family oriented neighborhoods will locate around the hubs, and travel between the neighborhoods and the hubs will be by **autonomous vehicles** or high tech transit.

**Autonomous vehicles** will increase roadway capacities and change how parking is provided. Rather than in front of buildings, parking will locate on the fringe of hubs as cars park themselves. Despite the higher capacities and simplified parking, changes in lifestyle preferences, including an emphasis on personal and environmental health, will foster walkable hubs and neighborhoods.
Reactions

Participants liked the “outside the box” thinking of the scenario and believed that it created options that could attract the next generation of high-tech workers. They also liked the increased connectivity via the internet and walkable high tech hubs and neighborhoods. Participants questioned whether such technologies and changes will become reality by 2060 and were concerned about the ability of older residents to adapt.
EXPLAINING THE ISSUES

Technological innovations are changing how cars of the future might operate. Communication technology connects cars to each other (V2V or vehicle-to-vehicle), to roadside infrastructure (V2I or vehicle-to-infrastructure) or to a communications system (such as to the internet). These technologies may manifest themselves as automatic braking to avoid collisions, or real-time travel condition notification to allow for route modification.

Autonomous vehicles, popularly known as “self-driving cars,” are quickly becoming a reality. Agricultural and mining operations already use self-driving cars. Some passenger cars are now equipped with a “self-parking” feature. Many automobile manufacturers and research organizations are developing autonomous vehicle technology. Developers are building large testing districts to simulate urban areas and provide real-world scenarios to test autonomous vehicles.

While this technology is developing rapidly, autonomous vehicles are not likely to be in widespread use before the next plan update. Use of autonomous vehicles could require significant modifications to the transportation system, but might also use existing capacity more efficiently. Autonomous vehicles could significantly lower the number of crashes, and might substantially change car ownership and travel patterns.
EXPLAINING THE ISSUES

The future of transportation generally portends the emergence of HAVs within a few years or over the course of the next several decades. While there is considerable uncertainty surrounding HAVs, there is much work that needs to be done in order to prepare for them. Some initial considerations in planning for HAVs, based on DVRPC’s research and stakeholder dialogue, include:

- **HAVs** still have technological, legal, and administrative hurdles to overcome. It is not clear when they will be commercially available, where they are on the cost curve, or what their rate of uptake will be once they are on the market. Their land use, vehicle ownership, VMT, road capacity, crashes, pavement distress, and job implications are also unclear. See Table 8.
  - Supporting regional Centers with denser land use patterns and building agglomeration economies, consistent with the Connections 2045 Plan, should be the goal.

<table>
<thead>
<tr>
<th>TABLE 8: HAV UNCERTAINTY</th>
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<tr>
<td><strong>COULD DECREASE DUE TO</strong></td>
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<tr>
<td>Vehicle sharing, higher vehicle costs</td>
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<tr>
<td>Increased travel willingness / better use of in-vehicle time</td>
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<tr>
<td>Vehicle sharing, denser development</td>
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<tr>
<td>Follows all road rules / defensive driving</td>
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<tr>
<td>Machine precision</td>
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<tr>
<td>Low-emission vehicles, right-sized vehicles, eco-driving</td>
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<tr>
<td>Vehicles avoid deficiencies, smoother traffic flow</td>
</tr>
<tr>
<td>AI (deep learning) displaces workers</td>
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</table>

- There is no guarantee HAVs will be shared, though sharing should be the goal.
- While they may increase the capacity of existing facilities, the rebound effect suggests they would equally increase VMT. Particularly significant is the potential for zero-occupant vehicles to clog the road, increasing the need for road pricing.
- HAVs may be connected and cooperative with other vehicles and infrastructure; or they may be autonomous and operate independently using only on-board sensors and operating systems.

**HAV** infrastructure needs include pavement, road markings, signs, construction zones, TSMO, curbside management, and updated design standards.

- Pavement must be smooth and well maintained as potholes and other bumps could cause equipment to become misaligned or malfunction.
- HAVs need well-maintained road markings for guidance.
- Signs need to be clear, readable, and standardized across the state or ideally the nation; and may require additional tree trimming to ensure visibility.
- A database of all active construction zones may need to be created and updated to inform HAVs when and where the rules of the road have changed.
- Roadway geometry design standards will likely be revised.
- TSMO strategies are a first step toward automating roads.
- Pick-up and drop-off zones will be needed to ensure safe vehicle and building egress as more trips become door-to-door.
- HAVs are likely to be electric, increasing the need to build out EV infrastructure.

Initial applications may be limited to closely monitored, geofenced areas where at least two of the following is in place: highly detailed digital maps, slow speeds, or good weather. There may be a long period where HAVs and human-driven vehicles share the road.

- Until HAVs are operating on their own infrastructure, society may not see significant safety, congestion, and other expected benefits.
- Achieving these benefits sooner could require: construction of new HAV-only facilities; conversion of existing facilities, or a proportion of existing facilities, to HAV-only; or banning human drivers.

**HAVs** will make the system more complex and reliant on advanced communications networks, increasing the risk of and magnifying the impact from system failures.

The actual price to use shared HAVs is likely to vary based on supply and demand. Shared HAV fleets are unlikely to be sized to meet peak-hour demand, as this would be inefficient. This means the calculus of each trip that an individual takes could vary based on the available supply and demand for each mode and create price surges, leading to affordability and equity issues.
A number of externalities in the existing transportation system could slow the deployment of CV and HAV technologies, which are widely expected to provide societal benefits for safety, the environment, health, and mobility for those that lack it. These include:

- Congestion, where underpriced roads mean each vehicle entering a roadway operating at or above its capacity causes more delay to each driver using the facility;
- Air and noise pollution, which could be reduced by new technologies but are not currently priced in the existing system;
- Insurance, where personal vehicles do not pay full liability for crash costs; and
- Traffic law enforcement, where human drivers regularly travel above the speed limit and go through yellow and red lights, while CVs and HAVs are likely to be bound by all the rules of the road. This will potentially slow these vehicles down relative to human driven ones. Automated enforcement could help to level the playing field and improve safety.

HAVs may reduce the need for parking, particularly if they are shared. To encourage shared HAV fleets, communities can relax parking requirements in existing zoning codes and begin to identify reuse opportunities for existing parking facilities, such as pick-up and drop-off zones, transfer stations between modes, EV charging stations, wider sidewalks, green infrastructure, protected bike lanes, street furniture, or bus-only lanes.

CVs and HAVs will generate copious quantities of data, creating ownership questions and personal privacy concerns. Greater vehicle movement data availability risks bias and distortion of the planning process in favor of cars over other modes.

> Trends, Forecasts and Forces > Networking Transportation

Connected Vehicles (CVs) use dedicated short-range communications (DSRC) through licensed wireless networks, cellular technologies, satellites, the Internet, and telematics to connect cars, trucks, buses, motorcycles, bicyclists, pedestrians, and infrastructure. Telematics integrate telecommunication and information technologies for enhanced vehicle safety and mobility. Connected systems create machine awareness with other CVs, infrastructure, and other objects. This can provide warnings to the driver about safety hazards, such as curves, intersections, and nearby vehicles. CVs can overcome range, sight, and data interpretation problems with sensors, while enabling more coordination and traffic flow management.9 By cooperating with each other, CVs are anticipated to reduce crash and fatality rates for nonimpaired drivers by up to 80 percent.10 However, connected and wireless technologies open CVs up to hacking and cybersecurity risks. In the longer term, CV technologies may move much road information - signs, speed limits, even traffic signals - to the vehicle dashboard, reducing roadside clutter and lowering maintenance costs.
Stability and Sustainability

Flat rate fees can be difficult to raise but would need occasional increases to keep up with inflation. Although vehicle ownership rates have outpaced population growth over the past several decades, future vehicle technologies, such as driverless cars, may revolutionize the vehicle ownership model. In a future with more carsharing, there may be fewer cars in the region to pay vehicle registration fees.
EXPLAINING THE ISSUES

The rapid development of Connected and Automated Vehicle (C/AV) technologies in recent years has led to an explosion of interest and concern as to how these technologies will impact our transportation system and the people who use it. Connected Vehicles are vehicles that use wireless technology to communicate with other vehicles and roadside infrastructure, while Automated Vehicles are vehicles with safety features that function automatically, i.e., without driver input. Many Automated Vehicle technologies (e.g., adaptive cruise control, collision avoidance, emergency braking, blind-spot detection, lane-keeping assist, and automated parking) are already available on the market.

The full range of impacts from these emerging technologies is unknown. Anticipated benefits include greater mobility for all system users, including those who cannot drive due to age, disability, or health concerns; increased safety through reduction in crashes; improved productivity for commuters, freight carriers, and other travelers, reduced vehicle emissions and increased road capacity due to greater vehicle and roadside infrastructure operations efficiency. However, a range of potential disadvantages have also been identified. These include the initial high costs of adopting and deploying C/AV supportive technology, data security and privacy issues, and induced demand for road space which may lead to increased congestion and emissions, as well as the simple fact that many people enjoy driving and may not want to give up manual control of their vehicles. The current national sentiment towards these technologies is mixed. A 2016 study conducted by the American Automobile Association (AAA) found that while 75 percent of drivers are afraid of self-driving cars, 61 percent also want autonomous features in vehicles. Balancing the public’s concerns with the potential benefits of these emerging technologies will be among the key challenges that transportation agencies, the automotive, legal, and technology industries, as well as the community at-large will need to address over the next several decades.
A more futuristic technology is the **automated vehicle**, which is also referred to as a **driverless** or **self-driving** vehicle. **Automated vehicles** can sense its environment and navigate the roadway network without human inputs.

The benefits of **automated vehicles** are numerous. Traffic congestion could be greatly reduced due to less space being needed between vehicles. The number of crashes would likely plummet. Ride-sharing could grow exponentially, and a number of parking lots may no longer be necessary. **Automated vehicles** would also provide increased mobility for the elderly, the blind, and the disabled. Productivity could also rise if vehicle owners no longer needed to operate the vehicles themselves.

A number of agencies are testing various aspects of **automated vehicle** technology. One of the most high profile efforts is being undertaken by Google. By 2014, the Google self-driving vehicle had driven 700,000 autonomous miles.

Since it is a developing technology, projected timelines for the widespread implementation of **automated vehicle** technology vary greatly. Many vehicle manufacturing companies expect to begin selling vehicles that will be **self-driving** at least part of the time in the next decade. By 2035-2040, many experts predict that the majority of vehicles sold could be fully **automated**.
Connected vehicles uses basic wireless technology to transfer real-time data between vehicles (V2V), from vehicle-to-infrastructure such as traffic signals (V2I), and from infrastructure-to-vehicle (I2V). This technology provides real-time warnings to drivers, informing them of traffic signal status, traffic congestion, and work zones, and helping them avoid crashes. These communication paths also provide the ability to send and receive traffic condition information to and from traffic management centers and other transportation agencies. This technology, when fully implemented, will improve mobility, productivity, fuel economy, and particularly safety. Connected vehicle technology is currently being installed in a few vehicles, and FHWA predicts that connected vehicle infrastructure will begin being installed in traffic signals in the 2020 timeframe. By 2040, FHWA predicts that 80% of traffic signals and 90% of passenger vehicles will have this technology installed.
Another technology that has the ability to increase mobility in the near-future is driver-assisted and driverless cars. There are significant implications with this technology. Will it increase congestion because more populations who would normally not drive - elderly, young, people with disabilities - now have access to a car? Or, as transportation consultant Denis Eirikis predicts, “Fully automated and connected vehicles will double existing road capacity because transportation planners and engineers can allow for narrower lanes, increased speed, and shorter safe following distances among vehicles.” These and related questions still need to be thoroughly examined in the Twin Cities region.

Driverless transit vehicles are also on the horizon with a model being tested now in France for use in college and medical campuses, theme parks, planned communities, office parks, and city centers. These vehicles could help to increase mobility by connecting people to the “last mile” of their destinations. Driverless transit and paratransit vehicles also have the potential to greatly benefit people with disabilities by increasing their mobility.
As this plan is updated, several issues are emerging that may prove to be significant in impacting future strategies and investments, but are new enough that consensus has not emerged about how to fully assess and address them. MARC will monitor these and other issues, and may need to update future regional planning assumptions as their impacts become apparent.

- **Connected** and **automated vehicle** technologies are becoming more prevalent in the automotive and trucking industries. Assistive technologies such as adaptive cruise control, lane departure warning systems and crash-avoidance systems have entered the mainstream passenger car market. In addition, academic institutions and private industry have completed numerous research and pilot programs for fully **automated vehicles**. As these technologies reach consumers, they may create significant changes in vehicle performance that may impact planning assumptions for factors such as safety and roadway capacity. They may also impact residents’ travel behavior, location decisions and mode choices, as well as the economics of trucking and freight transportation. The pace of change and rate of adoption of these technologies is uncertain, as their access will be influenced by cost, regulation and other factors.

- Ride-hailing services provided by Lyft, Uber and other firms may continue to grow in popularity and could provide significant competition for traditional taxi and limousine services, ride-sharing, public transportation and private auto-ownership, in a way that impacts future travel behavior and land-use decisions. These services, in combination with **automated vehicle** technologies, could create many unpredictable positive or negative impacts to the regional transportation system.
Autonomous vehicles

Autonomous vehicles, also referred to as self-driving or driverless cars, are motorized vehicles capable of sensing their environment and navigating roadways without human input. A number of research and engineering institutions estimate that within two decades these vehicles could make up 75 percent of all vehicles on the market. The use of autonomous cars could reduce many behavior-related crash types and result in fewer traffic crashes. Their use, however, creates many challenges, including establishment of government regulations, interaction between autonomous vehicles and traditional human-driven vehicles, determination of liability responsibilities for crashes and more.

Vehicular communication system

This is a type of intelligent transportation system (ITS) network that allows vehicles and roadside units to communicate and provide each other with information such as safety warnings and traffic information. V2V (vehicle-to-vehicle) technology uses ITS communication between vehicles to warn drivers about approaching dangers from other vehicles, upcoming obstacles or abrupt changes in the roadway. NHTSA believes vehicular communication systems could help avoid up to 79 percent of all vehicle target crashes.
Another technology that will potentially change the way that we travel is the autonomous, or self-driving vehicle. A self-driving vehicle is capable of sensing its environment and navigating without human input, and could reduce the occurrence of automobile accidents caused by dangerous driving, enhance human productivity by freeing them from driving, and improve mobility for children, the elderly and the disabled. No longer a futuristic idea, self-driving vehicles are in development at Tesla, Google, Mercedes, BMW, and other companies. In September of 2016 Uber launched its pilot program of autonomous vehicles in Pittsburgh, Pennsylvania using self-driving Ford Fusion vehicles. Boston has also partnered with the World Economic Forum to launch a yearlong program to test autonomous vehicles which began in January 2017.
Autonomous vehicles also called self-driving cars/trucks or driverless cars/trucks have received extensive press in recent years given significant development in the technology. As envisioned, these vehicles can drive themselves without any operator input. Connected vehicles allow a vehicle to communicate with other elements, such as passengers in the car, other vehicles on the road, wayside infrastructure, and the Cloud. Uber and Google have been testing their driverless cars with a driver in the vehicle; Tesla Motors has released new “autopilot” technology. Both the Uber and Google driverless cars have experienced operational errors, which can be expected as a new technology is tested. Most recently, as of this writing, the State of California ordered Uber to remove its self driving cars from the road after several instances of them running red lights in pedestrian-heavy San Francisco. Uber responded by saying the errors were “human errors” caused by the persons in the vehicle monitoring the drives and suspended those persons. As if this writing, it is not clear what actions will be taken - whether Uber will comply or California will enforce its order.

California aside, testing could be undertaken in many places, and many see driverless vehicles and connected cars as technologies that are indeed becoming a reality. If implemented as conceived, there are numerous benefits of autonomous and connected vehicles, including:

- safety, as most car accident injuries and fatalities are the result of human error; the technology would result in crash elimination
- the need for less infrastructure as cars could operate more closely together, making better use of limited pavement space
- increased productivity as commuting time could be spent on other activities besides driving
- new models of car ownership are anticipated as cars may be shared or owned cooperatively

As discussed above, however, the safe operation of such vehicles on city streets and the nation’s highways has yet to be proven. Accordingly, states and localities may require guidelines or processes to allow for the development phase of this technology. On a related note, beyond the testing phase, states and localities need to consider specific regulations to be implemented for automated vehicles, including registration, operations, maintenance requirements, etc. Furthermore, the infrastructure requirements for the safe operation of autonomous and connected vehicles need consideration, though these are not yet fully defined by the industry. For example, overhead wires or overhead trees with wind blowing the branches may impact safe operations. Would new tree maintenance requirements be necessary? Would lane striping need to be maintained more regularly compared to the many faded painted line seen on roads today?
> Operational Efficiency > Transportation System Management > Emerging Technology Investment Program

**Connected Vehicle** technologies create a collective intelligence that could enable safety, mobility, and environmental solutions to help save lives, prevent injuries, reduce traffic congestion, and decrease emissions.

> Operational Efficiency > Transportation System Management > Emerging Technology Investment Program

**Autonomous Vehicle**

**Autonomous vehicles** use radar, Global Positioning System, image recognition, or computer vision to navigate their environment with limited to no input from humans. This technology could improve reliability and reaction time, reducing traffic collisions; lead to smarter and greener driving and navigation; require less urban land for parking due to autonomous parking capabilities; and increase access to travel by occupants who face obstacles due to age or physical impairment.
This is an exciting time for transportation. Emerging technologies, including connected and autonomous vehicles, promise to revolutionize how people get around. Combined with car sharing systems and tools that better inform travelers, the future will look quite different than the past.

These changes are disrupting how we think about transportation systems. Emerging technologies such as self-driving cars have shifted from a futuristic vision to a likely reality that must be planned for. Shared mobility services such as Lyft and Limebike, and traveler information tools such as Waze have become far more prolific. The more established Intelligent Transportation System technologies, such as adaptive signal control and active traffic management, have seen significant upticks in deployment and are playing a key role in the growing “Smart Cities” approach to transportation planning, in which the emphasis shifts to the use of data and communication technology to improve the overall efficiency and effectiveness of a city’s transportation system. Transit agencies are emphasizing the importance of coordinating with and leveraging these new technologies to provide first-mile/last-mile connections, and beginning to think of complementary technologies and travel modes as “mobility as a service.”

Private companies are investing heavily in research and development of autonomous vehicles. A spring 2017 survey by CB Insights identified 44 companies around the world actively in the race to develop and deploy self-driving vehicles. The strong interest in self-driving cars has brought a convergence of venture capital, high-tech companies, and traditional automobile manufacturers and suppliers.

Autonomous and connected vehicles are expected to bring significant benefits, including increased mobility options, improved safety, and reduced congestion.

Yet uncertainty persists. The rapid change in technology makes it hard to predict when new technologies will mature and become widespread, what the impacts will be on all aspects of transportation, such as travel behavior, land use, and parking, and what must be done to ensure those changes support the region’s policy goals.

Questions remain about who will have access to these new vehicles and services, when manufacturers will produce the equipment, whether people will accept and adopt the new technologies, and how quickly. Even without definitive answers to these questions, now is the time to start considering how new technologies will impact transportation and land use. To prepare for the future, PSRC will continue to enhance the regional travel model’s ability to analyze the effects of new technology on travel, support technology deployment pilot programs, establish a technology advisory
committee, and facilitate regional discussions to both support private sector projects and partnerships, and identify the near-term changes that may be necessary to support autonomous vehicle testing, such as new roadway lane striping and street signage.

While new and emerging technologies will reshape our future, existing technology is in use today that provides operational efficiencies and mobility improvements. These include Intelligent Transportation Systems (ITS) such as freeway ramp metering, adaptive signals, coordination of traffic signals, transit signal priority, and other tools to improve traffic flow and safety for cars, buses, bicyclists, and pedestrians. The overall purpose is to make the best use of rapidly evolving technologies in the near-term and to forge a path for leveraging benefits, minimizing disruptions, and aligning with regional policy goals in the long term. Updating common ITS architecture is a first step to making sure that the region is coordinated as these improvements are implemented. These technologies are becoming more widespread throughout the region, and interconnected, but more work remains to be done. Jurisdictions should be encouraged to pursue innovative transportation technology.

Despite the uncertainty, both established and emerging technologies are critical to the future of transportation. This provides an excellent opportunity for government agencies across the region to make smart, effective investments that will leverage potential benefits, limit less desirable outcomes, and find efficiencies that make better use of the transportation system. PSRC will continue to engage with national, state and regional partners as new technologies emerge and intersect with regional planning efforts to ensure the region is poised to respond quickly and effectively.
Emerging technologies and their growing use will disrupt traditional transportation planning practices. To respond proactively, the RTC will develop innovative planning approaches that change how priorities are identified and how decisions are made. These new planning methods – which may take years to identify – will allow the RTC to develop effective, predictive, and timely responses to these disruptions.

Potential impacts are numerous. Engineering research indicates that connected and autonomous vehicles could nearly double effective road capacity, virtually eliminating traffic congestion and challenging the need for more capacity. At a certain threshold across the entire fleet, self-driving cars are expected to substantially reduce overall transportation crashes and fatalities. Transportation Network Companies and autonomous vehicles could drive down public transit operating costs and lead to changes in how transit is provided. RTC analysis of available data already shows that TNC ridership as a share of passengers at McCarran International Airport has doubled over a 6-month period. New ways of travel and vehicle ownership could change land use patterns, transportation revenue, and public transit preferences. With the actual impacts still unknown, the appropriate actions by the RTC (to avoid inefficient uses of resources for projects that may become unnecessary, avoid putting drivers, pedestrians, and bicyclists at risk, and accommodate these new trends and technologies) are difficult to determine until these technologies are more extensively adopted. To make smart decisions, some emerging planning-related questions may become:

- What infrastructure changes may be needed?
- When (or if) it will be appropriate to start changing how or what types of infrastructure or capacity are provided?
- How will these trends influence how and how much people travel, and how freight and household goods move?
BEGINNING IN THE 1980S, SCIENTISTS AND RESEARCHERS HAVE BEEN INVESTIGATING THE POTENTIAL OF REPLACING THE HUMAN ELEMENT IN TRANSPORTATION BY EXPLORING THE POTENTIAL FOR VEHICLE AUTOMATION, POPULARLY REFERRED TO AS DRIVERLESS CARS. IN THE LAST DECADE THE RATE OF TECHNOLOGICAL CHANGE IN VEHICLE AUTOMATION HAS INCREASED, AND DRIVERLESS CARS ARE NOW BEING TESTED TO VARYING DEGREES ACROSS THE COUNTY, INCLUDING ON HIGHWAYS IN VIRGINIA. PREDICTIONS AS TO WHEN DRIVERLESS CARS COULD TAKE THE ROAD VARY FROM FIVE TO FIFTY YEARS; HOWEVER, THE IMPACT OF SUCH TECHNOLOGY ON THE TRANSPORTATION SYSTEM COULD BE VAST. NEARLY ALL MAJOR CAR MANUFACTURERS, ALONG WITH GOOGLE, ARE DEVELOPING DRIVERLESS VEHICLES. THESE VEHICLES USE CAMERAS, RADAR, AND LASER SENSORS TO MANEUVER ALONG THE ROADWAY. CONNECTED AUTOMATION INCLUDES THREE VARIATIONS OF A VEHICLE:

- **Autonomous Vehicle**: Operates in isolation from other vehicles using internal sensors
- **Connected Vehicle**: Communicates with nearby vehicles and infrastructure
- **Connected Automated Vehicle**: Leverages autonomous and connected vehicle capabilities

A related technology for ‘Connected Cars’, relies on WIFI for communication between vehicles (v2v) or between vehicles and infrastructure (v2i), and can warn drivers of upcoming traffic congestion, accidents, or other emergencies. CONNECTED VEHICLES MAY HELP IMPROVE VEHICLE AUTOMATION AND HAVE SIMILAR ROAD SAFETY AND CAPACITY IMPACTS, BUT DO NOT HAVE THE SAME POTENTIAL TO TRANSFORM THE TRANSPORTATION SYSTEM BY REPLACING DRIVERS ALTOGETHER.

The adoption of autonomous and connected vehicles technologies will have significant impacts on travel behavior, safety, car-ownership, infrastructure, land-use, and development patterns. In addition to a wide range of outcomes—from just a small improvement in safety of driving to a profound shift in travel behavior—the impacts remain uncertain. For example, autonomous vehicles could increase vehicle miles traveled (VMT) by lowering the time-costs of travel and parking and by giving increased mobility to children, the elderly, the blind, and others restricted from operating vehicles. On the other hand, driverless cars could reduce VMT by enabling more car-sharing, better transit, and a shift from paying for vehicles and insurance in lump sums to paying for each trip or mile driven.
It’s the kind of stuff you see now in movies and sci-fi television shows – cars and other vehicles that drive themselves and are connected to one another and the larger environment through which they’re traveling. But those kinds of technologies aren’t fiction. They’re coming. Autonomous or automated vehicles are evolving from today’s driver-assist vehicles to vehicles that will be able to operate independently, and use sensors to survey their surroundings and respond to changing conditions. Vehicles that communicate wirelessly with one another will work cooperatively to increase the capacity of highway lanes, use fuel more efficiently, and increase safety. By 2025, driverless cars are expected to begin replacing conventional cars. Autonomous vehicle technologies will transform public transit as well, increasing efficiency and accessibility while reducing congestion.
Automakers already are manufacturing and installing advanced driver assist systems that can automatically center, reduce speed and brake in anticipation of vehicles ahead. Trucking companies are road testing automated driving and “platooning”—in which automated trucks safely follow or draft each other at very close distances to conserve fuel. Global corporations and research labs are testing small, fully automated vehicles on public roads. Certain automakers have begun experimenting with new service models like “fractional ownership” in which targeted customers collectively lease and share a vehicle. Locking and ignition packages are being offered to simplify the use of peer-to-peer car sharing platforms. These developments point to a very different vehicle ownership paradigm 25 years from now.

Automated/Connected Vehicle (ACV) innovations cover a range of enabling advancements that allow vehicles to operate with less driver input and coordinate with other vehicles to achieve improvements in safety, throughput and user experience. The term ACV covers on-board sensing capabilities, data integration and vehicle-to-vehicle (V2V) communication. ACV covers two distinct innovation paths: autonomous operation, where vehicles rely on digital maps and on-board sensing to operate without any driver input; and connected vehicle operation, where vehicles communicate with one another as well as the roadways they are traveling on. However, these two paths are being developed simultaneously and they may need to be integrated to achieve full benefits in terms of safety and reducing congestion, as promised by researchers. Vehicle to Infrastructure (V2I) communication is another aspect that is covered under roadway ITS operations. It is important to note that vehicles capable of partially automated operation, such as the top-of-the-line Mercedes S-Class and Infiniti Q35, are already available to the public. The California and Nevada Departments of Motor Vehicles (DMV) have already licensed manufacturers for on-road testing and those agencies will be releasing consumer model permitting rules by 2016.

Due to the uncertainty of deployment timelines and operational characteristics, initial research shows inconsistent impacts on travel behavior and locational choice. Some traffic simulations show that in the initial phases ACVs may increase congestion, especially if safety features are mandated at the expense of system operational efficiency. On the other hand, if fully automated vehicles change the vehicle ownership paradigm, they may facilitate more on-demand transportation services and an increased reduction in household vehicle ownership. In the long term, ACVs have the ability to dramatically increase the carrying capacity of the regional roadway network.
By some estimates, automation features being introduced within the next five years could be available in up to 70 percent of the vehicles on the road in 2040. The following are some examples of automated driving features that need to be considered and supported. There are a wide range of demonstration projects that could be pursued by SCAG and its partners, in collaboration with private sector organizations with increased federal, state and local funding:

- **Jam-Assist and Advanced Collision Avoidance**: Combining advanced collision detection and avoidance technology currently in development, vehicles will operate “hands-off” and “feet-off” on highways. These features could also improve operation in low-speed environments. Equipping transit vehicles with jam assist could dramatically improve vehicle throughput in congested transit-only corridors, or in Bus Rapid Transit systems.

- **Semi-Automated Mode Vehicles**: Vehicles will operate without driver input under certain limited conditions, while requiring driver input for most portions of the trip. This is the current state of technology with the Google car. However, safety and traffic benefits will begin to spread throughout the roadway network as this technology advances. Vehicles will be able to operate without driver input, although the driver will need to monitor the vehicle’s operation. These features could be available in both consumer and commercial vehicles as early as 2018–2020 and could represent a sizable minority of the fleet mix as early as 2030–2035.

- **Fully Automated Mode Vehicles**: Vehicles will operate without driver input in certain conditions, requiring driver input for other portions of the trip. Most researchers agree that this will be the mid-term state of vehicle automation. In highway driving conditions, drivers will turn over full control of the vehicle and vehicle systems will communicate with one another. Vehicles will be able to form “platoons” in order to operate at closer distances (less than 1.8 seconds apart in one Japanese study) in order to improve fuel consumption and traffic flows. Freight industry representatives are interested in whether the National Highway Traffic Safety Administration (NHTSA) will waive driver work hour limits for following vehicles under platooning conditions. In low-speed conditions, “platooning” could improve transit bus operations and automation could improve bus/curb alignment. To some researchers, this could facilitate a new business model of mobility—as a service similar to the way cellphone plans are priced, especially in dense urban areas.

- **Fully Autonomous Vehicles**: Vehicles will operate without driver input, but will still require a driver to monitor the vehicle. The vehicle will navigate trips from beginning to end and possibly self-park within low-speed environments. This technology could potentially be available as early as 2025–2030, but it will not be used in a significant share of vehicles until 2035–2040.

- **Fully Autonomous Vehicles**: Passenger vehicles will operate with or without drivers, resulting in radical changes to urban form. Cars will park themselves, attend to maintenance and refueling, or alter ownership patterns so that they stay in constant circulation. **Driverless** taxi, freight and transit vehicles could have a dramatic impact on various professional driving careers.
Autonomous cars, also known as driverless or self-driving cars, are vehicles that replace human operators with advanced control systems capable of sensing appropriate navigation paths, signage, obstacles, and changing road conditions. While human drivers possess limited situation awareness, the wide range of sensors aboard autonomous cars are expected to be able to quickly identify a potential hazard and react sooner, and more safely, than a human driver. The autonomous car's ability to react more quickly - and perhaps communicate with other autonomous cars - may result in the vehicle's ability to travel at a higher rate of speed and closer to other vehicles in controlled-access areas such as a freeway, increasing roadway capacity.

The future of autonomous cars and their impact on the way we travel is uncertain. Navigating our streets and highways is complex and often times an unpredictable endeavor for human drivers. In order for autonomous cars to be widely implemented, advanced artificial intelligence may need to be developed to accurately and efficiently traverse a challenging environment where random human movements and rapidly changing road and weather conditions occur. If autonomous cars are able to eliminate the need for human input while driving, one of their great potential benefits may be to increase the mobility of individuals who currently are unable to drive.

Should autonomous car technology advance and become a viable form of transportation, accommodations would need to be made for the transition period between the sole use of all traditional cars to autonomous cars. During this transition period, which may take many years, if not decades, autonomous cars may need to have a lower speed limit and/or larger safety gaps to anticipate unpredictable human movements. Separate "autonomous car only" traffic lanes may be needed to allow the autonomous cars to move at higher speeds and with a greater level of safety.

Some experts foresee a merging of autonomous cars and the mobile app technologies used by Uber and Lyft to create a low-cost, self-driving taxi service, making independent car ownership and low-ridership transit routes virtually obsolete. Currently, the average car remains idle approximately 96 percent of the day. The reduction in personal car ownership through sharing of self-driving cars could increase the time an average vehicle is in use from 4 percent to approximately 75 percent. Some experts think this collective ownership model will reduce the number of vehicles in the nation by as much as 30 percent as the amount of time a vehicle is in use is increased. This model would reduce congestion only if some portion of trips would be shared, similar to Lyft Line and UberPool.
Alternatively, others foresee a continuation of private ownership of automobiles, even while automated. Continuing our existing automobile ownership model could lead autonomous cars to having negative overall effects on congestion, perhaps resulting in cars driving without any passengers in them while being instructed by their owners to go park in a free parking space far from the owner’s destination, or the car being sent to run an errand without a human being riding inside, increasing demand on the Region’s roadways.

Autonomous cars will most likely not eliminate the need for transit in areas where streets could not be widened adequately to carry all travelers in private automobiles. Even if all traditional cars were eliminated and all residents participated in autonomous shared-ride taxi services, there would likely not be enough capacity available to allow all of these vehicles to use the roadway network simultaneously. The Region would still require the use of some form of high-capacity transit, such as bus or passenger train service, which would also likely be automated in this scenario.

The aforementioned factors make it difficult to fully incorporate autonomous car technology into the development of the VISION 2050 alternatives. Given that it is unknown whether autonomous cars will increase or decrease congestion, it cannot be conclusively stated that one alternative performs better than the others in a future with autonomous cars. If widespread, autonomous cars could reduce or eliminate the need for the roadway widenings as included in the alternatives, or could increase the demand on the Region’s roadways to such a level that additional widenings may be necessary.
ESTABLISHING POLICY
In the last few years, the automobile and technology industry are undergoing dramatic innovations in vehicle technology, smart infrastructure advancement, and shared mobility concepts. Several major automakers are working towards fully autonomous vehicles (AVs) available to the public within the next decade. While current opinion suggests the anticipated increase in autonomous and connected vehicles will enhance safety and efficiency; changes in mode, ridesharing, parking, and number of vehicle trips are not fully understood.

GSATS should consider the following strategies to address the potential changes to the transportation system:

**Leverage technology to enhance mobility**

Partner with transit agencies and private companies to adopt smartcards, open data, and universal apps to allow riders to compare, book and pay for trips that combine buses, trains, bikes and ridesharing vehicles. This will match customers with the most efficient travel choice.

**Prioritize and modernize public transit**

The role of transit will evolve as AVs and shared mobility become widespread. Transit agencies should focus on high-frequency, high-capacity services in dense urban corridors (such as rail or bus rapid transit), provide first and last-mile connections through driverless shuttles, and expand kiss-and-rides/mobility hubs.

**Implement dynamic pricing**

To ensure that AV use supports public objectives and complements public transit, localities may consider a dynamic road pricing plan that varies by origin, destination, number of passengers, congestion, and household income. This can be done through a combination of proven policy tools such as congestion pricing, zone pricing, variable tolls and vehicle miles traveled fee.
Plan for mixed-use, car-light neighborhoods

AVs can unlock demand for living and working in mixed-use neighborhoods – whether they are urban or suburban. To shape this demand, localities need to plan for and incentivize mixed-use development, overhaul parking requirements, and reevaluate new public transit projects.

Encourage adaptable parking

Fewer cars means fewer parking spaces, especially in city centers. Parking garages need to be built with housing or office conversion in mind and include level floors, higher ceiling heights and centralized ramps.

Promote equitable access to new jobs and services

To support disadvantaged populations, cities must encourage public and private operators to provide alternative payment methods, access via dial-a-ride and equitable service coverage. Cities and private partners must also create new employment and training opportunities for drivers and others in legacy occupations.
> The Cost Feasible Plan > Automated Vehicles

Technology is advancing rapidly, and the Lee MPO is staying up to date with changing policies and partnership opportunities. Its largest potential partner, FDOT, is actively engaged in research, data collection, and developing a statewide Automated Vehicles Strategic Plan through passenger vehicle and freight pilot projects.

Passenger vehicles in the Tampa Bay are being tested with Advanced Driver Assistance Systems. One hundred vehicles, including transit vehicles, have been equipped with GeoTab (data collection device). Fifty vehicles use MobilEye devices that assist the driver with daylight bicycle and pedestrian collision warning; forward collision warning, both in highway and urban areas, including motorcycle detection; lane departure warning; and headway monitoring and warning. The devices are currently collecting data.

With its elevated and reversible lanes, Tampa’s Selmon Expressway offers a perfect test bed for autonomous vehicles with support from U.S. Department of Transportation and FDOT where research is underway of wireless communications, vehicle sensors, and global positioning systems to provide drivers with better real time travel information. According to FDOT, it is the only transportation center-based operational test bed in the country. The freight delivery pilot project focuses on the floral industry through Miami International Airport (MIA), a multi-billion dollar industry; two-thirds of all flowers consumed in the US are imported through MIA.

The outcomes of these studies and other future opportunities have the potential to change the future of Lee County’s transportation entirely. The Lee County MPO will continue to monitor the progress made integrating these technologies into vehicles on the transportation system and will be ready to make decisions as needed. Necessary policies, regulations, and cooperative agreements are needed to support this innovation and determine impacts to local transportation plans.

IHS Automotive, a global marketing group, predicts that by 2030, 92 percent of the US automobile fleet will be equipped with self-driving features.
While fully autonomous vehicles might not be commonplace for ten or more years, until then there will be a steady ramp-up of automated features and communications technologies in vehicles. Within the ITS Master Plan adopted by the North Florida TPO and included in this plan, the most significant investment needed from public information is providing communication networks to address vehicle-to-infrastructure communication. With these communication networks in place cars will get FDOT-provided insights about accidents, ice, heavy rain, alternate routes and other factors - miles ahead of their current positions. Second, the agencies will get essential data about vehicle speed, wiper activity, tire slippage, traffic density and other factors, which will enable real-time responses (redirecting traffic, variable signs, in-vehicle alerts) to alleviate danger and congestion.

To provide the vehicle-to-infrastructure communication capability in the northeast Florida region, dedicated short range communications devices should be installed every half-mile along priority corridors. These devices are proposed to be installed in four phases to spread the funding needed for deployment.

The corridors are divided into four different phases for dedicated short range communications devices deployment:

- **Phase I, Limited Access Highways:** consists of all major limited access highways in the region such as I-95, I-295, SR 202 J.T. Butler Boulevard, and I-10.
- **Phase II, Other Limited Access Highways:** consists of other limited access highways or high volume corridors in the region such as SR 212 Hart Bridge Expressway, US 90 Arlington Expressway, SR 115 Martin Luther King Expressway, SR 9B, and SR 23 Branan Field Chaffee Road.
- **Phase III, Other State Roads:** consists of state roads in the region that are heavily travelled such as SR 21, SR 13, SR 5 / US 1, SR 200, SR 212, SR 90 and SR 15 / US 17.
- **Phase IV, Other Arterials:** consists of arterials that are listed in the needs arterial corridor list and not included in the previous phases such as SR 102 Airport Road and SR 105 Heckscher Drive.
Objective F.9

Continue to implement an autonomous and Intelligent Transportation System (ITS) plan to improve road efficiency and to maintain traffic flow.
AGENCY: St. Lucie Transportation Planning Organization
METRO AREA: Port St. Lucie / Fort Pierce, FL
PLAN TITLE: Go2040
LAST UPDATED: February 2016

> Implementing and Measuring the Plan > Performance Measures

Goal: Choices

Objective - Provide for transportation needs of transportation disadvantaged that may include use of automated vehicles.

Goal: Safety and Security

Objective - Improve safety of transportation system that may include incorporation of infrastructure in support of automated vehicles.
## Goals, Objectives, Policies and Performance Measures

**Goal 1:** A connected, responsive, aesthetically pleasing and efficient transportation system that meets the needs of Indian River County residents, visitors, and businesses.

<table>
<thead>
<tr>
<th>Goal</th>
<th>Description</th>
<th>Performance Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.01</td>
<td>Maintain the adopted level of service standard for all functionally classified roads through the year 2040.</td>
<td>Implement multimodal improvements identified in the 2040 Cost Feasible Plan, consistent with the Interim Year Roadway Improvement Sets. Percent of lane miles meeting the adopted level of service standard.</td>
</tr>
<tr>
<td>1.02</td>
<td>Maintain a 12 hour hurricane evacuation clearance time on roads designated as hurricane evacuation routes through the year 2040.</td>
<td>Implement multimodal improvements identified in the 2040 Cost Feasible Plan for roadways designated as hurricane evacuation routes. Hurricane evacuation clearance time measured through actual event.</td>
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<tr>
<td>1.03</td>
<td>Enhance the grid roadway network by constructing an average of two centerline miles of new roadway corridors with appropriate multimodal improvements each year from 2020 to 2040.</td>
<td>Implement new corridor multimodal improvements identified in the 2040 Cost Feasible Plan. Average annual centerline miles of new roadway corridors constructed during the period from 2011 to 2040.</td>
</tr>
<tr>
<td>1.04</td>
<td>Enhance the Florida Department of Transportation’s (FDOT’s) Strategic Intermodal System (SIS) by constructing the Osceola Road interchange at Interstate 95 by 2040.</td>
<td>Implement improvements to the SIS at Osceola Road by 2040. New interchange on SIS.</td>
</tr>
</tbody>
</table>
| 1.05 | Optimize functionality and efficiency of existing infrastructure and MTP through 2056. | Incorporate Transportation Systems Management and Operations (TSM&O) which includes Intelligent Transportation Systems (ITS) in the Transportation Performance Measurement (TPM) framework into all new roadway projects. Number of new roadways that incorporate TSM&O or Connected Vehicle Architecture.
PennDOT has created an AV task force that has released a report with recommendations for AV testing policies. The Pennsylvania legislature has proposed Senate Bill 1268 that would amend Title 75 of the Pennsylvania Consolidated Statutes. Specifically this bill would provide for controlled AV testing, but not operations; allow flexibility and adaptability to changing technology; require testing companies to submit an application and provide proof of $5 million in general liability insurance; and support in-vehicle and remote-operator testing for ‘full self-driving automation.’

HAVs increase uncertainty for long-range planning, travel demand models, and financial projections. Scenario planning is a tool for dealing with uncertainty and preparing for a range of plausible futures. HAV infrastructure needs and implications are likely to be better understood as the technology continues to develop.

Prepare for CVs, EVs, HAVs, and UASs

- Governments should appoint an HAV point-person, develop technological expertise, and perform a legal audit for regulations covering all vehicle types and transportation services.
- Develop an HAV action plan.
- Improve pavement condition and enhance management systems for maintenance of signs and lane markings, as well as timing and location for road construction activities.
- Have CVs relay the type, severity, and location of damage to a vehicle to more effectively alert first responders what equipment and personnel is needed to contain and clear incidents.
- Transmit road weather conditions, lane closures, incident scenes, and work zone information to vehicle interfaces.
- Ensure federal and state HAV regulations reflect and respond to specific needs of dense, urban areas.
- Improve EV charging infrastructure availability and allow drivers to easily locate them.
- Review comprehensive plans, infrastructure projects, zoning and building codes, and budgets to account for potential HAV impacts.
- Track automation level in vehicle registration databases.
- Coordinate with state DOTs and FHWA on implementing DSRC.
- Reduce speed limits and implement traffic calming.
- Implement advanced integrated traffic and transit management systems.
The auto and truck industry, along with federal regulations, will facilitate the deployment of connected and autonomous vehicles. It does represent a great opportunity for local governments, CDOT, and other transportation system operators. Vehicles equipped to communicate with each other can also communicate with the infrastructure. This means such vehicles will serve as another source of probe data and, in select cases, the network and vehicle operations can automatically react to roadway conditions. This will require the deployment of an extensive connected vehicle environment (including on-site field devices, communications infrastructure, and backend data collection, management, and monitoring services).

Both CDOT and the City and County of Denver have made commitments to develop a connected vehicle environment and implement suitable applications that benefit the traveling public. Primarily, these will include applications related to safety and mobility. This will help current and future vehicles talk to each other (vehicle-to-vehicle), roadways (vehicle to infrastructure), and to transit. Some of these applications will be implemented through such programs as CDOT's RoadX, Denver's Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant from the U.S. Department of Transportation.
AGENCY: Genesee Transportation Council
METRO AREA: Rochester, NY
PLAN TITLE: 2040 Long Range Transportation Plan for the Genesee—Finger Lakes Region
LAST UPDATED: June 2016

> Recommendations > Transportation System Management and Operations > Technology

Monitor advances in **Connected** and **Automated Vehicles** and implement supportive ITS projects as appropriate – Medium-Term/Long-Term

The ongoing evolution of the **connected vehicle** environment has the potential to dramatically improve transportation system safety, efficiency and reliability, as well as generate substantial economic and environmental benefits. By facilitating **vehicle-to-vehicle** and **vehicle-to-infrastructure** communications, wireless technology enables travelers to obtain more and better travel information, maximize vehicle and fuel efficiency, and minimize their exposure to weather and safety hazards. Regional transportation management agencies should be mindful of emerging **Connected** and **Automated Vehicle**-supportive technologies and integrate these technologies into their ITS deployments as appropriate.
> Transportation System Management

TSMO strategies also include Intelligent Transportation Systems strategies, which seek to integrate advanced communications technologies, transportation infrastructure, and vehicles. Intelligent Transportation Systems covers a broad range of wireless, wire line, and electronics technologies to improve travel conditions and the reliability of the transportation system. North Central Texas is exploring new strategies that employ cutting-edge technology and innovative operating concepts that expand TSMO capabilities. One of the strategies is to implement Connected Vehicle capabilities in the region. The core of the Connected Vehicle platform is the communications network which addresses safety, traffic management, and traveler information by enabling vehicle-to-infrastructure and vehicle-to-vehicle communication.
FINDINGS > Technology > MTP Notable Practices

AGENCY: Regional Transportation Commission of Southern Nevada
METRO AREA: Las Vegas, NV
PLAN TITLE: Access 2040 Regional Transportation Plan
LAST UPDATED: February 2017

> Vision, Goals and Strategies > Secondary Strategy: Use Innovative Planning to Address Emerging Technologies and Trends

The RTC is initiating a number of ACCESS2040-related actions over the next few years that will help identify and develop these innovative planning methods to manage the transition to new technologies and maximize the positive benefits for Southern Nevadans:

<table>
<thead>
<tr>
<th>Technology-Related Planning Needs</th>
<th>RTC Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporate emerging technologies into goals</td>
<td>Included in Access 2040</td>
</tr>
<tr>
<td>Establish policies &amp; plans with consideration for the future</td>
<td>Initiated in Access 2040</td>
</tr>
<tr>
<td>Develop scenario model with Emerging Technologies capabilities</td>
<td>Model development underway (2017)</td>
</tr>
<tr>
<td>Assess high-capacity transit impacts and requirements</td>
<td>High Capacity Transit Plan (2017-2018)</td>
</tr>
<tr>
<td>Evaluate road capacity needs</td>
<td>Emerging Technologies Planning Study (2017)</td>
</tr>
<tr>
<td>Forecast financial implications</td>
<td>Emerging Technologies Planning Study (2017)</td>
</tr>
<tr>
<td>Identify trigger points for longer-term actions</td>
<td>Emerging Technologies Planning Study (2017)</td>
</tr>
<tr>
<td>Evaluate and test use of AV paratransit vehicles</td>
<td>1-5 years</td>
</tr>
<tr>
<td>Update roadway policies and infrastructure to leverage the VMT impact</td>
<td>1-5 years</td>
</tr>
<tr>
<td>Develop new predictive models for pavement maintenance</td>
<td>1-5 years</td>
</tr>
<tr>
<td>Assess impacts on low-ridership transit routes</td>
<td>1-5 years</td>
</tr>
<tr>
<td>Provide analysis of transportation and land use impacts to support stakeholders</td>
<td>1-5 years</td>
</tr>
</tbody>
</table>
Link technologies in vehicles and mobile devices to improve the way people travel and reduce VMT. These include emerging technologies such as autonomous vehicles, expansion of the regional communications network, smart parking systems, and universal transportation payment systems.
ELECTRIFICATION
## FINDINGS > Electrification > MTP Keyword Search Results

<table>
<thead>
<tr>
<th>SEARCH TERM</th>
<th>NATIONAL</th>
<th>FTA REGION IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large MPOs (More than 1M)</td>
<td>All MPOs</td>
</tr>
<tr>
<td>Electrification</td>
<td>5 (9.6%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Charging Station / Charge Station</td>
<td>14 (26.9%)</td>
<td>6 (5.9%)</td>
</tr>
<tr>
<td>Electric Vehicle (EV) / Electric Car</td>
<td>27 (51.9%)</td>
<td>15 (14.9%)</td>
</tr>
<tr>
<td>Electric Bus</td>
<td>6 (11.5%)</td>
<td>6 (5.9%)</td>
</tr>
</tbody>
</table>

| Total | 52 | 101 | 46 | 43 | 12 |
Supplemental Caveats to the Keyword Analysis

- The term “electrification” is used most frequently to discuss the conversion of train propulsion systems or upgrades to truck stops to eliminate the need for idling. Keyword search results which were not directly synonymous with electric vehicles were excluded from the analysis.

General Observations

- The electrification of the passenger vehicle fleet is a new frontier for many MPOs and very few have found a meaningful way to integrate this phenomenon into their plans. Many of the plans which do reference this simply acknowledges that electric vehicles are becoming more common but provide no substantive discussion of their impacts on air quality, the need for supportive infrastructure or other issues.

- Several plans included line items in their project lists for the purchase of electric vehicles or the installation of charging stations, but there was no accompanying narrative in the main body of the document. Those keyword search results without narrative were generally excluded from the analysis.

- Many plans acknowledged that a more extensive network of charging stations will be required in the future to support electric vehicles.

- Some plans included a summary of the local transit system’s fleet which included a small number of electric buses.
DEFINING THE CONCEPTS
EV Charging Station

A location where a vehicle can be parked and the electric storage or battery can be recharged. **EV Charging Stations** can be private or publicly accessible and can be free to the user or used for a fee. **EV Charging Stations** are configured in three different levels defined by the amount of electricity that can be transmitted to the vehicle. Level 1 provides energy through a 120 Volt AC Plug comparable to a household product. Based on the battery type and vehicle, AC Level 1 charging adds about 2 to 5 miles of range to a PEV per hour of charging time. Level 2 equipment offers charging through 208 or 240 V AC electrical connection comparable to a household appliance such as a washing machine. AC Level 2 adds about 10 to 20 miles of range per hour of charging time. Direct-current (DC) fast charging equipment, or Level 3 (typically 208/480 V AC three-phase input), enables rapid charging along heavy traffic corridors and can add 50 to 70 miles of range in about 20 minutes.
EXPLAINING THE ISSUES
EXPLAINING THE ISSUES

>| Rank | Metropolitan Statistical Area | Public Electric Charging Stations | Population (2014) | Stations per 100,000 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Corvallis, OR</td>
<td>15</td>
<td>86,316</td>
<td>17.4</td>
</tr>
<tr>
<td>2</td>
<td>Bloomington, IL</td>
<td>29</td>
<td>188,917</td>
<td>15.4</td>
</tr>
<tr>
<td>3</td>
<td>Kahului-Wailuku-Lahaina, HI</td>
<td>25</td>
<td>163,108</td>
<td>15.3</td>
</tr>
<tr>
<td>4</td>
<td>Wenatchee, WA</td>
<td>14</td>
<td>114,392</td>
<td>12.2</td>
</tr>
<tr>
<td>5</td>
<td>Napa, CA</td>
<td>16</td>
<td>141,667</td>
<td>11.3</td>
</tr>
<tr>
<td>142</td>
<td>Hattiesburg, MS</td>
<td>1</td>
<td>149,312</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Average of Small MSAs with at least 1 station: 2.3

Note: Includes planned and temporarily unavailable stations
Source: 2015 National Transportation Atlas; 2014 American Community Survey

> Future Transportation Needs > Roadways and Bridges > Alternative Fuel Vehicle Infrastructure Needs

While AFVs only made up approximately seven percent of all light-duty vehicles in the U.S. in 2013, by 2040 the U.S. Energy Information Administration’s Annual Energy Outlook anticipates that the AFV market share will grow to about 16 percent. In terms of raw numbers, the report forecasts a roughly threefold increase from approximately 15.8 million light-duty vehicles to 45.4 million light-duty vehicles. The two biggest gainers amongst AFVs are ethanol vehicles (+16.9 million) and electric vehicles (+12.1 million), which together account for about 98 percent of the forecasted growth in light-duty AFVs through 2040. While electric vehicles are forecast to grow at a much faster rate than...
ethanol vehicles, accommodating the increase in both types of AFVs will require regional transportation systems to provide additional infrastructure (i.e. fuel/charging stations).

The Hattiesburg MSA currently has only one publicly accessible electric vehicle charging station. This translates to about 0.7 per 100,000 residents, which is below the 2.3 per 100,000 average for MSAs with populations less than 250,000 and significantly below the rates of the top performing small MSAs. Furthermore, there are currently no E85 stations in the MSA.

In order to ensure that the current and future infrastructure needs for these two growing types of AFVs are being met, the MPO needs to further study the regional demand for AFVs and examine the most appropriate role of the MPO in encouraging and accommodating increases in their use.
The threat of climate change, together with rising fuel prices and geopolitical instability, are making clear that the petroleum-based transportation system constructed over the last fifty years is neither environmentally nor economically sustainable. As a result, other forms of mobility and accessibility are growing in prominence. These include the traditional forms of walking, biking, and transit, as well as newer approaches such as telecommuting and a renewed focus on denser, multi-use communities.

While these approaches are valuable and, as numerous domestic and international examples attest, can dramatically shrink the dependency of a society on automobiles, it is unlikely that the need for cars will ever completely disappear. To address this need in a limited-petroleum, limited-emissions future, alternative fuel vehicles are being developed and, as of writing, starting to be marketed. Electric cars are the most promising of these technologies. While these cars perform like and can share the road with conventional vehicles, they have unique fueling needs that are incompatible with the existing fuel distribution network. The rise of electric vehicles necessitates the creation of new distribution system, not of roadside fuel tanks and pumps but of charging stations at trip origins and destinations.

The wholesale adoption of electric cars is likely to necessitate the installation of charging stations and supporting equipment (e.g., smart meters). While charging stations are not expensive, the breadth of the deployment—tens, if not hundreds, of thousands of installations across the region—is a logistical challenge unlikely to be achieved without government involvement. As and so that the electric vehicle fleet grows, this Plan calls for installing stations at all major destinations in the region (employers, schools, and shopping centers); it also recommends supporting the installation of charging stations at automobile owner’s locations (i.e., where vehicles are kept overnight).
Increased fuel economy, fuel price volatility, alternative fuels and vehicle electrification may have a range of impacts such as emissions reductions, increases or decreases in vehicle operating costs, or additional stress on traditional funding sources for transportation (such as motor fuel taxes).
Electric Vehicles

The rapid advance in battery technology is leading to a transformation of the world’s vehicle supply. While growth in the region has been slow, battery electric and plug-in hybrid vehicle ownership has been steadily increasing. At this point significant challenges exist surrounding the provision of vehicle charging. The density of New York City makes off street as well as on-street charging a more difficult solution as compared to the lower densities of California and other West Coast and Sun-Belt states. Charger development has potential impacts on the region including electricity supply, land use and curb space policy and parking garage design. Those effects expand to buildings design as the electrification of freight delivery is included in the mix.

Electric Vehicles can be charged from standard electricity sources. Hybrid electric vehicles (HEVs) combine an internal combustion engine with an electric motor. Both EVs and HEVs also convert energy from coasting and braking into electricity, which is stored in batteries. Compared to regular vehicles, EVs have greater energy efficiency, produce lower emissions and cost less to operate. However, there are still issues with the range of EVs that limit their practicality. EVs and HEVs have gained presence in the NYMTC planning area: the first hybrid electric buses and taxis entered service in New York City in 2004 and 2005 respectively. Hybrid buses are also used by transit operators in Westchester and Rockland counties. A New York State initiative, ChargeNY, has supported the installation of nearly 500 charging stations for EVs and HEVs since 2013. The State has also revised regulations to clarify charging station ownership rules, and supported research and demonstration projects on new EV technologies and policies.
The economics behind the cost of different fuel types will continue to be a driver of change by determining the attractiveness of certain modes or of adopting certain fuel types. For example, lower gasoline and diesel prices combined with improvements in vehicle fuel mileage will likely encourage continued use of fossil fuels, while decreases in the cost of alternative and green energy would potentially incentivize their adoption. This relationship in turn has implications on public health and emissions reductions efforts. The potential impacts of fuel costs similarly apply to public transit. Transit agencies’ decisions to transition from diesel or compressed natural gas (CNG) to EVs and HEVs could provide significant operating cost savings to transit agencies in the long-term, while also mitigating air quality and emissions concerns from continuing to use traditional fossil fuels.
As of summer 2017, almost 25,000 plug-in electric vehicles were registered in Washington state. This is an increase of 37 percent since the previous year, and it is expected that this number will only continue to increase in the years to come. More and more auto manufacturers are making electric vehicles, and the range of these vehicles continues to increase - e.g., the 2018 Nissan Leaf has a 150-mile range, and the Chevy Bolt has an estimated 238 mile range on a single charge. In addition, more and more fast charging stations are coming to the region. The West Coast Electric Highway offers fast-charging along I-5, US 2 and parts of I-90, and by 2019 an additional 15 fast charging stations will be coming to freeway locations around the state. Charging infrastructure is also beginning to take hold in other parts of the region, with more coming over the next several years.
EXPLAINING THE ISSUES

In the last decade, electric vehicle technology has once again begun to gain popularity in the form of hybrid-electric vehicles (HEVs). HEVs contain both an electric motor and an internal combustion engine, both of which are capable of producing sufficient energy to power the vehicle. In contrast, electric vehicles (EVs) utilize an electric motor as their sole source of locomotive power.

An issue that comes up regularly when reviewing EV literature is the term “range anxiety”, referring to the worry of EV owners and potential owners regarding the relatively short travel range (40-60 miles) of most current generation electric vehicles. A 2011 National Geographic online article, Range Anxiety: Fact or Fiction, reports that “a survey conducted last year by the Consumer Electronics Association found 71% of respondents feared running out of charge on the road—placing range anxiety among the most common perceived disadvantages of electric vehicles.” Clearly, this can be a barrier to the acceptance of electric vehicles by a wider segment of the general driving public. Presumably, as EV infrastructure (charging stations specifically) becomes increasingly common, range anxiety will become less of an issue to potential buyers.

Potential Impact of Electric Vehicles on the Richmond Region’s Transportation System

- Reduced emissions from non-point sources (i.e. vehicles)
- Net emissions unknown; electric vehicles require electrical generation and associated emissions
- Improved ground level air quality
- Requires new investment in dispersed charging stations and electric grid
- Electric vehicles can use existing roadway infrastructure without major adjustments
- Impact on Vehicle Miles Traveled is inconclusive
Other emerging technologies and programs that could have an impact on transportation demand, systems management, travel choices, and system accessibility include:

- Traveler Information Program
- Arterial Management
- Freeway Management
- Transit Management System
- Advanced Transportation Technology Program
- Transit Infrastructure Electrification/Regional Charger Program
- Active Traffic and Demand Management

These technologies and programs are described in Appendix E: Transportation System and Demand Management Programs, and Emerging Technologies.

Since 2012, SANDAG has provided a forum for local governments and other regional stakeholders to discuss how to lower barriers to increasing the number of alternative fuel vehicles, and how to take steps toward building the needed fueling stations. In 2014, SANDAG completed a regional readiness plan for plug-in electric vehicles (PEVs) and charging stations, as shown in Appendix U.12: San Diego Regional Plug-In-Electric Vehicle Readiness Plan. By 2016, an expanded plan that also addresses readiness for all alternative fuels will be completed.

As of 2015, our region is home to more than 16,000 plug-in electric vehicles and more than 500 public charging stations, including more than 20 DC Fast Chargers, a type of electric vehicle charging station, along key corridors. Moving forward, the readiness plan for plug-in electric vehicles identified barriers that the region still needs to address. These include the need for a better installation process for chargers at multi-unit dwellings, at the workplace, and at other commercial sites. Also needed is a more streamlined permitting process, as well as the integration of plug
-in electric vehicle infrastructure into building codes. The Regional Plan provides us with an opportunity to continue to be leaders in this area, and to address these barriers to progress toward wider use of zero-emission vehicles.

> Appendix C: Attachment 2 - SANDAG Off-Model Greenhouse Gas Reduction Methodology

Plug-In Electric Vehicles (PEV) Charging Stations

According to the Electric Power Research Institute (EPRI), one electric vehicle charging station (EVCS) is needed for every five plug-in electric vehicles (PEVs), with a breakdown of 75 percent Level 1 EVCS (which adds 2-5 miles of range per hour of charging) and 25 percent Level 2 EVCS (which adds 10-20 miles of range per hour of charging). Increasing the number of publicly available EVCS would reduce greenhouse gas emissions by extending the electric range of plug-in hybrid electric vehicles that would replace gasoline-powered internal combustion engines.
In addition to Governor Brown’s Executive Order discussed earlier, a number of policy trends are converging that will continue to push the state and region toward increasing de-carbonization of the transportation and energy sectors. Over the past 20 years, the international community has outlined a goal of limiting global warming to two degrees Celsius above pre-industrial levels. In the context of California, these trends include advancing beyond the Governor’s Executive Order goal of reducing greenhouse gas emissions by 80 percent below 1990 levels by 2050 to reducing greenhouse gas emissions by 100 percent later in the century. This could be accomplished in stages through various market and regulatory tools such as the Cap-and-Trade program and updates to the Assembly Bill 32 Scoping Plan. 

**Electrification** of the transportation sector over the next few decades is likely to be one outcome of these trends. The California Energy Commission (CEC) is also developing net zero energy building policies. Caltrans has prepared a new state transportation plan to significantly reduce vehicle miles traveled. Through the Senate Bill 375 target setting process, ARB will likely propose higher greenhouse gas reduction targets for metropolitan planning organizations through the continued integration of transportation and land use planning. Finally, Cap and Trade Triennial Investment Plans will continue to be updated to fund the implementation of greenhouse reduction goals.
ESTABLISHING POLICY
Construct a network of charging stations to support the use of electric vehicles.

Status and Next Steps

- CCRPA identifies priority locations for charging station installation. Starts within one year of the adoption of this Plan.
- DOT, municipalities, and third parties install charging stations at priority locations. Starts as soon as funding is available. Concludes within two years of start.
The State of California has a goal to have 1.5 million zero emissions vehicles (ZEVs) operating in California by 2025. ZEVs include both Plug-in Electric Vehicles (PEVs) and fuel cell electric vehicles. To achieve additional greenhouse gas reductions beyond the state goals, a larger network of electric vehicle charging stations (EVCS) is needed to extend the electric range of plug-in hybrid electric vehicles. SANDAG will establish a Regional Charger Program by setting aside approximately $30 million of Congestion Management and Air Quality (CMAQ) Improvement Program funds expected between 2020 and 2050 (approximately $1 million annually) to fund an incentive program for the installation of publicly available EVCS.
SCAG is supporting several local governments throughout the region in the formation of Climate Action Plans (CAP). CAPs outline strategies for reducing greenhouse gas emissions in a cost effective manner. This is done by creating greenhouse gas inventories so that local governments can efficiently target their emission reduction practices to sources that pollute the most. Strategies outlined by CAPs in the SCAG region include Green Building guidelines for municipal buildings and facilities, implementing public electric vehicle charging stations and establishing energy retrofit incentive programs for residents.
INTERCITY BUS
<table>
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<th>SEARCH TERM</th>
<th>NATIONAL</th>
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<td></td>
<td>Large MPOs (More than 1M)</td>
<td>All MPOs</td>
</tr>
<tr>
<td>Intercity Bus / Inter-City Bus</td>
<td>25 (48.1%)</td>
<td>36 (35.6%)</td>
</tr>
<tr>
<td>Trailways</td>
<td>3 (5.8%)</td>
<td>6 (5.9%)</td>
</tr>
<tr>
<td>Greyhound</td>
<td>16 (30.8%)</td>
<td>40 (39.6%)</td>
</tr>
<tr>
<td>Megabus</td>
<td>10 (19.2%)</td>
<td>7 (6.9%)</td>
</tr>
<tr>
<td></td>
<td>52</td>
<td>101</td>
</tr>
</tbody>
</table>
General Observations

- In many cases, intercity bus and intercity rail services are discussed concurrently. This is sensible considering the often interface at a common multimodal terminal and are generally operated by private sector entities. Where policy statements reference both types of service, they may be duplicated between this section and the one which follows on intercity rail services.

- Several plans make reference to “regional bus” services, but it was often unclear whether the term was being used to describe intercity bus services or to refer to the collective network of bus transit available within the metropolitan region. For this reason, “regional bus” was not used as a keyword search term.

- Virtually every plan which does discuss intercity bus services does so without elaborating on what distinguishes them from other mobility options. Only two plans were found to include a definition for “intercity bus”. The assumption seems to be that most people are familiar with the term or that they can discern its meaning by concurrent references to well-known providers such as Greyhound, Trailways or Megabus.

- References are commonly made to the existence of multimodal transfer centers and the variety of services available there, including intercity buses, with little additional information.

- In several cases, the only time intercity bus service and facilities are mentioned is in a direct quotation of the federal planning requirement or eligibility for federal Surface Transportation Block Grant Program funding.

- There appears to be an inverse correlation between the size of the metro area and the amount of information regarding intercity bus services provided in the MTP. This is likely due to the fact that other issues such as traffic congestion, transit services and multimodal access command more “bandwidth” during the plan development process in larger urban areas.
Policy statements are not common and those which do exist tend to be of a general nature expressing support for the expansion of services. The lack of specific actions to be taken by the MPO or other public sector agencies is not surprising since intercity bus services are run by private sector companies responding to market demands, not necessarily the vision, goals or objectives of a metro area.

Greyhound or Trailways service is available in 124 of the 141 metropolitan areas for which MTPs were reviewed. Of those 124 plans, 49 (39.5%) make direct reference to Greyhound, while 9 (7.3%) reference Trailways. A total of 54 of the 124 plans (43.5%) include a discussion of intercity bus service but do not mention either carrier by name.

Megabus service is available in 49 of the 141 metropolitan areas for which MTPs were reviewed. Of those 49 plans, only 9 (18.4%) make direct reference to that carrier.
DEFINING THE CONCEPTS
Inter-city bus service provides transit service between distant cities, with stops spaced further apart than commuter-oriented services like the 85X - Gastonia Express.
> Glossary of Terms

**Intercity bus**

A mode of transit service that provides connections between cities, towns, and other places typically tens or hundreds of miles away. This type of service generally provides fewer bus stops than provided by local bus routes. Greyhound Bus Lines and private carriers operate inter-city buses. Some local transit systems offer bus lines to nearby cities or towns served by another transit agency. **Intercity bus** services provide important travel connections to smaller towns and rural areas that do not have airports or train service. Several private **intercity bus** services are currently provided in the region.
EXPLAINING THE ISSUES
> Where Are We Now > Public Transportation > Intercity Bus Service

Intercity bus service in the ARTS is provided by Southeastern Coach Stages, Greyhound Lines Inc. There are two intercity bus terminals in the study area: Augusta terminal located at 1125 Greene Street, and the Aiken Terminal located at 153 Pendleton Street NW. Five daily bus services connects Augusta with Atlanta and Augusta with Columbia SC. Two of the five daily Augusta-Atlanta services are non-stop while the other services make several stops along the route. Four daily services link Aiken with Columbia SC and three link Aiken with Atlanta.

> Financial Plans and Long Range Transportation Planning > Federal Grant Programs and Revenue Sources for Transportation Improvements

Section 5311 – Other than Urbanized Areas

Section 5311 grants are available to transit agencies that provide service in rural areas with population of less than 50,000. Section 5311 grants seek to: 1) Enhance the access of people in rural areas to health care, shopping, education, employment, public services, and recreation; 2) Assist in the maintenance, development, improvement, and use of public transit in rural areas; 3) Assist in the development and support of intercity bus transportation; and 4) Provide for the participation of private transportation providers in rural transportation. Eligible activities using these grant funds include: acquisition of public transportation services and capital, operating, and administrative expenses on providing public transit services in rural areas.
Intercity bus services in the BCD region are provided by Greyhound and by I-95 Coach, while intercity rail services are operated by Amtrak. Greyhound’s regional bus terminal is located on Dorchester Road in North Charleston, and provides service to points north, south, and west. Another Greyhound terminal is located in Summerville. I-95 Coach provides daily express bus service from locations in North Charleston (Wal-Mart on Rivers Ave) and Summerville (McDonalds at US 17A and Interstate 26) to a location in New York City, NY. The region’s Amtrak station is located in North Charleston, and is served by Amtrak’s Palmetto and Silver Meteor lines.
> Public Transit > Intercity Transit

The Jackson MPA is served by three major intercity transit services, Amtrak, Greyhound Lines, and Delta Bus Lines. Both Amtrak passenger train service and Greyhound Lines intercity bus service operate out of Union Station in Jackson. Union Station is also the transfer hub for JATRAN’s fixed route service.

Greyhound Lines bus service operates regional routes daily 6:00 a.m. to 11:00 p.m. Two of these routes, the Dallas-Jackson and Mobile-Jackson routes, are timed to allow transfers between Amtrak service.

Delta Bus Lines provides intercity bus service between Jackson and Indianola, MS with stops in Yazoo City, Louise, and Belzoni along the way.
AGENCY: Charlotte Regional Transportation Planning Organization
METRO AREA: Charlotte, NC
PLAN TITLE: 2040 Metropolitan Transportation Plan
LAST UPDATED: April 2014

> Other Transportation Modes > Inter-City Bus

**Mecklenburg County**

**Greyhound** Lines, Inc. serves the Charlotte region from its terminal located on West Trade Street. There are approximately 86 daily arrivals and departures serving the entire continental United States. Four local and ten express CATS routes, as well as the Gold Rush Red Line uptown circulator, serve the **Greyhound** terminal. This permits **Greyhound’s** passengers convenient access to the Charlotte Transportation Center and other transportation terminals in the region. As noted in the previous section, the NCDOT is currently acquiring land on West Trade Street for construction of a new multimodal station that could include a new inter-city bus terminal.

In addition, **Megabus** provides service to and from the Charlotte Transportation Center several times per day between Charlotte and the Cities of Atlanta, Durham, New York, Richmond, and Washington DC. Arrivals and departures to the cities listed range from one to three daily, seven days a week.

**Union County**

**Greyhound** Lines, Inc. serves Union County from its terminal located in the City of Monroe. There is one daily arrival and one daily departure serving the entire continental United States.

**Iredell County**

**Greyhound** Lines, Inc. serves Iredell County from its terminal located in the City of Statesville. There are two daily arrivals and three daily departures serving the entire continental United States.
**Intercity Bus**

Service in the Cleveland area is currently available from Greyhound, which has a “partner station” located on Benham Drive in Cleveland, close to the I-75 / Paul Huff Parkway interchange. Partner stations are co-located with other establishments such as a service center or gas station, as opposed to a full-service standalone Greyhound bus station which would also offer seating, restrooms and other amenities. Tickets can be purchased at the Cleveland partner station on weekdays from 8:30 a.m. to 5 p.m., with a lunchtime closure from 11 a.m. to noon, and on Saturdays from 9 to 11 a.m.

Key intercity bus routes connecting Cleveland to other regions include daily service to Atlanta, departing daily about 2:15 p.m. Since Atlanta is one of Greyhound’s Express Hubs, making the 3-hour trip from Cleveland allows travelers to access special limited-stop service to a number of other major cities: New York, Washington D.C, Orlando, Chicago, Dallas, El Paso and Los Angeles. Although the time savings is not always significant, traveling through the Atlanta hub can be less expensive and involve fewer transfers when traveling to these cities.

A future CUATS/CARTA connection, as described earlier, could give Cleveland MPO area residents an additional option for intercity travel since downtown Chattanooga currently has two intercity bus providers: Greyhound and MegaBus.
FINDINGS > Intercity Bus > MTP Notable Practices

AGENCY: Florence Area Transportation Study Metropolitan Planning Organization
METRO AREA: Florence, SC
PLAN TITLE: 2035 FLATS Long Range Transportation Plan
LAST UPDATED: July 2012

> Transit Element > Existing Public Transportation > Other Public Transportation Providers > Greyhound Service

From its terminal at 611 South Irby Street in Florence, Greyhound (Southeastern Stages) connects riders of the Pee Dee region with locations throughout North America, including 18 cities in South Carolina and more than 30 cities in North Carolina. Fares vary based on the trip’s distance and departure date. Table 7.1 shows sample one-way fares for Friday travel to cities across the United States.

In addition to the reduced price of advanced purchases, Greyhound offers a variety of discounts for military personnel and companion travel. Schedules for Greyhound service vary by day and time. Station and ticketing hours are weekdays from 9:00 a.m. to 5:00 p.m. and 8:30 p.m. to 10:00 p.m. or weekends from 10:00 a.m. to 4:00 p.m. and 8:30 p.m. to 10:00 p.m. More information is available at www.greyhound.com.

<table>
<thead>
<tr>
<th>City</th>
<th>Distance from Florence</th>
<th>Regular Refundable Fare</th>
<th>21-Day Advance Purchase Fare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbia</td>
<td>80 miles</td>
<td>$26.00</td>
<td>n/a</td>
</tr>
<tr>
<td>Charleston</td>
<td>135 miles</td>
<td>$39.50</td>
<td>n/a</td>
</tr>
<tr>
<td>Charlotte</td>
<td>160 miles</td>
<td>$57.00</td>
<td>$25.00</td>
</tr>
<tr>
<td>Atlanta</td>
<td>290 miles</td>
<td>$76.50</td>
<td>n/a</td>
</tr>
<tr>
<td>Washington</td>
<td>400 miles</td>
<td>$106.00</td>
<td>$40.00</td>
</tr>
<tr>
<td>Orlando</td>
<td>450 miles</td>
<td>$127.00</td>
<td>$56.00</td>
</tr>
<tr>
<td>New York City</td>
<td>650 miles</td>
<td>$130.00</td>
<td>$65.00</td>
</tr>
<tr>
<td>Chicago</td>
<td>875 miles</td>
<td>$172.00</td>
<td>$76.50</td>
</tr>
<tr>
<td>Dallas</td>
<td>1,075 miles</td>
<td>$197.00</td>
<td>$89.00</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>2,500 miles</td>
<td>$251.00</td>
<td>$127.00</td>
</tr>
<tr>
<td>Seattle</td>
<td>2,950 miles</td>
<td>$270.00</td>
<td>$126.00</td>
</tr>
</tbody>
</table>

Note: Sample fares are one-way from Florence for Friday travel.
Source: Greyhound.com
Greyhound Bus Lines provides inter-city bus service from downtown Gadsden. Although centrally located at 503 Meighan Boulevard, this improvised station location offers no passenger amenities. Greyhound’s local connector service circulates through Gadsden from its origin in Birmingham, where passengers can then access Greyhound’s national express routes. Buses depart Gadsden for Birmingham twice daily, at 11:55 AM and 4:45 PM, and cost $35.50 for a standard fare. Operating hours for the station, ticketing, and Package Express services are Monday-Friday from 9:00 AM to 5:00 PM and Saturday from 8:00 AM to 2:30 PM.
> Public Transportation > Inter-City Service

In the GCLMPO there are two providers of inter-city transit service, Greyhound Bus Lines and Coach America.

Greyhound Bus Lines has a station in Kings Mountain that allows travelers to head either north towards Charlotte or south towards Atlanta.

In 2010 the NCDOT contracted with Coach America to provide inter-city bus service between Charlotte and Boone. This route is called the N-S Mountaineer. Ridership has steadily increased since inception. Ridership for FY 10-11 averaged 300 passengers per month. Ridership for FY 11-12 nearly doubled to approximately 600 passengers per month. The majority of trips originate or terminate in Charlotte, but there is some utilization of the stops in Lincolnton and Gastonia. This service operates seven days a week, with two round trips made each day.
**FINDINGS > Intercity Bus > MTP Notable Practices**

AGENCY: Gainesville-Hall Metropolitan Planning Organization  
METRO AREA: Gainesville, GA  
PLAN TITLE: Gainesville-Hall Regional Transportation Plan  
LAST UPDATED: May 2015

> **Existing Conditions & Needs Assessment > Other Transportation Providers**

National **intercity bus** service is provided by **Greyhound** Lines from a passenger station on Martin Luther King Jr. Boulevard. The station is open from 7:30 am to 5:00 pm Monday through Friday and from 7:30 am to noon on Saturday. Currently, the station is served by two buses per day from Gainesville to Atlanta at 8:10 am and 8:25 pm.
 Intercity buses also connect the Memphis MPO Area to other regions. Currently two companies serve the area: Megabus and Greyhound.

Megabus provides direct connections between Memphis and Atlanta, Birmingham, Chicago, Dallas/Fort Worth, Little Rock, New Orleans, St. Louis, and Oxford and Jackson, Mississippi. Buses arrive and depart from the south side of MATA’s North End Terminal located just off North Second Street.

Greyhound bus services arrive and depart from 203 Union Avenue. In addition to their regular service network, Memphis is one of the markets where Greyhound provides its Express Routes, which offer faster service due to limited stops as well as extra amenities such as wireless internet access, electrical outlets and seating with more legroom than their standard buses. Currently Greyhound Express service in Memphis is available to and from Little Rock, Dallas, Texarkana, Birmingham, Atlanta, Chicago, Milwaukee, and Effingham and Champaign, Illinois.
Intercity bus services are operated by Greyhound, Capital Trailways, and MegaBus.

Greyhound operates a 24-hour passenger terminal at 950 W. South Boulevard in southwest Montgomery. Major cities accessible via direct routes from the Montgomery terminal include Selma, Birmingham, and Mobile, Alabama; Atlanta and Columbus, Georgia; and Pensacola and Panama City, Florida.

Capital and Colonial Trailways have been providing safe and reliable motor coach charter and tour transportation in the Southeast for over 77 years. Serving destinations throughout the entire U.S., they are equipped to meet every transportation need. Capital Trailways can help with any bus charter, bus rental, group charter, group tour, or; and any special event requiring tour planning. Capital Trailways currently has a fleet of 31 luxury motor coaches, 33 motor coaches and 2 mini coaches/ trolleys.

MegaBus is the first low-cost express bus service to offer city center-to-city center travel for as low as $1 via the Internet. Since launching in April 2006, megabus.com has served more than 30 million customers throughout more than 100 cities across North America; from Montgomery, MegaBus travels to Mobile, Atlanta, and New Orleans.
The Greyhound Bus Line maintains a depot just south of the City of Tuscaloosa. The facility is located at 7022 Highway 82 East. The line offers passenger and package service. The company is scheduled to stop in Tuscaloosa 10 times daily. The station averages 50 passengers a day. A local representative indicated in a 2013 telephone interview that there were no transportation deficiencies in Tuscaloosa County that affected Greyhound Bus Line operations.

In 2012, two new intercity bus companies began operating in Tuscaloosa County. ACR Express provides daily round-trip service between Starkville, MS and Birmingham. In Tuscaloosa, the service includes stops at the Intermodal Center, the University of Alabama, and the Tuscaloosa Veterans Affairs Medical Center.

In late 2012, Capital Trailways of Alabama began providing daily service between Mobile and Tuscaloosa. The line offers stops at the Tuscaloosa Greyhound depot, the Tuscaloosa Intermodal Center, and the Tuscaloosa Amtrak station. Both of these services receive federal funding support through the Federal Transit Administration 5311 program. The rural communities along these routes have been without intercity bus service since Greyhound reduced its operations in 2005.
AGENCY: Winston-Salem Urban Area Metropolitan Planning Organization  
METRO AREA: Winston-Salem, NC  
PLAN TITLE: 2040 Metropolitan Transportation Plan  
LAST UPDATED: September 2015

One bus carrier, Greyhound Lines, Inc. currently serves the Winston-Salem Urban Area. The schedule contains 17 daily arrivals and departures with service to the northeast, midwest, south and southeast. Services to and from Winston-Salem includes; New York, Detroit, Cleveland, Atlanta, Jacksonville, Knoxville, Raleigh, and Charlotte. Greyhound Lines, Inc. not only carries passengers, but also packages. Greyhound Package Xpress (GPX) piggybacks on the intercity bus services to deliver packages throughout the US. GPX works with independent couriers to get packages from bus terminals to recipients’ doors. Customers include companies from industries such as food, environmental and medical, printing, and technology.

Currently, Greyhound Lines, Inc. operates out of the Clark Campbell Multimodal Transportation Center in downtown Winston-Salem and shares the covered bus parking bays and interior waiting area to provide passengers the comfort and security of waiting indoors and the convenience of boarding buses in a sheltered space.
EXPLAINING THE ISSUES

AGENCY: Genesee Transportation Council
METRO AREA: Rochester, NY
PLAN TITLE: 2040 Long Range Transportation Plan for the Genesee—Finger Lakes Region
LAST UPDATED: June 2016

> Transportation System > Interregional Travel

The City of Rochester and NYSDOT are actively working to advance and secure funding for Phase 2 of the Intermodal Transportation Center. Phase 2 will provide customer direct access to interregional bus service providers, allowing a seamless travel experience along with new circulation and parking components.

In 2011, the current downtown Greyhound/Trailways Bus Station located directly across from the existing Amtrak Station handled over 220,000 boardings and alightings. In addition to the downtown Rochester terminal, there are eleven other locations in the Region where residents and visitors may access the Greyhound Lines or New York Trailways bus services. Megabus, a discount interregional bus operator, provides service from downtown Rochester to four destinations in New York State along with Toronto, Ontario.

Rendering of the Rochester Intermodal Transportation Center
Intercity bus services – those provided between the metropolitan areas of Phoenix and Tucson and various cities outside the MAG Region - are provided solely by the private sector carriers. MAG’s role is limited to transit services within the MAG Region (Maricopa County and portions of northern Pinal County). Rural Connectors in the MAG region operate similarly to intercity buses, but operate in order to link passengers from rural communities to the urbanized areas. At present, a Rural Connector provides transit service from West Phoenix to Ajo; other Rural Connectors are being evaluated for future implementation.

The State of Arizona, through the Arizona Department of Transportation, does not at present have a program for the operations or subsidization of state managed intercity bus. ADOT has analyzed the potential for dedicated bus service between downtown Phoenix and downtown Tucson as a precursor to future commuter/intercity passenger rail. As a component of the Tier 1 Environmental Impact Statement (EIS) commissioned within ADOT’s Passenger Rail Study, an intercity bus alternative was evaluated using existing HOV lanes on I-10 within Maricopa County, with a conceptual dedicated busway on I-10 from Chandler to Tucson.
> The Region’s Existing Transportation System > Passenger Travel Beyond the Region

Each mode of transportation best serves a specific trip distance, providing its own unique characteristics and values for interstate and international mobility.

The vast majority of intercity passenger movements occur by automobile, especially on the National Highway System roads maintained by MnDOT and other states. The Twin Cities region is also served by Amtrak passenger rail service and a number of intercity bus companies and airlines.

**Intercity bus** service continues to remain a presence in the region, with recent upgrades to attract passengers. These include WiFi on buses and express services that provide bus travel times that are more competitive with the private automobile. Intercity buses are all privately operated. Providers include Megabus, Greyhound, and Jefferson Lines. **Megabus** serves Madison and Milwaukee, Wisconsin, and Chicago, Illinois, from the Union Depot in Saint Paul, in addition to an informal stop in downtown Minneapolis. **Megabus** is known for curbside stops without stations so their stop locations can easily change. **Greyhound** provides service from the downtown Minneapolis intercity bus terminal adjacent to the I-394/7th Street parking garage and from the Saint Paul Union Depot. Jefferson Lines serves over 500 cities and towns in the Midwest, operating out of Union Depot and the downtown Minneapolis intercity bus terminal, as well as MSP airport and numerous college and suburban stops throughout the region. Although the Council has no role in planning or providing these intercity bus services, MnDOT does work with these operators and provides some subsidies to support bus service in Greater Minnesota.
> Intercity Travel > Connection Links

The Kansas City metro area is connected to the 44 cities within the 550-mile radius by bus service, passenger rail and commercial air service. These three modes offer at least 90 connections each day — 42 direct connections and 48 indirect connections.

**Intercity bus connectivity**

The Kansas City metro has direct and indirect bus service to the 44 cities, with at least 116 connections per day. Bus service provides direct connections to 23 cities, with 81 connections per day, and indirect connections to 17 cities, with 35 connections per day. For the cities — Lawrence, Columbia, St. Louis and Chicago — have both direct and indirect bus service offered by multiple carriers.

**Travel times**

Bus travel times from the Kansas City metro to cities within the 550-mile radius can range from one to 23 hours. For destinations less than 250 miles away, bus travel times are similar to those associated with personal vehicle travel. For farther
destinations (such as Tulsa, Oklahoma City, Minneapolis, Memphis, Dallas and Chicago) traveling by bus can increase travel time by about 40 percent compared to the auto.

Travel costs

Bus travel costs gradually increase as the distance from the Kansas City metropolitan area increases. Prices for travel to cities within the 550-mile radius can range from $11 to $112 for one-way tickets, and $22 to $224 for roundtrip tickets. For major metropolitan areas connected by national highways and interstates, bus ticket costs can be the lowest-cost option in many cases.

Service gaps

Bus connectivity offers comprehensive connections to intercity destinations, second only to automobile travel among the four transportation modes reviewed. Auto and bus travel have fewer service gaps compared to passenger rail and air travel. With rising fuel costs, increased airfares and growing congestion, bus travel has seen a resurgence in activity over the last few years, with service expansion occurring throughout the U.S. at the fastest rate in four decades.

In addition to connections to the Kansas City metro, many medium and small cities in the Midwest have Greyhound bus service along routes that connect to other metro areas. The region might benefit by examining additional direct bus service to Kansas City International Airport, the Kansas City region’s three Amtrak stations and seasonal destinations such as Branson, Missouri, and the Ozark Mountains.
In addition to the local transit systems, three companies provide inter-city motor coach service in the planning area.

**Greyhound** operates the largest intercity bus system in the nation. It offers service to over 2,300 destinations and maintains interline partnerships to facilitate transfers to destinations beyond its network. Greyhound also offers passengers the opportunity to connect with Amtrak service in Cleveland or Cincinnati. The company maintains a station in Downtown Columbus.

**MegaBus** offers service to Chicago through Indianapolis and direct service to Cincinnati. It runs from two posted on-street stops in Columbus close to the Columbus Greyhound Station and at the OSU Student Union. MegaBus offers lowcost, limited-stop service. Others nationally are using this same model, replacing old amenities, such as centralized stations, with on-board Wi-Fi internet access and electrical outlets. These services also appeal to new generations of riders in terms of speed by minimizing the number of stops and cost.

GoBus is a Rural Inter-City Bus Service. This service is designed to address lowcost and geographically accessible intercity bus transportation needs of the entire state by supporting projects that provide transportation between nonurbanized areas and urbanized areas that result in connections of greater regional, statewide, and national significance. Funding for the Rural Inter-City Bus is administered by ODOT, and the service is currently operated by Lakefront Lines.

Buses are equipped with amenities, such as bike racks, wireless internet and electrical outlets, offering service similar levels to those found on MegaBus or Greyhound, with connections to other transportation options such as Amtrak and airports. Passengers are also able to connect with healthcare and educational opportunities.
GoBus operates five lines, some of which can be transferred between each other listed below.

- Columbus, Athens, OH and Parkersburg, WV, facilitating transfers at Port Columbus International Airport and the Greyhound Station in Downtown Columbus
- Cincinnati and Athens, OH, facilitating transfers to the Greyhound Station in Cincinnati
- Cleveland, OH and Parkersburg WV, and Athens, OH with transfers to the Greyhound Stations in Cleveland, Akron and Canton
- Columbus to Wooster, OH, with transfers to the Licking County Transit Board office, Port Columbus International Airport and the Greyhound station in Downtown Columbus
- Columbus to Van Wert, OH, with transfers to the Greyhound station in Downtown Columbus
New York City is also a major hub for long-distance and inter-city bus services to/from destinations such as Boston and Washington, DC, as well as more distant cities such as Toronto and Atlanta. Many intercity buses operate into the PABT and the GWB Bus Station.

Intercity bus travel has been regaining popularity due to discount operators based in Chinatown, and services offered by companies like Megabus, a Coach USA brand started in 2006, and BoltBus, a joint venture of Greyhound Lines and Peter Pan Bus launched in 2008. Megabus and BoltBus offer discount express city travel between New York and various cities throughout the eastern United States and Canada including Washington, D.C., Boston, Philadelphia, Albany and Toronto. Other bus companies such as Vamoose Bus and Go Buses offer less variety in destinations (mostly to the Washington, D.C. and Boston areas) and similar amenities. All of these discounted services arrive and depart from on-street locations in Midtown Manhattan instead of the Port Authority or George Washington Bridge Bus Station. “Chinatown” buses, which began providing intercity service in the late 1990s, also provide frequent, inexpensive bus services from Manhattan Chinatown, mostly to the Washington, D.C. and Boston areas. Lucky Star, Dragon Deluxe and Easter Travel all offer services to Boston and Washington D.C. for one way fares around $25, which is slightly cheaper than Megabus and Bolt Bus.
> Plan Development > Livable Communities > Travel and Tourism > Regional Bus Service

There are three bus services that provide connections between Northeast Ohio and other regions. Greyhound provides daily direct service to several Ohio cities, with connections available to over 3,800 locations in the United States, Canada, and Mexico. There are four Greyhound stops in the NOACA region; they are located in Broadview Heights, Cleveland, Elyria, and Parma. Megabus has a stop at the Stephanie Tubbs Jones Transit Center in Cleveland. It provides daily service with direct connections to four American cities (Chicago; New York City; State College, PA; and Toledo), with transfer options to 98 locations in the eastern United States and Canada. Baron bus provides daily regional service to 14 cities and eight colleges within a day’s drive of Cleveland. Local bus stops include the Cleveland Greyhound Terminal and the Parma Barons Bus Office. Baron also provides charter services.
Intercity passenger rail and **intercity passenger bus** provide long-distance transportation and connections for all types of trips. These services connect the region to a national system of passenger rail and bus terminals. The region benefits from having both long-distance passenger trains and buses and a federally designated high-speed rail corridor.

**Intercity bus** service in the region is provided by a variety of private companies, including service by Greyhound, Bolt Bus, Northwest Trailways, and the Washington State Department of Transportation-funded Dungeness Line. These services are distinguished from public transit bus service in that they are designed to provide long-distance bus service connecting cities and regions across a longer distance. Bolt Bus provides express service on the I-5 corridor with a terminal in Seattle that connects to Portland, OR, and Vancouver, BC. Greyhound has stops in Everett, Seattle, and Tacoma and provides service on both the I-5 and I-90 corridors connecting to a national network. Northwest Trailways provides service with connections to its national network with service along US 2 (stops at Skykomish and Monroe) and I-5 (stops at Everett, Seattle, and Tacoma). Washington State Department of Transportation subsidizes an intercity route connecting the region with the Olympic Peninsula called the Dungeness Line (operated under contract with Greyhound). This service connects communities in Clallam and Jefferson counties on the Olympic Peninsula with the central Puget Sound region. The Dungeness Line makes stops at Kingston, Edmonds, several Seattle stops, including Seattle’s Amtrak and Greyhound stations, and Sea-Tac Airport. Additional **intercity bus** service is provided by Bellair and Shuttle Express, connecting outlying counties and communities with Seattle, Sea-Tac Airport, and other major destinations in the region.

Washington State Department of Transportation is planning an update to its **Intercity Bus** Plan in the coming years. The **Intercity Bus** Plan includes a needs assessment for communities that need subsidies through the FTA Section 5311(f) **Intercity Bus** Program, similar to the Dungeness Line. Given the level of intercity bus service on corridors in the region, it is unlikely that new **intercity bus** corridors that would require subsidies will be identified in the **Intercity Bus** Plan update. **Intercity bus** travel is anticipated to continue to grow as population and employment growth continues in the central Puget Sound region. **Intercity bus** operators are expected to continue their strategy of co-locating their terminals with public transit service and in some cases intercity rail, given the number of their riders who need to make transit connections when boarding and alighting from the **intercity bus** service.
Within the U.S., inter-city bus service has historically been provided mostly by Greyhound, its subsidiaries and its business partners. Together these services provide a nationwide city-to-city network, including stops at smaller locations that are not served by either air or rail. They are widely recognized as an affordable option for long-distance travel.

In the past few years, Greyhound has restructured many of its service patterns to concentrate on main flows and make fewer stops. Some smaller communities – including Rock Hill – have lost their inter-city transit connections as a result. The closest available service is now in the neighboring communities of Charlotte, NC and Spartanburg, SC. Other companies such as Megabus have recently entered the Charlotte market, stimulating price competition. However, the only connections currently offered by Megabus from Charlotte are to Atlanta, Durham, Richmond, and Washington, D.C.
In 2012, scheduled intercity bus services were provided by seven carriers: Badger Coaches, Inc.; Greyhound Lines, Inc.; Indian Trails, Inc.; Jefferson Lines, Inc.; Lamers Bus Lines, Inc.; Megabus; and Wisconsin Coach Lines. Service provided on weekdays by Badger Coaches included seven daily round-trips between Madison, downtown Milwaukee, and General Mitchell International Airport, one daily round-trip between Milwaukee and Eau Claire, and two daily round-trips between Milwaukee and Minneapolis-St. Paul. Service provided by Greyhound in Southeastern Wisconsin was centered in Milwaukee, which the carrier used as a regional hub at which passengers had the opportunity to transfer between buses. In 2012, Greyhound operated a total of 13 daily round-trips to and from Milwaukee. Most of these trips were Chicago-based, going to and from Madison, Minneapolis-St. Paul, and Green Bay. Daily service by Indian Trails included one bus trip in each direction between Milwaukee and Hancock, Michigan, with stops in Sheboygan, Manitowoc, Green Bay, Oconto, Peshtigo, Marinette, and many communities in Michigan’s Upper Peninsula, including Escanaba, Marquette, L’Anse, Baraga, and Houghton. Daily service by Jefferson Lines included one bus trip in each direction between Milwaukee and Menomonie, including service to Green Bay, Wausau, and Eau Claire. Daily service by Lamers Bus Lines included one bus trip in each direction between Milwaukee and Wausau with intermediate stops in Stevens Point, Waupaca, New London, Appleton, Oshkosh, and Fond du Lac. In 2012, Megabus operated two round-trips daily from Milwaukee to Chicago and two round-trips daily from Milwaukee to Minneapolis. In 2012, Wisconsin Coach Lines operated 15 round-trips daily from Milwaukee to Chicago’s O’Hare International Airport.

General Mitchell International Airport

General Mitchell International Airport (GMIA) currently provides access to commercial air service, intercity bus service, and intercity passenger rail service, connecting the Region to both nearby regions and other metropolitan areas across the nation and world. Commercial airlines serving GMIA provided daily non-stop flights to 39 domestic and international destinations as of August 2015. Intercity bus companies stopping at GMIA provide daily service to nearby cities, including Chicago, Madison, La Crosse, Wisconsin Rapids, Stevens Point, Wausau, Fond du Lac,
Oshkosh, Appleton, Sheboygan, Manitowoc, and Green Bay. Amtrak’s Hiawatha Service trains stop at GMIA and provide daily service to Chicago.

**Milwaukee Intermodal Station**

The Milwaukee Intermodal Station (MIS) in downtown Milwaukee provides access to intercity bus service and intercity passenger rail service connecting Southeastern Wisconsin to nearby cities and metro areas. Intercity bus companies stopping at MIS currently provide daily service to nearby cities, including Chicago, Sheboygan, Manitowoc, Green Bay, Marinette, Escanaba, Marquette, Fond du Lac, Oshkosh, Appleton, Madison, Wisconsin Rapids, Stevens Point, Wausau, La Crosse, Eau Claire, and Minneapolis-St. Paul. Amtrak’s Hiawatha Service and Empire Builder trains stop at MIS and provide daily service to nearby cities, including Chicago, La Crosse, Winona, and Minneapolis-St. Paul.

**Other Intercity Bus Stops, Train Stations, and Ferry Terminals**

Several other locations in the Region provide access to intercity bus service, intercity passenger rail service, commuter rail service, and Lake Michigan ferry service. The Goerke’s Corners park-ride lot in Brookfield provides access to daily intercity bus service connecting Waukesha County with Madison, Wisconsin Rapids, and Stevens Point. The Sturtevant Amtrak station provides access to daily intercity passenger rail service connecting Racine County with the Chicago metro area. The Kenosha Metra station provides access to daily commuter rail service connecting the City of Kenosha with the Chicago metro area. Finally, the Lake Express ferry terminal in Milwaukee provides access to daily Lake Michigan ferry service in the spring, summer, and fall connecting Milwaukee with Muskegon.
ESTABLISHING POLICY
Rural Area Formula Grants (Section 5311)

This formula-based funding program provides administration, capital, planning, and operating assistance to support public transportation in rural areas, defined as areas with fewer than 50,000 residents. Activities eligible under the former Job Access and Reverse Commute (JARC) program, which provided services to low-income individuals to access jobs, are now eligible under the Rural Area Formula program. In addition, the formula now includes the number of low-income individuals as a factor. Funds may be used for planning, capital purchases, administration, planning and operating expenses, and requires a local match. Eligible recipients include local public bodies, non-profit organizations and state agencies. Federal share is 80% for capital projects, 50% for operating assistance, and 80% for ADA non-fixed route paratransit service, using up to 10% of a recipient’s apportionment. This program is administered by MDOT and includes the follow sub-programs:

- **Intercity Bus** Program
  - This program meets a federal requirement for assistance to bus operators in providing connecting services between non-urbanized areas and larger regional or national bus routes.
  - At least 15% of annual apportionment is used to develop and support *intercity bus* transportation...
Planning transportation infrastructure to guide growth in a way that enhances quality of life is not easy. In the past, transportation planning focused on improving highways and major roads, but these improvements can help only so much. Strategic investment in major roadways must be balanced with improvements to the bicycle, pedestrian, transit, rail, and aviation networks to keep people and goods moving, allow better access for residents and visitors, and enhance the quality of life in the Jacksonville area. Multimodal Integration projects seek to:

- Develop bicycle and pedestrian priorities in concert with transit and roadways;
- Create coordinated transit improvements and strategies for system maintenance;
- Promote the expansion of passenger rail and intercity bus; and
- Support economic vitality.

Greyhound Lines, Inc. operates daily intercity bus service to Jacksonville from a terminal located on Onslow Drive. This service provides connections to many destinations throughout North Carolina and the United States; however, connectivity to Jacksonville Transit is limited to the terminal location served by existing routes. Greyhound riders often hail a taxi or walk from the terminal to extend their range of mobility. Greyhound staff has indicated a desire to improve coordination among the systems by routing service through the Jacksonville multimodal center when it is operational.
### Center for Climate Strategies Sample Transportation & Land Use GHG-Reducing Action

<table>
<thead>
<tr>
<th>HEAVY-DUTY VEHICLES</th>
<th>2045 MTP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heavy-Duty Vehicle Operations</strong></td>
<td>• There are a number of goals, objectives, and projects within the 2045 MTP that address GHG reduction strategies for heavy duty vehicles and other vehicle operations. These include:</td>
</tr>
<tr>
<td></td>
<td>• Nearly $55 million (10% of the MTPO region’s transportation capital funds) in ITS, safety, and other traffic operational investments within the MTPO region over the planning horizon.</td>
</tr>
<tr>
<td></td>
<td>• Continued support for enhancements at the Tri-Cities airport including air cargo transportation</td>
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<tr>
<td></td>
<td>• Continued support of intercity bus service between surrounding communities</td>
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<td></td>
<td>• Continued support of improvements to railroad infrastructure</td>
</tr>
<tr>
<td></td>
<td>• Continued support of improved traffic flow, signal operations, and access management.</td>
</tr>
<tr>
<td><strong>Increasing Low-GHG Heavy-Duty Travel Options</strong></td>
<td>• Enforce speed limits</td>
</tr>
<tr>
<td></td>
<td>• Improve traffic flow</td>
</tr>
<tr>
<td></td>
<td>• Truck stop electrification</td>
</tr>
<tr>
<td><strong>Heavy-Duty Vehicle Incentives &amp; Disincentives</strong></td>
<td>• Procurement of efficient fleet vehicles (public, private, or other)</td>
</tr>
<tr>
<td><strong>Intercity Passenger Travel: Aviation, Rail, &amp; Bus</strong></td>
<td>• Airport ground equipment</td>
</tr>
<tr>
<td></td>
<td>• Intercity bus incentives and subsidies</td>
</tr>
<tr>
<td><strong>Off-Road Vehicles (E.G., Construction Equipment, Etc.)</strong></td>
<td>• Incentives for purchase of efficient vehicles and equipment</td>
</tr>
<tr>
<td></td>
<td>• Improved operations, operator training</td>
</tr>
<tr>
<td></td>
<td>• Increased use of alternative fuels or low-sulfur diesel</td>
</tr>
</tbody>
</table>
FINDINGS > Intercity Bus > MTP Notable Practices

AGENCY: Metropolitan Council
METRO AREA: Minneapolis / St. Paul, MN
PLAN TITLE: Thrive MSP: 2040 Transportation Policy Plan
LAST UPDATED: January 2015

> Transportation Strategies > Competitive Economy

Strategy D2

The Council will coordinate with other agencies planning and pursuing transportation investments that strengthen connections to other regions in Minnesota and the Upper Midwest, the nation, and world including intercity bus and passenger rail, highway corridors, air service, and freight infrastructure.

Other agencies and private companies are largely responsible for planning and implementing the transportation investments that connect the region to the rest of Minnesota, the Upper Midwest, the nation, and the world. For example, MnDOT and counties are responsible for the major highway corridors that connect the Twin Cities to other regions within the state and to other states, and support cars, trucks, and private intercity bus providers such as Greyhound and Jefferson Lines. Amtrak provides intercity passenger rail, and MnDOT is responsible for planning additional intercity passenger rail services. The Metropolitan Airports Commission works with the airlines provide the region's air service connections. MnDOT works with the private freight railroads that are responsible for freight rail service and infrastructure, and also with barge companies, port authorities and the Army Corps of Engineers, which provide infrastructure and serve freight service along the Mississippi. The Council will work closely with these partners to ensure that their planned improvements are coordinated with regional investments and that regional needs are considered in the prioritization of these investments.
The Tucson region is home to three privately operated bus providers: Greyhound, Tufesa and TAP Royal.

**Greyhound**

The Tucson Greyhound bus station provides service to nearly 1,800 destinations across the United States, including four daily trips to Phoenix. As of the writing of the 2045 RMAP, a temporary Greyhound bus station is located in downtown Tucson on Congress St. near I-10. Meanwhile, the City of Tucson and the Rio Nuevo Multipurpose Facilities District are working with Greyhound to relocate the station in order to clear the way for the ongoing development of downtown Tucson.

**Tufesa**

Tufesa is a Mexican *intercity bus* carrier that serves destinations in the U.S. states of Arizona, Nevada and California as well as the west coast of Mexico, as far south as Guadalajara, in the state of Jalisco. Tufesa connects Tucson to 15 cities within the western United States, including two daily buses to Phoenix, and 13 destinations in Mexico. The Tufesa station in Tucson is located at S. 12th Avenue, just north of the intersection with Drexel Road and close to I-19.

**TAP Royal**

TAP Royal is another Mexican bus carrier, which began operating in the United States in 2012. TAP Royal currently connects Tucson with the cities of Los Angeles, Nogales, AZ, Phoenix, and Las Vegas, as well as 16 locations in Mexico. The TAP Royal Tucson station is located on W. Irvington Rd. near the I-19 interchange.

Mexican bus carriers provide an important connection with Mexico, supporting tourism on both sides of the border, and allowing easy access for Mexican visitors who, according to a 2009 study from the Eller College of Management’s Economic and Business Research Center, contribute an estimated $1 billion annually to the Tucson region’s economy.
Intercity rail and bus services provide transit connections between the Region and destinations outside Southeastern Wisconsin. Because the primary focus of intercity transit services is to connect communities within the Region to communities in other parts of the State and the remainder of the Midwest, the Commission uses long-range plans completed by WisDOT as the basis of the Commission’s recommendations for intercity transit services. VISION 2050 recommends that the number of intercity bus services be expanded and that existing services be enhanced with increased service frequencies. Two new intercity rail lines are recommended, one connecting Chicago to Minneapolis and St. Paul via Milwaukee and Madison, and another connecting Chicago to Green Bay via Milwaukee and the Fox Valley. Both services would be operated as extensions of the existing Amtrak Hiawatha service from Chicago, and all three lines would operate at speeds up to 110 miles per hour. Map 1.10 shows the segments of the intercity services recommended by WisDOT that are within the Region, and the stations that would be served within the Region.
> Recommendations > Transit

Give RIPTA the responsibility of “mobility manager” in Rhode Island. Include transit, paratransit, park-and-ride lots, vanpools, carpools, and other shared-ride alternatives as options to the single-occupant automobile. RIPTA could be the “one-stop shop” for information on intercity bus and rail, commuter rail, water transportation, and supporting bicycle and pedestrian modes for tourism and recreational travel. Pursue means to tie the various modes more closely, including shared ticketing and trip chaining opportunities. Develop a program for improving coordination of transportation alternatives to single occupancy vehicles. As the designated mobility manager for the state, RIPTA will be responsible for providing direction to this program.
INTERCITY RAIL
## Findings > Intercity Rail > MTP Keyword Search Results

<table>
<thead>
<tr>
<th>SEARCH TERM</th>
<th>NATIONAL</th>
<th>FTA REGION IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large MPOs (More than 1M)</td>
<td>All MPOs</td>
</tr>
<tr>
<td>Passenger Rail / Rail Passenger / Commuter Rail / Intercity Rail / Inter-City Rail / Regional Rail</td>
<td>49 (94.2%)</td>
<td>72 (71.3%)</td>
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<tr>
<td>High Speed Rail / High Speed Train / Higher Speed Rail / Higher Speed Train</td>
<td>32 (61.5%)</td>
<td>36 (35.6%)</td>
</tr>
<tr>
<td>Amtrak</td>
<td>35 (67.3%)</td>
<td>48 (47.5%)</td>
</tr>
</tbody>
</table>

| Total | 52 | 101 | 46 | 43 | 12 |
General Observations

- In many cases, intercity bus and intercity rail services are discussed concurrently. This is sensible considering the often interface at a common multimodal terminal and are generally operated by private sector entities. Where policy statements reference both types of service, they may be duplicated between this section and the preceding one on intercity bus services.

- Because the terminology is fairly common in everyday usage, very few definitions were found in MTP documentation.

- Many plans make only a passing reference to Amtrak and/or commuter rail services being available as connecting modes at a multimodal facility.

- During the keyword search, the term “commuter rail” was used primarily as a way to find relevant sections of the document where passenger rail services were discussed. This report does not include information on traditional commuter rail services because this report focuses on intercity rail between two or more metro areas. As commonly used, commuter rail lines are generally internal to a single one metropolitan area and its surrounding suburban and exurban communities, and are not for movement between metro areas.

- Many plans identify improvements to the railroad network to support both freight and passenger trains.

- Amtrak service is available in 69 of the 141 metropolitan areas for which MTPs were reviewed. Of those 69 plans, 53 (76.8%) make direct reference to Amtrak. A total of 64 of the 69 plans (92.6%) include a discussion of intercity rail service but may not mention Amtrak specifically.
DEFINING THE CONCEPTS
## Intercity Rail MTP Notable Practices

**AGENCY:** Nashville Area Metropolitan Planning Organization  
**METRO AREA:** Nashville, TN  
**PLAN TITLE:** Middle Tennessee Connected: 2016-2040 Regional Transportation Plan  
**LAST UPDATED:** February 2016

### Tools and Options > Public Transit Options

<table>
<thead>
<tr>
<th>Mode</th>
<th>Operation Characteristics</th>
<th>Characteristics of Corridor Population and Employment</th>
<th>Width of Corridor</th>
<th>Average Trip Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Speed Rail</td>
<td>Operates 8-16 car trains on exclusive ROW</td>
<td>Connection between major metropolitan areas ranging between 3 to 15 million people</td>
<td>N/A</td>
<td>250 miles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode</th>
<th>Average Speed (incl. stops)</th>
<th>Route Capacity</th>
<th>Passenger Capacity / Vehicle</th>
<th>Right-of-Way (ROW)</th>
<th>Station / Stop Spacing</th>
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</thead>
<tbody>
<tr>
<td>High Speed Rail</td>
<td>125 - 155 mph</td>
<td>Approximately 10,000 to 23,000 passengers per hour</td>
<td>350 to 1,000 + passengers per hour</td>
<td>Exclusive ROW</td>
<td>Generally 25+ miles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode</th>
<th>Construction Cost per Mile</th>
<th>Capital Cost per Vehicle</th>
<th>Operating Cost per Hour</th>
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</thead>
<tbody>
<tr>
<td>High Speed Rail</td>
<td>$50 to $200 M</td>
<td>$32 to $75 M</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Intercity Rail

Diesel-powered heavy vehicles, low-frequency service, longer-distance trips, and very few stations (located in selected communities).
COMMUTER RAIL

A passenger rail road that carries riders within a metropolitan area, typically between urban areas and their suburbs. They typically operate on freight rails or dedicated tracks. Propulsion is provided either by diesel locomotives or by self-propelled Diesel Multiple Units, which combines the engine function into one or more of the passenger rail cars. Typically there are a small number of stations and multiple departure times primarily in mornings and evenings. Stops are typically five miles or more apart and route lengths extend more than 20 miles.

HIGH SPEED PASSENGER RAIL

A type of intercity passenger rail that operates at speeds significantly faster than current passenger rail. Speeds are in excess of 90 mph in the United States and in excess of 125 mph in the European Union.
EXPLAINING THE ISSUES
Rail passenger service to the ARTS ceased with the 1968 closure and subsequent demolition of the Augusta Union Station in 1972 (Walker Street between 8th and 9th Streets in downtown Augusta). The closest passenger rail facilities to the ARTS area are provided by AMTRAK in Denmark, SC (62 miles away), Columbia, SC (74 miles away), Gainesville, GA (140 miles way), and Atlanta, GA (148 miles away).
EXPLAINING THE ISSUES

The American Reauthorization and Reinvestment Act (ARRA) of 2009 presented a renewed interest in high-speed rail in pursuit of advancing the interconnected, livable communities initiative. Through this bill, $8 billion was allocated to states through the 2012 fiscal year for the improvement and advancement of intercity high-speed rail services with $1.3 billion of these funds allocated specifically to Amtrak. Aimed at near-term economic recovery, this act established the basis for longer-term improvements that promote economic viability and competitiveness. Subsequently, the Passenger Rail Investment and Improvement Act of 2008 aimed specifically at improving existing intercity rail services and designating corridors through inter-state coordination. In April of 2009, the Federal Railroad Administration (FRA), a branch of the United States Department of Transportation (DOT) that is committed to advancing a national intercity rail network, completed the High Speed Rail Strategic Plan, which delineated the goals, challenges, and benefits of implementing intercity high-speed rail. With previous legislation and planning efforts providing the policy framework, FRA developed the High-Speed Intercity Passenger Rail (HSIPR) program in June 2009, which strives to facilitate intercity rail by providing funding for infrastructural and capital improvements as well as multimodal connections. Furthermore, the FY 2010 DOT Appropriations Act allocated $2.5 billion to the HSIPR program for service development programs, individual projects, planning projects, and multi-state coordination with a 20% local match requirement.

A coalition has been formed among transportation leaders of Southeastern states, including Alabama, Tennessee, Virginia, North Carolina, Georgia, Florida, and South Carolina to facilitate a high speed, interconnected, intercity rail service. Two federally designated high-speed rail corridors within South Carolina are as follows: 1) Raleigh, NC – Spartanburg/Greenville, SC – Atlanta, GA 2) Raleigh, NC – Columbia, SC -Savannah, GA. Neither route passes through the BCD area. The South Carolina Department of Transportation is participating in these efforts and continues to study intercity passenger rail connections within South Carolina. As of May 2010, CHATS supports the designation of an East Corridor under HSIPR to serve the CHATS Area. The East Corridor would provide daily intercity rail services between leading tourism destinations, Myrtle Beach and Charleston. Additionally, the North Charleston Amtrak station accounts for over 30% of all boardings and alightings in the state. The proposed North Charleston Regional Intermodal Center will provide the new terminus for Amtrak as the existing station becomes functionally obsolete; thus, the advancement of the intermodal center is essential not only in facilitating high speed rail in the CHATS Area but also in maintaining and increasing Charleston-bound rail passengers and intercity connections to the region.
The 2013 Tennessee Rail Plan identified the Bristol-Knoxville-Chattanooga rail corridor in the short list of potential intercity passenger rail for Tennessee. This corridor has even greater potential given Virginia’s extension of Amtrak service to Roanoke and consideration of future service to Bristol. The ridership projections for the Chattanooga-Knoxville-Bristol corridor could have a significant impact on the cost-to-benefit ratio with connection to Virginia’s extension of Amtrak service to Bristol. The 2015 Tennessee Rail Plan, currently under development, provides the opportunity for a multi-state effort, including Georgia, to connect the major population centers of Atlanta and Washington DC, and points beyond.

A new passenger rail service can only be instituted if there is demonstrable ridership to financially support system operations and to justify the infrastructure and rolling stock that would be required. It is important to note that investment in passenger rail can only be justified if freight movements are the primary purpose for the rail infrastructure enhancements.
All Aboard Florida (AAF) is a privately owned, operated and maintained passenger rail service under development by Florida East Coast Industries (FECI). All Aboard Florida will provide service along the existing Florida East Coast Corridor (FEC), a SIS facility, between Miami and the Space Coast and along new tracks, yet to be constructed, that will extend to the Orlando metropolitan area. Stations are currently planned for the downtowns of Miami, Fort Lauderdale, West Palm Beach and at the future Intermodal Station at the Orlando International Airport. FECI is currently selecting rolling stock, identifying exact station locations and making other decisions to bring the project to fruition.

While the exact details of AAF are still being finalized at the time of Commitment 2040, FECI, as a private owner/operator, has the legal authority and responsibility to finalize plans consistent with the requirements of the SIS, its shareholders and regulators. To review All Aboard Florida’s investment plan visit http://www.allaboardflorida.com/.
The BGUA has had a strong history with rail transportation and the movement of people and goods. Although the historic rail depot no longer provides passenger service, it does represent a focal point where public commerce took place and has now grown into a prosperous central business district. Through the years, several service and commercial businesses and government facilities have developed near the depot and now form the Central Business District. In 2003, the "Company Shops Station" Depot was rehabilitated to house city offices and the Amtrak waiting areas. The "Company Shops Station" now provides a convenient and safe place for use of passenger rail services and for public/community events and use.

Existing Passenger Service

The State of North Carolina sponsors two Amtrak-operated passenger trains, provides passenger service: The Piedmont and the Carolinian. The Piedmont makes a daily round trip between Raleigh and Charlotte by way of Burlington. The State owns the equipment for the Piedmont and contracts with Amtrak for maintenance and operations of the train. The Carolinian makes daily trips each way between Charlotte and New York City by way of the Burlington depot. The Carolinian uses Amtrak equipment and is Amtrak-maintained.

Passenger rail planning efforts were expanded with the Piedmont Triad Regional Mobility/Passenger Rail Major Investment Study, Study Management Plan. The Piedmont Authority for Regional Transportation (PART) managed the rail studies. These Studies included: 1) A passenger rail proposal providing services between Asheville and Raleigh through Winston-Salem generally following the I-40 corridor; and 2) A passenger rail proposal providing for commuter rail services between Winston-Salem, Greensboro, High Point, Burlington, and outlying communities.

The evaluation and validation of the two services were completed under one study called the “Piedmont Triad Region Mobility/Passenger Rail Investment Study.” This Study was designed to coordinate and integrate efforts, identify improvements that enhance the feasibility of both services, and document stand-alone support for each service. The Study produced two separate documents upon its completion.

The first document, entitled the “Mobility/Rail MIS,” will facilitate careful consideration of a full range of mobility alternatives, as well as quantitative and qualitative measures to assess and evaluate alternatives in an open process founded on community input. The Mobility/Rail MIS identified a Regionally-Preferred Investment Strategy consisting
of a comprehensive package of transportation and policy solutions to enhance land use, build livable communities, provide transportation choices, and manage future congestion problems.

The second document, called the Piedmont Triad Intercity Rail Connection, addressed the need to re-establish intercity rail services from Winston-Salem through Greensboro to Burlington. The document also included needs, cost, and public benefit of intercity passenger rail travel in the Triad.

**Piedmont High-Speed Corridor**

The Piedmont High Speed Corridor is a 477-mile federally designated high-speed rail corridor running from Washington, D.C. through Richmond, VA; Raleigh; Greensboro; Burlington; and on to Charlotte, NC. A recent study on the corridor indicated that the potential for ridership and revenue along the passenger rail line would be greater than any other high-speed route in the United States.

As a result of the studies, this corridor has been designated as one of eight national rail corridors currently identified for improvements to high-speed status. This effort has led to the adoption of a NCDOT resolution to protect the integrity of the rail corridor. The approved resolution endorses the concept of providing better separation between vehicle and train movements at existing and proposed crossings of the rail corridor. Additionally, traffic separation studies were performed within several BGMPO jurisdictions to study which crossings need to be closed or improved. The purpose of these closings is to assist in reducing train travel time to two hours between Raleigh and Charlotte.

The resolution lists the following directives:

- That any new intersection of the Federally-Designated High-Speed Rail Corridor be grade-separated and supports the closure of redundant and/or unsafe highway/rail at-grade crossings on this route;
- That municipalities be encouraged to implement crossing consolidation projects; and
- That new crossings be strongly discouraged in adopted plans, zoning changes, site plan approvals, and building construction approvals.

NCDOT will make every effort to provide grade-separated alternatives to enhanced warning or traffic control devices (four-quadrant gates, median barriers, longer gate arms, and intelligent signal systems) as a part of the widening of existing highway/rail at-grade crossings. Replacement of the at-grade crossing with a grade separation will be evaluated and considered through the planning and engineering process.

Two completed projects related to the high-speed rail corridor include the closure of Norfolk Southern Railroad crossings at Antioch Avenue and Holt Avenue in the Town of Elon. Two other rail projects completed are TIP #s Y-3449A and Z-2749D which were safety projects involving the installation of automatic warning devises. Both projects are located in Gibsonville on East Joyner Street at the Norfolk Southern Railway crossing. A major rail “siding” project is underway in Haw River that will allow passenger and freight train traffic to coexist and improve safety.
Potential North Carolina Commuter Rail Service

The NCDOT Rail Division conducted a study to identify potential rail commuter corridors throughout the State that would like a sizeable suburban population with a substantial central city. One of the corridors identified is the Burlington-to-Greensboro link. This 23-mile commuter corridor extends westward from Burlington along I-40/85. Travel time between the two cities is approximately 25 to 30 minutes by automobile, given the 65-mph speed limit along much of I-40/85. The speed for Amtrak has recently been increased to reduce the train travel time to be more competitive, if not the same as, the automobile trip. NCDOT estimates at least 44,000 potential commuters can be served by this rail service.

Funding

Federal - Funding will be used to improve the rail route through Raleigh-Burlington-Charlotte and to purchase new passenger train cars and locomotives.

State - The North Carolina General Assembly continues to approve additional funding for rail programs.

Local - PART will continue to allocate funds to implement the two rail studies referenced above. These studies will be in partnership with the surrounding urban areas and MPO's.

For a copy of the commuter rail study and additional information regarding the Rail Improvement Program, contact the NCDOT Rail Division at (919) 733-4713, or visit their web-site at www.bytrain.org. For the Regional Commuter Rail Study information contact PART at (336) 662-0002 or website at www.partnc.org

Future Study

The BGMPO commits to work with state and local partners to develop both regional and commuter rail options for the urban area. BGMPO and PART will work together to achieve the rail passenger needs of the BGMPO urban area.
Existing Passenger Service

The State of North Carolina, which sponsors two Amtrak-operated passenger trains in the CR MPO area, provides passenger service: The Piedmont and the Carolinian.

The Piedmont makes a daily round trip between Raleigh and Charlotte by way of Kannapolis and Salisbury. The State owns the equipment for the Piedmont and contracts with Amtrak for maintenance and operations of the train. The Carolinian makes one daily trip each way between Charlotte and New York City by way of Kannapolis and Salisbury. The Carolinian uses Amtrak equipment and is Amtrak-maintained.

Both Depots in Kannapolis and Salisbury serve as focal points of the downtowns and central business districts. The Kannapolis Depot has undergone improvements to become a first class hub for passenger rail. The Rider Transit System also maintains a bus stop at this Depot providing daily bus service Monday thru Sunday. The Salisbury Depot has become a tourist and business attraction as a staple in the redeveloped downtown area. Salisbury Transit also provides local bus service in close proximity to the Depot on a regular schedule Monday thru Saturday.

Piedmont High-Speed Corridor

The NCDOT Rail Division, in conjunction with the North Carolina Railroad and Norfolk Southern, has plans to improve the busy (freight and passenger) Raleigh to Charlotte rail corridor to reduce travel time for both freight and passenger trains. The goal was to implement two-hour passenger service between the two major cities by 2010. In September 1997, a detailed evaluation of the Piedmont High-Speed Corridor (PHSC) was presented in the Piedmont High-Speed Corridor Rail Study Status Report.

The PHSC is a 477-mile federally designated high-speed rail corridor running from Washington, D.C. through Richmond, VA; Raleigh; Greensboro; Kannapolis; and on to Charlotte, NC. The report indicated that the potential for ridership and revenue along the PHSC would be greater than any other illustrative high-speed route in the United States.
Because of the studies, this corridor has been designated as one of eight national rail corridors currently identified for improvements to high-speed status under TEA-21. This effort has led to the adoption of a NCDOT resolution to protect the integrity of the PHSC. The approved resolution endorses the concept of providing better separation between vehicle and train movements at existing and proposed crossings of the rail corridor. Additionally, traffic separation studies have been performed by NCDOT within individual jurisdictions in the Urban Area. These studies have identified which crossings need to be closed or improved. The purpose of these closings is to assist in reducing train travel time to two hours between Raleigh and Charlotte. The resolution lists the following directives:

- That any new intersection of the Federally-Designated High-Speed Rail Corridor be grade-separated and supports the closure of redundant and/or unsafe highway/rail at-grade crossings on this route;
- That municipalities be encouraged to implement crossing consolidation projects; and
- The Department (NCDOT) will make every effort to provide grade-separated alternatives to enhanced warning or traffic control devices (four-quadrant gates, median barriers, longer gate arms, and intelligent signal systems) as a part of the widening of existing highway/rail at-grade crossings.

The Division 9 TIP Priority List included the following grade separation projects: Kimball Road, Jake Alexander Blvd, Klumac Road, and Long Ferry Road. Two of these projects were funded in the STIP: Kimball Road and Klumac Road through the American Recovery and Reinvestment Act (ARRA), but the other two remained unfunded at the present time. The City of Kannapolis has also given priority to a grade separation at Universal Street/Rogers Lake Road. A new grade separation is scheduled for construction as part of the I-85 widening project at Winecoff School Road. The City of Kannapolis staff has long lobbied NCDOT for this project. Replacement of additional at-grade crossings with grade separated structures will be evaluated and considered through the planning and engineering process.

Potential North Carolina Commuter Rail Service

The NCDOT Rail Division in January 1999 conducted a study that addressed the need for commuter rail service. The purpose of the study was to identify potential rail commuter corridors throughout the State that would serve a sizeable suburban population with a substantial central city.

Future commuter / passenger rail planning in the Urban Area may include the Northeast Blue Line Extension which would be a part of the Charlotte Transit System. The Blue Line Extension would be a major “spine” of the entire light rail system. Running from northeast to southwest in the CR MPO area, this line and extension begins in downtown Charlotte and continues parallel to US Highway 29 towards Concord and terminates on the campus of UNCC. The extension could cross I-485 one day and continue past the Lowes Motor Speedway and potentially to the Concord Mills Mall.
Our Long Range Transportation Plan > Rail Investments

The region is traversed by several key rail corridors, most notably the state-owned North Carolina Railroad Company (NCRR) right-of-way that stretches from Morehead City to Charlotte. Other major lines are owned by the region’s two Class I railroads: Norfolk-Southern and CSX. The NCRR corridor carries both freight and intercity passenger rail traffic; existing passenger rail stations within the MPO boundaries include Raleigh, Cary and Durham. The CSX “S” line heading north from central Raleigh and south from central Cary intersects the NCRR corridor along a section carrying freight and passenger traffic. The CSX “S” line from Richmond to Raleigh and the NCRR from Raleigh to Charlotte is also part of the Federally-designated Southeast High Speed Rail (SEHSR) Corridor.

This Rail Investments section of the plan focuses on freight rail and intercity passenger rail that links the Triangle to other regions. Commuter rail and light rail services within the region that could be located within or adjacent to existing rail corridors are addressed in Section 7.3 Transit Services. General freight issues—including freight carried by rail—are addressed in Section 7.5 Freight Movement.

Rail planning and investments are frequently a cooperative effort between owners and operators of rail assets and partner agencies. For example, a project to straighten curves and replace an at-grade crossing with a bridge may involve funding and other contributions from the North Carolina Railroad, Norfolk-Southern and NCDOT’s Rail Division. Funding from NCDOT is from state and federal sources, including Federal Railroad Administration competitive grants. Rail-related investments that involve roadway improvements and are included in the Transportation Improvement Program are included in the fiscal constraint analysis and transportation modeling that are part of this 2040 Plan. Other types of investments, many of which fall under a category of “exempt” projects listed in Figure 7.12.1, are not specified in 2040 MTP project lists. Examples include safety improvements at highway-rail crossings, replacement of existing rail bridges or the expansion of track within rail corridors.

Current intercity passenger rail service consists of three trains in each direction each day operated by Amtrak and serving the Durham, Cary and Raleigh stations. Two of the trains travel between Charlotte and Raleigh, while the third continues north from Raleigh to Washington, DC and New York City via a route heading east to Selma in Johnston County, then north along the CSX “A” line that roughly parallels I-95. Ridership has increased steadily on the service; during 2011, more than 900,000 riders boarded a train in NC. Two additional Raleigh-Charlotte Piedmont daily trains are planned to be added upon completion of the Piedmont Improvement Program projects.
Another aspect of the Commuter Rail Plan was to examine the feasibility for a regional high speed rail corridor that would pass through the Upstate of South Carolina. This connection would serve as a passenger link between the Columbia area and a terminal point in either Charlotte or Spartanburg, both of which lie along the primary corridor for the Southeast High Speed Rail service.

In determining the best connection to high speed rail, a comparative cost analysis was performed with regard to the major categories of infrastructure improvements. The projected cost associated with instituting service on the Columbia to Charlotte corridor is less than the cost of establishing service in the Columbia to Spartanburg corridor. However, if commuter rail service were already in place to Newberry, the additional cost of extending service to Spartanburg would be less than the cost of the Columbia to Charlotte corridor.

Based on the projected infrastructure costs in each corridor, it appears that the Columbia to Charlotte corridor offers a more effective opportunity for connecting to the potential Southeast High Speed Rail line. The caveat to this statement is that if improvements were to already be made to the Spartanburg corridor enabling commuter rail service to Newberry, the additional costs of extending service to Spartanburg would be less than the costs of establishing new service to Charlotte. Furthermore, there may be additional business ties between Columbia and Charlotte that could be strengthened with a rail connection.
> Public Transit > Intercity Transit

The Jackson MPA is served by three major intercity transit services, Amtrak, Greyhound Lines, and Delta Bus Lines. Both Amtrak passenger train service and Greyhound Lines intercity bus service operate out of Union Station in Jackson. Union Station is also the transfer hub for JATRAN’s fixed route service.

Union Station and the Jackson MPA are only served by one Amtrak route, the City of New Orleans route between New Orleans and Chicago, pictured in Figure 2.3. A Chicago-bound train stops in Jackson at 5:44 p.m. and a New Orleans-bound train stops in Jackson at 11:20 am. In 2014, Amtrak ridership at Jackson’s Union Station was 47,295. Since 2007, ridership has increased from just over 35,000, as shown in Figure 2.4.

Greyhound Lines bus service operates regional routes daily 6:00 a.m. to 11:00 p.m. Two of these routes, the Dallas-Jackson and Mobile-Jackson routes, are timed to allow transfers between Amtrak service.

Delta Bus Lines provides intercity bus service between Jackson and Indianola, MS with stops in Yazoo City, Louise, and Belzoni along the way.
Amtrak Service

Charlotte’s current passenger station is located on North Tryon Street approximately two miles north of the uptown business district. Constructed in the early 1960s, at a time of declining passenger services, the station does not meet current North Carolina or Americans with Disabilities Act (ADA) standards. ADA problems are acute for parking, station and platform access. Parking itself is available for only 60 cars, with overflow often parking in the grass area and on adjacent properties. The parking area is unfenced and in the past year has flooded, damaging passenger vehicles. As an interim measure the waiting room and ticket areas were expanded in 2002 with the removal of Norfolk Southern offices from the building. The station is adjacent to an active freight yard and occupies the mainline tracks, creating conflicts with freight operations.

Pedestrian access and connections to other transportation modes are inadequate at the current station. The region’s main business, government and cultural center is two miles away, and there are no connections to the inter-city bus service or car rental agencies nearby. The Charlotte Area Transit System (CATS) provides transit service to the station, but passengers who wish to connect to the Route 11 service to downtown Charlotte (in order to connect with other services) have to cross 4 lanes of traffic, without a signal or crosswalk.

The current schedule consists of four trains - Piedmont Service (2), the Carolinian, and the Crescent. Current scheduled times are:

<table>
<thead>
<tr>
<th>Time</th>
<th>Train</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:46 AM</td>
<td>Crescent</td>
<td>Northbound departure for Washington and New York</td>
</tr>
<tr>
<td>2:45 AM</td>
<td>Crescent</td>
<td>Southbound departure for Atlanta and New Orleans</td>
</tr>
<tr>
<td>7:00 AM</td>
<td>Carolinian</td>
<td>Northbound departure for Raleigh, Washington and New York</td>
</tr>
<tr>
<td>9:55 AM</td>
<td>Piedmont</td>
<td>Southbound arrival from Raleigh and Greensboro</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Piedmont</td>
<td>Northbound departure for Greensboro and Raleigh</td>
</tr>
<tr>
<td>2:55 PM</td>
<td>Piedmont</td>
<td>Southbound arrival from Raleigh and Greensboro</td>
</tr>
<tr>
<td>5:15 PM</td>
<td>Piedmont</td>
<td>Northbound departure for Greensboro and Raleigh</td>
</tr>
<tr>
<td>8:12 PM</td>
<td>Carolinian</td>
<td>Southbound arrival from Raleigh, Washington and New York</td>
</tr>
</tbody>
</table>

All trains serve numerous intermediate points in addition to the destinations named.
American Recovery and Reinvestment Act (ARRA)

North Carolina was awarded funding under the ARRA for several projects, among them the restoration of the final three sections of double track, between Charlotte and Greensboro, passing sidings on the line from Greensboro to Raleigh and some funding for a new station in Raleigh. Since 2009 several of the passing sidings have been completed, and it is expected that the double track projects will be let for bid in 2013 and 2014, with completion by 2017. The completion of these projects will allow for the addition of a 4th, and ultimately a 5th, frequency of the Piedmont service between Charlotte and Raleigh.

In addition, ARRA funds have been designated for use, along with other state funds, for the purchase of land adjacent to the Charlotte Pipe and Foundry, just outside the I-277 loop for a train maintenance facility for both Piedmont services and future Southeast High Speed Rail (SEHSR) train sets. At this point, no funds have been identified for construction of the SEHSR Corridor.

In 1992, the US Department of Transportation designated five national High Speed Rail corridors. The original SEHSR Corridor, extending from Washington DC to Charlotte NC was identified as the most economically viable.

The SEHSR program is designed to provide an alternative to the overburdened highway and airport networks. Because of its slower speed, the existing conventional passenger service is not time competitive with the highway and airport modes, but the proposed SEHSR service could reduce trail times between Charlotte and Washington from its current 10 hours to an estimated six to seven hours.

In 2004, the Rail Division of the NCDOT along with the Virginia Division of Rail and Public Transportation completed the National Environmental Policy Act (NEPA) Tier 2 Environmental Impact Study. Since that time both departments have been refining alternative alignments and holding public meetings along the route seeking public comment. The most recent meetings were held in the spring of 2013. Information is available at www.sehsr.org.
Western North Carolina Service

In March 2001, NCDOT adopted a phased plan to extend passenger rail service to Asheville and western North Carolina. This service would include a station stop in Statesville, within the CRTPO area. The plan includes renovating or building train stations that incorporate other community uses. NCDOT continues to work with communities on station and rail safety improvements, and is also working to identify funding to restore passenger rail service to Western NC. Information is available at www.ncbytrain.org.

Proposed Multimodal Station

A new multimodal station, to include a rail passenger facility, is being planned in Charlotte to better serve the increasing number of rail passengers, and to provide better connections to local transit options including intercity bus services. It will also accommodate the Norfolk Southern Railroad’s desire to separate passenger and freight operations at the existing North Tryon Street station.

The NCDOT has completed an engineering feasibility study for a multimodal facility on West Trade Street (the location of the original Charlotte passenger station) and has purchased 27 acres of land, bounded by West Trade Street, Graham Street, Fourth Street and the Norfolk Southern Railroad.

In 2012, the NCDOT and the City of Charlotte announced a partnership with the Hines Group out of Atlanta, GA as the Master Developer for the Charlotte Gateway station. The City, Center City Partners, the NCDOT and the Hines Group continue to meet to refine the station area plan. It is expected that the project will be a public-private partnership (P3) as it proceeds.
Both Kentucky and Tennessee participated in a recent tri-state study of a potential high speed passenger rail corridor from Atlanta to Louisville, led by the Georgia Department of Transportation (GDOT). The intercity service would be a link in a longer connection between Atlanta and Chicago, passing through Chattanooga, Nashville and Louisville. The study concluded that the line was cost-feasible based on projected revenue from passenger fares, although the ratio was not quite as favorable as two other projects that GDOT evaluated (Atlanta to Birmingham, Ala., and Atlanta to Jacksonville, Fla.) The study used a “representative” alignment that generally follows the Interstate 65 corridor between Nashville and Louisville, with a potential station in Bowling Green, Ky. CUAMPO area residents would most likely access the future intercity rail service by driving or taking regional transit to the Nashville station.

The proposed Atlanta to Louisville route is likely to receive attention at some future point, since it would provide the connection between planned intercity rail service in the Southeast and the Midwest. (See Figure 4-26.) In a recent evaluation of passenger rail corridors performed independently by TDOT, this line emerged as the one with the best near-term potential for high speed service. Practically speaking, the project’s timeline will likely be driven by the degree of interest from the Atlanta region. The primary focus in the Southeast for the next decade will likely be the proposed high speed rail service linking Atlanta to the Washington, D.C. region via Charlotte and Raleigh, NC, which connects much larger population centers and includes a link where North Carolina has already been operating successful passenger rail service for many years.
AGENCY: French Broad River MPO
METRO AREA: Asheville, NC
PLAN TITLE: Metropolitan Transportation Plan 2015-2040
LAST UPDATED: September 2015

> Vision and Goals > MTP Goals > Goal 4: Improve Public Transit Options

Address Lack of Inter-City Transit

- Develop a passenger rail market study with NCDOT rail and Norfolk Southern to reinstate Amtrak service to the region—initially with seasonal, weekend & holiday schedule; identify origin & destination markets and potential ridership

> Accessibility and Connectivity > Rail

Regular passenger train service to Asheville and Western North Carolina ended in 1975, yet the area still attracts millions of visitors each year - many from cities served by existing Amtrak service. Support for passenger rail service in the Land of Sky region remained strong. Many believe it will enhance economic development and improve connectivity with the state’s transportation infrastructure.

In March of 2000, the Asheville Chamber of Commerce, in conjunction with other regional leaders, formed the Western North Carolina Rail Corridor Committee to promote restoration of passenger rail service to the foothills and mountains of North Carolina and to provide assistance and support to NCDOT. This committee consisted of stakeholders and representatives from communities along the proposed route between Salisbury and Asheville.

In the FBRMPO region, NCDOT adopted a phased plan to extend passenger rail service to Black Mountain and Asheville along the Norfolk Southern Track that runs from Old Fort to Asheville. The plan would increase the number of trains on the corridor through Black Mountain and along US 70 and includes rail safety improvements and the elimination of at grade crossings wherever possible.

In 2001 a Western North Carolina Passenger Rail Study was completed and suggested four alternatives depicted in Figure 1. Each scenario was evaluated as a possible way to extend passenger rail service from Salisbury to Asheville. Each scenario incorporated a detailed review of potential ridership and revenue, as well as probable costs of operation. The plan would increase the number of trains on the corridor through Black Mountain and along US 70 and includes rail safety improvements and the elimination of at grade crossings wherever possible.
Western North Carolina Passenger Rail Study Alternatives

Alternate 1 - Raleigh to Asheville via Salisbury
- Trains would operate from Raleigh to Salisbury to Asheville with stops at 13 cities along the way.

Alternate 2 - Raleigh - Raleigh to Asheville via Salisbury
- Trains would operate along the 270-mile route between Raleigh and Asheville via Salisbury with 13 stops. Improvements to the track infrastructure would also be made between Raleigh and Salisbury to increase the average speed to 46 mph and decrease travel time to just under six hours.

Alternate 3 - Salisbury to Asheville with connections to Piedmont service
- Trains would operate between Salisbury and Asheville only, but passengers could easily connect to the existing daily Raleigh-Charlotte Piedmont service. The Salisbury-Asheville portion of the trip is 139 miles with an average speed of 37 mph.

Alternate 4 - Salisbury to Asheville with connections to New York-Atlanta service
- Trains would operate independently between Salisbury and Asheville with one coach that connects to/splits off from New York-Atlanta train. Under this alternate Northbound passengers could depart from Asheville, arrive in Salisbury and transfer to the New-York or Atlanta bound train.
Amtrak also operates one daily route, the Crescent, through Gastonia. This route allows passengers to travel to the Northeast, as well as southwest towards New Orleans. In Fiscal Year 2013, boardings and alightings at the Gastonia station were by far the lowest of all Amtrak stations in North Carolina. This is likely explained by many reasons, including: only being served by one Amtrak route; early AM arrival/departure times of the trains; the isolated location of the station; and proximity to the Charlotte Amtrak station where more frequent and greater service is provided.
The goal for the Southeast High-Speed Rail (SEHSR) project is to provide passenger rail service between Washington, D.C. and Charlotte, NC at top speeds of up to 90-110 miles per hour and an average speed of 86 mph. In 2002, North Carolina and Virginia completed a Tier I Environmental Impact Statement, which examined alternatives and selected the preferred route for the corridor. This study also established the purpose and need for the project, and the vision for passenger rail service on the corridor.

The North Carolina Department of Transportation (NCDOT) and the Virginia Department of Rail and Public Transportation (DRPT) are nearing completion of the SEHSR Tier II Final Environmental Impact Statement Raleigh to Richmond study. The study covers the 163-mile CSXT S-Line rail corridor between the two cities and is a critical segment of the federally designated Southeast Corridor. Subsequent Tier II studies are required by law, and transition the corridor segments from vision to location-specific alternatives, and recommend the best design and location for the required investments. The Tier II FEIS R2R document is the culmination of a detailed environmental planning process, which included exhaustive field research, valuable background studies, compilation of costs and impacts on the human and natural environment, and validation of the project purpose and need. Once the document is approved by the Federal Railroad Administration (FRA) of the USDOT, NCDOT and DRPT can seek funding for final design, right-of-way, construction and implementation of service (for more information see http://www.ncdot.gov/projects/sehsr/).

NCDOT’s short term implementation work is making substantial upgrades to the NCRR between Raleigh and Charlotte. Between 1992 and 2008 the N.C. Department of Transportation invested more than $300 million in the state’s intercity passenger rail service for renovation and construction of train stations, track work improvements and corridor preservation projects to pave the way for high speed service. More recently, NCDOT was awarded $545 million from the American Recovery and Reinvestment Act to support implementation of Southeast High Speed Rail Corridor (SEHSR). An anticipated $520 million will be spent between Raleigh and Charlotte on improvements to enable higher speeds and more reliable service through the corridor while also improving the security of the rail service and its riders. Corridor wide, the improvements include expanding all single track sections to double track, removing and improving crossings, and station security upgrades. While the bulk of these improvements are located outside of the Greensboro MPO area, the improvements will clearly benefit both freight and passenger rail through the Greensboro area. NCDOT’s original request was for $5.2 billion, which is the current estimated cost to fully complete SEHSR improvements in the state.
The Hattiesburg MPA is served by two major intercity transit services, Amtrak and Greyhound Lines. Amtrak passenger train service operates out of the Hattiesburg Train Depot while the Greyhound stop is on US 49 near Rawls Springs.

The Hattiesburg Train Depot is only served by one Amtrak route, the Crescent Route between New Orleans and New York, pictured in Figure 6.16. A New York-bound train stops in Hattiesburg at 9:30 a.m. and a New Orleans-bound train stops in Hattiesburg at 4:38 p.m. In 2014, Amtrak ridership at the Hattiesburg Train Depot was 11,448. Since 2007, ridership has increased from just over 9,000, as shown in Figure 6.17.
Three AMTRAK trains operate through the historic passenger rail terminal in High Point (Carolinian-Piedmont Schedule, 2012) (Crescent Schedule, 2012). Table 4.5-1 shows the trains, scheduled departure time, route and direction of the trains. To support passenger rail service, the Piedmont Authority for Regional Transportation provides connector service from the AMTRAK station to Winston-Salem for trains 73, 74, and 76. Time schedules and fare information are available at: http://www.bytrain.org/docs/5AmtrakConnectorweb.pdf.

<table>
<thead>
<tr>
<th>Train</th>
<th>Name</th>
<th>Number</th>
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<th>Route</th>
<th>Direction</th>
</tr>
</thead>
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</tr>
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<td>SB</td>
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</tr>
<tr>
<td>Crescent</td>
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<td>NB</td>
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</tr>
<tr>
<td>Carolinian</td>
<td>80</td>
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<td>Clt-HP-Ral-NY</td>
<td>NB</td>
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</tr>
<tr>
<td>Piedmont</td>
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<td>6:29 pm</td>
<td>Ral-HP-Clt</td>
<td>NB</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.5-1 Passenger Trains Using the Historic High Point Depot
North Carolina has eighteen passenger rail stations serving three passenger routes. Figure 4.5-2 shows the number of passengers boarding, or alighting, at Triad rail stations through September 30th, 2012 and the growth in rail passengers boarding for stations in the Triad since 2005. Thirty-eight thousand (38,000) passengers boarded trains at High Point in 2012. This is about four percent of rail passengers in the state. Between 2005 and 2012, the number of boardings in High Point rose from eleven thousand to thirty-eight thousand. Some of the increase is attributable to improved service quality (i.e., on-time), some to greater convenience (additional trains), and some to the rising costs of other modes.
Figure 4.5-3 shows the passenger boardings at each of North Carolina’s seventeen passenger rail stops as well as their percentage of total passengers and their contribution to boardings in the state.
Amtrak operates one long distance Superliner train through Tennessee, the City of New Orleans route. The daily overnight service includes stops at Chicago; Memphis; Jackson, Mississippi; and New Orleans, operating on a track owned by Canadian National Railway (CN). Full dining and sleeper service cars are available for the 19-hour, 926-mile trip.

By rail, travel time between Jackson and Memphis is about 4 hours and 15 minutes. Travel time between Memphis and Chicago is slightly more than 10 hours. On-time performance for the City of New Orleans service was about 70% for travel during 2014, with a ridership of approximately 251,000.

Within Memphis, Amtrak’s passenger rail service connects to the MATA trolley system via Central Station (constructed in 1914 and recently restored), located on South Main Street.

Studies or efforts are currently underway by the Tennessee Department of Transportation, Arkansas State Highway and Transportation Department (AHTD), and Amtrak to increase intercity passenger rail options to and from Memphis; however, at this time no funds have been committed for implementation.

High-speed rail connections for the Memphis MPO region are also being explored. Although the Federal Railroad Administration’s initial High-Speed Rail Strategic Plan did not show Memphis on the South Central Corridor running from southern Texas to the Chicago Hub, subsequent planning efforts and funds were allocated for AHTD to evaluate the feasibility of extending the South Central High-Speed Rail Corridor from Little Rock to Memphis.

The FRA 2009 High Speed Rail Strategic Plan defines three categories of high speed service based on distance between markets, top speeds of service, and existence of dedicated right of way:

- **HSR Express** – operates in corridors 200-600 miles in length, with top speeds over 150 mph on primarily dedicated tracks;
- **HSR Regional** – operates at top speeds of 110-150 mph on a mix of dedicated tracks and tracks shared with slower passenger and freight trains; and
- **Emerging HSR** – corridors of 100-500 miles in length with service operating at top speeds of 90-110 mph on tracks shared with freight and/or commuter services.
EXPLAINING THE ISSUES

> Planning Process > Plan Alternatives > Inter-Regional Projects

As part of the development of the plan, the following key interregional projects that will connect North Florida to other metropolitan regions were identified.

- Jacksonville to Atlanta high speed rail
- Miami to Jacksonville intercity passenger rail
- Tampa Bay to Northeast Florida: Florida’s Future Corridors

No funding was allocated to these projects as part of the plan but they are long-term needs that will be addressed through intra-state or inter-state cooperation. The following provides a brief overview of these projects.

Jacksonville to Atlanta High Speed Rail

In 1998, the U.S. Department of Transportation designated the Jacksonville to Atlanta as a component of the Southeast High Speed Rail network. According to the report Ground Transportation for America prepared by U.S. Department of Transportation the Southeast High Speed Rail network was given a “specialized analysis” and “afforded exceptional treatment” because of its extraordinary potential for commercial success.

In 2012, the Georgia Department of Transportation and U.S. Department of Transportation completed a feasibility study for the potential of high speed rail consistent with the Southeast High Speed Rail Network program. The total costs of implementing service ranged from $5 billion to $15 billion if shared rail use or exclusive rail was constructed. The following summarizes the recommendations of the study.

High-speed rail service in the Atlanta-Macon-Jacksonville Corridor presents an opportunity to provide needed transportation solutions and promote economic development. While high-speed rail is not the only transportation solution, this study gives evidence that passenger high-speed rail will provide added mobility and transportation choices to consumers. High-speed rail can provide more efficient and cost-effective means to consumers, providing added connectivity to major cities such as Atlanta and Birmingham through commercial centers and national / international destinations.
The Atlanta-Birmingham corridor extends from the Hartsfield-Jackson Atlanta International Airport to the proposed downtown Atlanta Multi Modal Passenger Terminal (MMPT) and onto Birmingham, Alabama. This particular rail corridor was included in the 1997 High-Speed Ground Transportation for America report and is one of the 11 federal-designated high-speed rail corridors.

Georgia Department of Transportation (GDOT) partnered with the RPCGB to determine the relative feasibility of the corridor with regards to capital costs, funding and financing opportunities, operation and maintenance costs, ridership and revenue, operating ratios, and benefit-cost analysis.

Representative routes for 90-110 mph Shared Use and 180-220 mph Dedicated Use corridor operations were identified based on a technical and stakeholder review of the corridor. The selected routes are shown in Figure 8.

The study concluded that although the initial investment in high-speed rail is significant, the mobility and economic opportunities offered by this new mode are also significant. Based on the analysis findings, this study determines that high-speed rail is feasible in the Atlanta-Birmingham Corridor and would present an opportunity to provide needed transportation solutions and promote economic development. Detailed information regarding this study can be found at http://www.swcorridor.org/.
This study illustrates that although the initial investment in high-speed rail is significant, the mobility and economic opportunities offered by this new mode are significant. Based on the analysis findings, this study determines that high-speed rail is feasible in the Atlanta-Macon-Jacksonville Corridor. It is further recommended that a Tier 1 NEPA Document and Service Development Plan be pursued for high-speed rail service within the corridor. This analysis should continue to address a range of technology alternatives including the Hybrid High Performance implementation approach.

A copy of the executive summary of the Georgia Department of Transportation study is provided in Appendix F.

Miami to Jacksonville High Speed Rail

All Aboard Florida, an intercity passenger rail program being developed by the owner of the FEC railroad, Fortress Investment Group, will be a privately owned, operated and maintained passenger rail service to connect South Florida and Orlando that is anticipated to open service in 2016. As part of their long-term plan, Jacksonville to Miami service is proposed in the future. However, no timetable has been set.
Inter-city passenger rail service is provided by Amtrak, an arm of the Federal government. Outside the northeastern U.S., the services fall into two kinds: long-distance services, often running once a day, and shorter-distance ‘corridor’ services, often with several trips per day and usually supported financially by states. Amtrak mostly operates over track owned by freight railroads (‘host’ railroads). Although Amtrak’s operations and expansion have been hampered by budget restrictions, there is increasing political recognition of inter-city rail’s potential contribution to energy independence, offering an alternative to highway congestion, and providing resilience in the event of disruption to civil aviation.

Most of South Carolina’s Amtrak service only serves the state incidentally, as trains pass through the state. The State makes no contribution to the capital or operating cost of the Amtrak service.

There are currently no passenger rail services within the RFATS region. The nearest Amtrak stations are Charlotte NC, Gastonia NC, Camden SC and Spartanburg SC. (In Charlotte, the station is due to be relocated to a new downtown intermodal center within the next few years.) These stations are currently served by the following trains:

- The Crescent (serving Spartanburg, Gastonia and Charlotte) – a long-distance service between New York and New Orleans. One train each way, daily. Other key destinations en route include Atlanta, Georgia and Birmingham, Alabama. The schedule for this service is determined by the main points on the route, and so the timings at stations near the RFATS area can be inconvenient; currently the train calls at these stations during the late night/early morning in both directions.

- The Silver Star (serving Camden) – a long-distance service between New York and Miami. One train each way, daily. Other key destinations en route include Savannah and Orlando. The schedule for this service is determined by the main points on the route, and so the timings at stations near the RFATS area can be inconvenient; currently the train calls at these stations during the late night/early morning in both directions. (Additional services between New York and Florida operate through the eastern part of the state via Florence and Charleston.)
The Carolinian (serving Charlotte) – a long-distance service between Charlotte and New York. One train each way, daily. This is potentially the most useful service for rail passengers living within the RFATS area, as it offers daytime service between Charlotte and the mid-Atlantic states. This train is supported financially by the North Carolina Department of Transportation (NCDOT).

The Piedmont (serving Charlotte) – a short-distance (‘corridor’) service between Charlotte and Raleigh. This service is supported financially by NCDOT. There are currently three trains each way, daily. NCDOT plans to add a fourth frequency in 2017 and a fifth frequency by 2019.

Locally, Charlotte will remain the main access point for area residents to reach the inter-city rail network, at least in the near-term. There might be future opportunities to extend the Piedmont to Rock Hill along the Norfolk Southern track. This would require further study and would almost certainly involve upgraded infrastructure as part of any agreement with the railroad. It might also be possible to extend the Carolinian through Rock Hill to Columbia. As with the Piedmont extension, further studies would be required.

A step-change in inter-city rail service could come from the development of a national high-speed passenger rail (HSR) network, similar in scope to the interstate highway system, and similar in concept to the high-speed rail networks already in place in other advanced nations and being planned in California. One of the HSR corridors designated by the US Department of Transportation (USDOT) – the Southeast High Speed Rail Corridor – would serve Charlotte, potentially providing access to RFATS area residents.

The Southeast HSR Corridor broadly shadows the Norfolk Southern (NS) main line and I-85. It was originally designated as running from Washington, DC through Richmond, VA and Raleigh, NC to Charlotte, NC with maximum speeds of 110 mph. It is part of an overall plan to extend service from the existing high speed rail on the Northeast Corridor (Boston, MA to Washington, DC) to points in the Southeast.

Extensions designated in 1998 included an extension from Charlotte through Spartanburg and Greenville, SC to Atlanta, GA and on through Macon, GA to Jacksonville, FL. It is this extended corridor that passes close to the RFATS region. There are no firm timelines for implementation on any segment.
Environmental studies for the Raleigh-Charlotte segment are complete and incremental improvements along this rail corridor are underway. These improvements, largely funded through the American Recovery and Reinvestment Act, are scheduled to be completed in 2017. The initial technical work suggested that high-speed service could be extended from Charlotte (Downtown) station to a new station (and servicing facility) at Charlotte-Douglas International Airport.

The proposed extension through South Carolina to Atlanta is now being analyzed through a Tier 1 Environmental Impact Statement (EIS), which analyzes potential route alternatives and station locations and is scheduled for completion in 2016. Three potential routes are being studied (Figure 8.3):

- The Norfolk Southern (NS) railroad corridor (also referred to as the Southern Crescent Corridor route);
- The I-85 corridor; and
- A “greenfield” corridor which offers the opportunity to define a fully grade-separated route alignment with optimal geometric characteristics for high-speed passenger rail service.

Although the two HSR alternatives that would link Rock Hill and Columbia were not carried forward into the current study, the SCDOT State Rail Plan notes there is interest in connecting Columbia to the expanding passenger rail network being developed in the Charlotte region.

Figure 8.3: Potential High Speed Rail Routes from Charlotte to Atlanta

Rocky Mount has a rich railroad tradition. Trains skirted the eastern boundary of the community and by 1840 a downtown depot was in operation. Although the Emerson Shops and the Atlantic Coast Line Railroad are long gone, the depot still operates today. The passenger depot, which serves Amtrak patrons, was renovated and reopened in October 2000. The depot is also located immediately adjacent to the renovated bus station (March 1998), which accommodates both Tar River Transit and Greyhound / Trailways bus services under one roof. Together these two facilities comprise the Rocky Mount Multi-Modal Transportation Center.

The Rocky Mount train station is one of 16 North Carolina Amtrak stations. With approximately 58,000 passengers getting on or off at Rocky Mount, this is the fourth most active station in NC. Amtrak train sets are named and also carry number identifiers. Odd numbered trains head south and even numbered trains travel north. Rocky Mount sits about midway on the mainline from Miami, FL to New York, NY. Passenger service on the Carolinian (#80) goes west to Charlotte, NC.
AGENCY: Winston-Salem Urban Area Metropolitan Planning Organization
METRO AREA: Winston-Salem, NC
PLAN TITLE: 2040 Metropolitan Transportation Plan
LAST UPDATED: October 2015

> Public and Private Transportation Element > Public Transportation > Amtrak

America’s railroads provide an important alternative to auto and air transport for both passengers and freight. As the Nation’s largest provider of passenger rail service, Amtrak serves 500 stations in 46 states, serving over 31.5 million passengers in 2013. Each day, an average of more than 86,000 passengers ride more than 300 Amtrak trains. The MPO works with the NCDOT Rail Division to plan for future services that will meet growing passenger rail transportation needs. Three passenger trains serve Greensboro twice daily: the Carolinian, the Crescent, and the Piedmont. The Carolinian runs from Charlotte to New York, the Crescent runs from New Orleans to New York City, and the Piedmont runs from Charlotte to Raleigh. Connecting service at Galyon Station is available via GTA, taxi, and rental car.

**AMTRAK Connector**

In April 2004, PART began service from Winston-Salem to the High Point Train Depot with public transit services to allow passengers to board the Amtrak rail services that operate in North Carolina.

**How to Catch the Connector**

The Amtrak Connector provides shuttle service between the Winston-Salem Transportation Center, Winston-Salem State University and the High Point Amtrak Station. The services is open to all or present your Amtrak tickets (or Passenger Reservation Number) to the shuttle driver. One fare takes care of your entire trip - the ride to the station and your train ticket.

For more information: 1-800 872-7245 or amtrak.com 1-800 BYTRAIN(298-7246) or bytrain.org
Lone Star Rail District (LSRD) is an independent special district authorized by the Texas Legislature. The Rail District encompasses five counties — Bexar, Comal, Hays, Travis and Williamson — and the cities of San Antonio, Schertz, New Braunfels, San Marcos, Austin and Georgetown. The Rail District’s governing board of 20 members includes elected and appointed officials from those counties and cities as well as representatives of the Alamo Area and Capital Area Metropolitan Planning Organizations (AAMPO and CAMPO), local transportation providers, and the San Antonio and Austin business communities.

The Lone Star Rail passenger rail project is a key initiative to help alleviate the congestion and safety problems on IH 35 due to extraordinary population growth and increased NAFTA traffic. The locally preferred alternative—adopted in 2005 by the Rail District Board as well as the Austin and Alamo Area MPOs—is a 112-mile regional passenger rail system located in the existing Union Pacific rail corridor for most of its length. Fifteen stations are planned along the route, which is anchored by the Austin and San Antonio metropolitan areas with additional stations in Schertz, New Braunfels, San Marcos, Kyle/Buda, Round Rock and Georgetown. A 16th station in south San Antonio is being studied in the environmental clearance process which is currently underway.

Intercity rail service will offer relaxing, stress-free travel that allows riders the freedom to make the most of their travel time by studying, working, or simply enjoying the scenery. Travel times will be competitive with, if not faster than, travel by automobile; but the key element is that rail travel is predictable and dependable, while accidents, weather conditions, and other variables can often cause unexpected delays for drivers.

Significant technical work has been completed for the regional passenger rail project, including: conceptual engineering, alternatives analysis, station location studies, station economic impact analyses, capital and operating cost estimates, operating plans, ridership studies, and financial and economic benefits studies.

In October 2010, Lone Star Rail and Union Pacific Railroad (UPRR) executed a Memorandum of Understanding that states the Rail District and UPRR will study the feasibility of relocating UPRR’s through freight to a new route. If an appropriate route is identified, UP will consider moving its “through” freight, which makes up the bulk of the freight traffic, to a new line in exchange for the existing freight line. In November 2010, the Rail District launched the initial study in the freight rail relocation effort—a fatal flaw analysis of alternative routes for the through freight. UPRR’s local
freight will remain on the existing mainline, but the relocation of UPRR’s through-freight operations will allow the Rail District to provide passenger rail service on the existing mainline. The Lone Star Rail District believes this project to:

- Improve mobility throughout the Austin-San Antonio Corridor
- Provide a predictable, reliable travel choice
- Divert trucks from IH 35 to new freight bypass, thus improving speed and efficiency of NAFTA trade flows
- Improve safety in the IH 35 corridor
- Maintain air quality status (Austin and San Antonio both near-non-attainment areas)
- Create a regional, seamless, multi-modal transportation system

> Public Transportation Services > Texas-Oklahoma Passenger Rail Study

The Texas-Oklahoma Passenger Rail Study (TOPRS) is an evaluation of a range of passenger rail service options in an 850-mile corridor from Oklahoma City to South Texas. The study began in 2013 and is expected to conclude by the end of 2014. It will document the costs, benefits and impacts of potential rail service alternatives compared to a no-build alternative in a service-level environmental impact statement (EIS).

This rail corridor, shown in Figure 6.12, could potentially be a high-speed rail corridor and could complement the aforementioned commuter rail system as a whole. The study will consider the corridor as a whole, as well as three discrete portions of the corridor:

- Northern: Oklahoma City to Dallas/Fort Worth
- Central: Dallas/Fort Worth to San Antonio
- Southern: San Antonio to Rio Grande Valley/Corpus Christi/Laredo
Amtrak rail service in the OCARTS area consists of the Heartland Flyer service to Fort Worth, Texas. The train departs Oklahoma City’s Santa Fe Depot, located at Reno Avenue and E. K. Gaylord, at 8:25 a.m. daily and arrives in Fort Worth at 12:39 p.m. It departs Fort Worth at 5:25 p.m. daily and arrives back in Oklahoma City at 9:39 p.m. The train also serves the Oklahoma communities of Norman, Purcell, Pauls Valley, and Ardmore, as well as Gainesville, Texas. Table 9.2 provides historical ridership and funding information for the Heartland Flyer.

The Heartland Flyer service corridor (Oklahoma City to Fort Worth), as well as the Oklahoma City to Tulsa corridor (no train service is currently provided) are both part of the federally-designated South Central High-Speed Rail Corridor. In January 2009, the Federal Railroad Administration (FRA) awarded $11 million in high-speed and intercity passenger rail funding to Texas, which included $4 million for adjusting signal timing over 63 miles of Burlington Northern Santa Fe (BNSF) track. The project was expected to reduce travel time on the Texas leg of the Heartland Flyer by over 15 minutes by increasing travel speeds from 49 mph to 79 mph.

In March 2010, Amtrak completed a feasibility study for the Kansas Department of Transportation (KDOT) on the costs and logistics of a potential expansion of passenger rail service in Kansas. Out of four possible scenarios, two involved extension of Heartland Flyer service to either Newton or Kansas City. The next step was the selection of one of the four alternatives and incorporation of the feasibility study data into a Service Development Plan, a comprehensive business and operations plan for implementing expanded passenger rail service in Kansas. KDOT was awarded a $250,000 American Recovery and Reinvestment Act federal grant to create the Service Development Plan. The federal funds provide only a 50 percent share and must be matched by another $250,000. KDOT and the Oklahoma Department of Transportation (ODOT) are sharing the cost of the match requirement.
FINDINGS > Intercity Rail > MTP Notable Practices

AGENCY: Capital Area Metropolitan Planning Organization
METRO AREA: Austin, TX
PLAN TITLE: CAMPO 2040 Regional Transportation Plan
LAST UPDATED: September 2015

> Our Regional Mobility Needs > Rail

The capital area is served by one Class I railroad, Union Pacific Railroad (UPRR), and two short line railroads: Capital Metro and Georgetown Railroad. UPRR operates from San Antonio through San Marcos, Austin, and continuing north. It also operates a line from San Marcos to Lockhart and into Bastrop County. A third line comes from La Grange through Bastrop and continues through Williamson County.

UPRR runs freight traffic on all their lines. Amtrak’s Texas Eagle operates daily on its north-south route running from San Antonio to Chicago. Lone Star Rail District is conducting environmental studies on a proposed freight bypass that would move UPRR’s through-freight operations to a new line east of Austin in order to offer regular passenger service between San Antonio and Austin, continuing to Georgetown.

Capital Metro’s commuter rail line runs from Llano through Burnet, Austin, and Elgin before terminating in Giddings. Capital Metro offers service from Leander to downtown Austin. Austin Steam Train operates several trips on the portion between Austin and Burnet. Freight operations also run on this line.

Georgetown Railroad operates from Austin to Georgetown and continues north to the UPRR line. It primarily serves a large quarry outside Georgetown.

> Planning Considerations > Emerging Technologies > High-Speed Rail

With long distances to cover between its major cities, Texas is a logical candidate for high-speed, or higher-speed, rail. Four of the nation’s 15 largest cities are in Texas, and discussions are already underway regarding higher-speed rail between Dallas and Houston. The proposed route for this new high-speed service is east of the capital area roughly along the IH 45 corridor. The proposed project would reduce travel between Dallas and Houston from approximately four hours to 90 minutes.
Planning for Southeast **High Speed Rail** envisions high performing rail operating within the region along the NCRR corridor east to Raleigh at speeds up to 90 mph, then north along the CSX “S” line at speeds up to 110 mph. The NCDOT Rail Division is leading efforts to provide a “sealed corridor” for higher speeds and additional trains, closing or bridging existing at-grade crossings where feasible to improve both safety and operations. The NCRR has led **commuter rail** capacity and ridership studies to better understand the interplay of freight and **passenger rail** operations within the region and the range of track investments that might be needed to accommodate increased shared use.

Due to the complexity of rail investments and the myriad of interested organizations, the MPOs helped initiate a Triangle Main Lines Partnership in 2011 to bring together public and private sector owners and operators of critical rail assets along with the communities and anchor institutions adjacent to the rail lines. The partnership is designed to help stakeholders: i) better understand projects affecting the region’s main rail corridors, ii) identify interests of primary importance to the stakeholders, and iii) generate collaborative efforts to advance shared interests.
Unlike the east-west axis described in the preceding project, passenger trains still run between New Haven, Hartford, Springfield, and northern New England. Yet due to the constraints listed below, this line has yet to realize its full potential, both in terms of ridership and economic development:

1. **Frequency.** Trains do not run often enough or at convenient times.
2. **Speed.** Single track conditions and low operating speeds slow the train.
3. **Layovers.** Poor coordination with other transit services results in long transfer waits, especially in New Haven Union Station.
4. **Price.** Amtrak tickets are beyond the reach of many and are not competitive with long-distance bus service.
5. **These factors make the train uncompetitive with private automobiles for much travel along the corridor. This is unfortunate. The concentrations of population and destinations between New Haven and northern New England, as well as congestion on I-91 and Route 15 indicate potential for high ridership, low operating subsidies, and transit-oriented development.

Although enhanced rail service on this line would run tangential to the region, stopping only in Berlin, given the centrality of the corridor to the State, as well as the potential for an in-land high-speed alternative to the coastal Northeast Corridor (connecting New York and Boston via Hartford, Springfield, and Worcester), this Plan supports the majority of the upgrades that have been proposed and that are under study for it. These include the New Haven-Hartford-Springfield Commuter Rail project and Pioneer Valley’s Knowledge Corridor project. Amtrak and its State and rail authority partners in the Northeast Corridor Master Plan Working Group recently identified this line as one of four core network branch lines and described future improvements thereto in its Northeast Corridor Infrastructure Master Plan.

### Cost

DOT has estimated a full-build scenario that can accommodate high-speed trains with 30-minute headways and minimal freight disruption at $880 million.
Status and Next Steps

This project, which has been under study since at least 1994, is currently undergoing an Environmental Assessment to qualify for federal funding. In 2010, the State was awarded $40 million in stimulus funds to double-track a ten-mile stretch of the line between New Britain and Newington. It is expected that the State will apply in the near future for a further $400+ million to complete more substantial upgrades to the line that will enable intercity and, by extension, commuter rail, along the line. Figure 7 depicts the route and stations of this line. Next steps to follow are:

- DOT and associated consultants finish the Environmental Assessment and accelerate subsequent phases of the project (e.g., funding application, full design, construction). Currently underway.
- DOT begins operations, including through trains to New York City, Boston, and/or northern New England, and re-configures local bus routes to fit service. Starts once construction is complete.
- Berlin, CCRPA, and/or DOT develop, study, and, pending feasibility and favorable evaluation, implement projects to improve the area around, access to, and patronage of Berlin-Kensington station. Starts post-adoption of this Plan.
> Systems > Public Transit > Rail

Although there have been repeated calls over the years for restoration of passenger rail to central Connecticut, including from this Plan (for details, see Integration with New York, p. 25), no commuter or express trains serve the region. The sole community with passenger rail is Berlin, at whose Kensington station Amtrak’s Vermonter and some of its Northeast Regional trains stop. Due to the Vermonter’s leisurely speed and awkward schedule, which partly result from track removal and deterioration, the service is unable to satisfy the commuter or high-speed rail market. (It essentially fills the same niche as long-distance bus service, only at higher cost.) The New Haven-Springfield Shuttle, which began after electrification of the Northeast Corridor, complements this service and provides an alternative to commuters from Hartford to New Haven.

(Current timetables do not facilitate a commute for most workers in the reverse, i.e., northbound, direction.) Amtrak also runs a limited number of through trains between Washington, D.C. and Hartford/Springfield. Table 18 and Table 19 reproduce the schedule as of writing for the Vermonter and Northeast Regional trains.

Statistics on ridership and mileage for the Amtrak’s and DOT’s operations on the line are as follows. As the numbers show, ridership is relatively low. The poor turnout reflects the condition of the line, which, since the removal of additional tracks, limits the speed of trains as well as their frequency and ability to make schedules that respond to a larger market (e.g., the New Haven to Hartford commuter and high-speed long-distance markets, which at present the Amtrak trains do not serve).

Projects are underway to return the line to a state of repair sufficient for more frequent and higher-speed service. Table 17 quantifies the changes, a tripling to quadrupling in both service capacity and ridership, that are planned. This Plan supports those projects.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Avg. weekday trains</th>
<th>Train miles (000)</th>
<th>Passenger mi. (000)</th>
<th>Ridership (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Now 2030</td>
<td>Now 2030</td>
<td>Now 2030</td>
<td>Now 2030</td>
</tr>
<tr>
<td>DOT</td>
<td>0 36</td>
<td>0 571</td>
<td>0 43,129</td>
<td>0 617</td>
</tr>
<tr>
<td>Amtrak</td>
<td>12 28</td>
<td>245 571</td>
<td>54,598 152,698</td>
<td>1,215 3,399</td>
</tr>
<tr>
<td>Total</td>
<td>245 1,142</td>
<td>54,598 195,827</td>
<td>1,215 4,016</td>
<td></td>
</tr>
</tbody>
</table>
### Table 18. Amtrak trains, northbound

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Type</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>V</td>
<td>V</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
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<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
</tr>
<tr>
<td>Days</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
</tr>
<tr>
<td>NYC</td>
<td>6:58</td>
<td>7:00</td>
<td>8:30</td>
<td>9:00</td>
<td>11:30</td>
<td>11:33</td>
<td>13:00</td>
<td>15:00</td>
<td>15:30</td>
<td>16:30</td>
<td>17:40</td>
<td>18:43</td>
<td>19:30</td>
<td>20:00</td>
<td>21:07</td>
</tr>
<tr>
<td>Spfd</td>
<td>10:10</td>
<td>10:00</td>
<td>11:35</td>
<td>12:05</td>
<td>14:58</td>
<td>15:00</td>
<td>16:16</td>
<td>18:15</td>
<td>18:45</td>
<td>20:00</td>
<td>20:50</td>
<td>22:00</td>
<td>22:50</td>
<td>23:18</td>
<td>0:30</td>
</tr>
</tbody>
</table>

### Table 19. Amtrak trains, southbound

<table>
<thead>
<tr>
<th>Train</th>
<th>141</th>
<th>143</th>
<th>95/495</th>
<th>195/405</th>
<th>147</th>
<th>83/93/493</th>
<th>161/401</th>
<th>163/463</th>
<th>57</th>
<th>55</th>
<th>165/465</th>
<th>175/475</th>
<th>167/467</th>
<th>179/479</th>
<th>169/469</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>V</td>
<td>V</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
<td>NER</td>
</tr>
<tr>
<td>Days</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Sa</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
<td>Mo-Fr</td>
<td>SaSu</td>
</tr>
<tr>
<td>Spfd</td>
<td>6:30</td>
<td>6:30</td>
<td>7:10</td>
<td>7:30</td>
<td>8:00</td>
<td>10:40</td>
<td>10:40</td>
<td>12:40</td>
<td>14:55</td>
<td>14:55</td>
<td>16:10</td>
<td>16:05</td>
<td>17:25</td>
<td>19:20</td>
<td>19:40</td>
</tr>
</tbody>
</table>
Six of the nation’s seven Class I railroads have major terminals in Chicago. Nearly 500 freight trains per day operate in the Chicago region. In 2007, regional rail tonnage was estimated at more than 631 million tons (approximately 30 percent of the 2007 annual regional freight tonnage), with about 24,000 trailers and containers and about 16,800 carload units moving into, out of, or through the region daily. Rail terminal operations in Chicago are beset by congestion, with numerous heavily-used freight lines crossing each other at grade and being used for passenger services. However, railroads have recently worked together to mitigate congestion and improve efficiencies through improved operations coordination. In addition, the railroads have worked together to improve train travel and reduce community impacts in the Chicago terminal district through CREATE. CREATE was announced as a partnership among U.S. Department of Transportation (U.S. DOT), the State of Illinois, City of Chicago, Metra, Amtrak, and the nation’s freight railroads in 2003 to upgrade four critical corridors. These upgrades include the construction of flyovers, grade separations, improved signalization, and modernization of equipment. A key element of these improvements, particularly the flyovers and grade separations, is the alleviation of conflicts between passenger and freight services on the rail system. Progress has been made to secure initial funding for this program and a small number of the projects have been completed. However, despite its strong partnership and commitment to its implementation, additional funding is necessary.

While freight services provide an economic benefit for the region, there are also community impacts that must be addressed. Railroad delay at at-grade highway-rail and at-rail-rail grade crossings is a major issue affecting highway users, passenger transport, and the freight rail industry itself. In addition to the economic impacts of delay and travel time reliability, grade crossing delay can be an issue for community emergency responders. Grade crossing delay will likely be an increasingly frustrating issue for travelers as rail shipments increase and, more importantly, train lengths increase.

In addition to delay, at-grade crossings are associated with a number of highway-rail crashes, costing a number of lives each year. However, the number of annual deaths has been declining rapidly. One safety option, train whistles, often presents a serious nuisance to adjacent communities, and effective alternative safety enhancements are being undertaken by many suburban communities.
Assuming future economic growth, rail companies foresee the length of trains increasing from 125 cars to 175 cars. While railroads will need to address infrastructure issues related to longer trains (e.g., increasing siding lengths to beyond 10,000 feet), longer trains will also affect public highway at-grade crossings, likely increasing motorist delay at these crossings. Thus, at-grade crossing improvements will take on increased importance.

Finally, freight traffic impacts our existing commuter rail service and can also potentially limit our ability to expand passenger service or future high-speed rail. An increase in rail traffic could also impact the development of transit-supportive land uses that are critical to the success of our transit system.
Amtrak provides passenger rail service to Rochester via nine trains per day on its Empire Service (New York City to Niagara Falls), Lakeshore Limited (New York City/Boston to Chicago), and Maple Leaf (New York City to Toronto) routes. Overall Amtrak ridership in Rochester, as measured by passenger boardings and alightings, has increased approximately 37 percent since 2003. Although, for 2013 and 2014 ridership has been slightly tapering off as shown in Exhibit 16. Amtrak operates trains on the CSX Transportation (CSXT) railroad’s mainline and must yield the right-of-way to CSXT traffic. The railroad typically operates 70-80 trains per day along the mainline. According to Amtrak, on-time performance along the Empire Service corridor was 78.4 percent with the majority of delays attributed to CSXT interference. Uncertainty surrounding the performance of passenger rail service may push riders to other more reliable modes of travel, if not rectified over the long term. Seeking to increase ridership and update the current defunct Amtrak Station, the City of Rochester in partnership with the NYSDOT secured federal funding through the USDOT’s National Infrastructure Investments Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant to construct a new Intermodal Transportation Center in Rochester.

The recently demolished Amtrak Station, built in 1978 as a temporary facility, lacked ADA accommodations and was in dire need of repairs. Phase one of the new project is fully funded at $29.5 million. This funding includes upgrades to the tracks, better access to boarding platforms, and construction of a fully ADA compliant facility. Construction of the new Intermodal Transportation Center began in October 2014 and is expected to be fully operational in 2017. Ridership is projected to increase as a result of these upgrades as has been the case with other station enhancements around the country.
Performance Measures

Passenger Rail On-Time Performance

According to Amtrak, passenger trains traveling the Empire Corridor (New York City to Niagara Falls) in January 2015 were on-time 74.8 percent of the time [reported as 70 percent for December 2010 in LRTP 2035]. Amtrak calculates the on-time performance by calculating the total number of trains that arrive on-time at the end of the route divided by the total number of trains operating along it. A train is on-time if it arrives at its final destination within an allowed number of minutes based on the total miles the train traveled.

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>What It Evaluates</th>
<th>LRTP 2040 Benchmark</th>
<th>LRTP 2035 Benchmark</th>
<th>Desired Change</th>
<th>Actual Change</th>
<th>Likely Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fatalities (3 year rolling average)</td>
<td>Safety</td>
<td>99 (2012)</td>
<td>100 (2008)</td>
<td>Decrease</td>
<td>1</td>
<td>Slight Decrease</td>
</tr>
<tr>
<td>Percent of Federal-Aid Roadways with Pavement Conditions</td>
<td>System Preservation</td>
<td>92.03% (2012)</td>
<td>90.3% (2009 w/overlap)</td>
<td>Increase</td>
<td>Not comparable due to data collection methods</td>
<td>Slight Decrease</td>
</tr>
<tr>
<td>Rated &quot;Fail&quot; or Better</td>
<td>System Preservation</td>
<td>67.2% (2014)</td>
<td>64.8%</td>
<td>Increase</td>
<td>2.4%</td>
<td>Slight Decrease</td>
</tr>
<tr>
<td>Not Structurally Deficient Bridges</td>
<td>System Preservation</td>
<td>5.9 years</td>
<td>7.65 years</td>
<td>Decrease</td>
<td>1.75</td>
<td>Slight Decrease</td>
</tr>
<tr>
<td>Average Age of Transit Buses</td>
<td>System Preservation</td>
<td>5.9 years</td>
<td>7.65 years</td>
<td>Decrease</td>
<td>1.75</td>
<td>Slight Decrease</td>
</tr>
<tr>
<td>Travel Time Index on Major Roadways (Principal Arterials in the MPA)</td>
<td>Mobility</td>
<td>1.085</td>
<td>Not comparable due to data collection methods</td>
<td>Decrease</td>
<td>Not comparable due to data collection methods</td>
<td>Slight Increase</td>
</tr>
<tr>
<td>Transit On-Time Performance</td>
<td>Mobility</td>
<td>89.8%</td>
<td>84%</td>
<td>Increase</td>
<td>5.8%</td>
<td>Slight Increase</td>
</tr>
<tr>
<td>Passenger Rail On-Time Performance</td>
<td>Mobility</td>
<td>74.8% (January 2015 NY - Niagara Falls)</td>
<td>70% (December 2010 NY-Niagara Falls)</td>
<td>Increase</td>
<td>Increase of 4.8%</td>
<td>Slight Decrease</td>
</tr>
</tbody>
</table>
> Passenger Rail

Passenger service is provided by Amtrak on 521 of the total miles of railroad in Michigan and 80 miles are owned by Amtrak. The state of Michigan recently acquired another 135 miles from Norfolk Southern between Kalamazoo and Dearborn, MI, to ensure continuation and development of Accelerated Rail Passenger Service between Pontiac/Detroit and Chicago. MDOT is also working with the states of Illinois and Indiana on an Environmental Impact Statement (EIS) to develop more efficient routes into Chicago from Michigan. The results of this EIS could impact Grand Rapids to Chicago service. The Pere Marquette service between Grand Rapids/Holland and Chicago operates over trackage owned by CSX in the GVMC MPO area. Additional passenger service on the Pere Marquette route has been discussed locally, but has been delayed due to funding issues.

MDOT is moving forward with a feasibility study in FY2015 which is the first step in an effort to re-establish a rail passenger service between Holland and Detroit through Grand Rapids. As noted in the State Rail Plan, there is also interest locally in an Alternatives Analysis of long term options for the Grand Rapids area to access Chicago and points east, including the feasibility of connecting to the Accelerated Rail Corridor owned by MDOT at Kalamazoo. Currently, there is no funding available for this study or service development.

Passenger Rail – Amtrak Pere Marquette

There are currently three passenger rail routes in Michigan: the Wolverine (Chicago-Detroit/Pontiac), the Blue Water (Chicago-Port Huron), and the Pere Marquette (Chicago-Grand Rapids). Refer to Map 10 for the Michigan Intercity Passenger Rail System. Michigan passenger rail service is provided by the National Railroad Passenger Corporation (Amtrak), which was created by the passage of the National Railway Passenger Service Act by Congress in 1970. Amtrak began service on May 1, 1971, with the Pere Marquette beginning service in Michigan on August 5, 1984. Fifteen states, including Michigan, contract with Amtrak for the operation of trains to supplement the national Amtrak network, extending passenger rail service and/or increasing frequencies on national routes. This operating assistance helps to provide some of Michigan’s heaviest travel corridors and population centers with intercity passenger rail service.
Funding

The Pere Marquette passenger rail service, which runs roundtrip between Grand Rapids and Chicago seven days a week, celebrated its 30th anniversary in 2014. The Pere Marquette is operated by Amtrak at the request of the State of Michigan, which provides an operating subsidy for service. Between Fiscal Year (FY) 2004 and 2006, the State of Michigan provided an Amtrak operating subsidy of $7.1 million for both the Blue Water and the Pere Marquette. However, between FY2006 and 2009, the operating subsidy hovered at around $6.2 million annually, a 12 percent decrease from previous contract years. In FY2010, the operating subsidy increased to $7.6 million, and from FY2011 through FY2013, the operating subsidy stayed relatively steady at approximately $8 million or slightly over per year. In FY2014, the subsidy increased significantly to $25.2 million because of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), which required the state to also fund the Wolverine in addition to the Blue Water and the Pere Marquette. It is hoped that continued Michigan Department of Transportation funding, through the state legislature, will provide for a better and more viable national passenger rail system in the future.

Performance Challenges for the Pere Marquette

The Pere Marquette operates over rail lines owned by CSX and Norfolk Southern. It is typical for Amtrak operations to run over freight-owned railroads. The freight railroads used by Amtrak generally allow maximum speeds of 65-79 mph. Significant coordination must occur between Amtrak operations and the freight-owned railroads in dispatching passenger trains, which may create on-time performance issues. Scheduled maintenance on the rail lines as well as unforeseen challenges, such as inclement weather, may impact on-time performance as well. Michigan’s peninsular geography also poses challenges for railroad economics (both passenger and freight), since most of the rail lines must be supported by traffic originating or terminating in Michigan.

Ridership

Ridership on the Pere Marquette continued to increase from 2004-2008, with a record-setting 111,575 riders in 2008. Ridership declined significantly in 2009, but continued to climb again in consecutive years until 2012, which saw 109,501 riders. In 2014, 100,961 people rode the Pere Marquette, a decrease of approximately 7,500 from 2012.
There are a number of possible reasons for the decreases in 2009 and 2014, including ending service to and from New Buffalo along the line, which occurred in 2009 (see Figure 10) and, more recently, an increase in options for travelers going from Grand Rapids to Chicago. The area is now serviced by Megabus in addition to Indian Trails and the Pere Marquette. Consequently, the route showed a decrease in ticket revenue of 3.8% between 2013 and 2014, which is reflective of the reduction in ridership. (See Figure 10 and 11.)

New **Amtrak** Station

The new Vernon J Ehlers Pere Marquette Grand Rapids station opened on October 27th 2014. The $6.1 million station, located at 440 Century Avenue SW, serves one daily round trip of **Amtrak's** Grand Rapids-to-Chicago Pere Marquette. The first train departed at 7:40 a.m. on October 27th. Named in honor of the former U.S. Congressman, the station will integrate bus and rail transportation, offer more passenger amenities, and streamline train operations. The public was invited to celebrate the grand opening with a special ceremony that included speeches from U.S. Senator Carl Levin, Grand Rapids Mayor George Heartwell, and officials from MDOT and Amtrak.

**WESTRAIN**

**Passenger rail** issues are currently being studied by the WESTRAIN Collaborative. The WESTRAIN Collaborative is a group of agencies working to further rail issues in West Michigan. Participants include the Michigan Department of Transportation, the Grand Valley Metropolitan Council, the Macatawa Area Coordinating Council, Michigan Association of Railroad Passengers (MARP), the Cornerstone Chamber of Commerce, Sharp Marketing, the City of Bangor, the Rapid, Van Buren County Public Transit, and the Southwest Michigan Planning Commission. The focus of
WESTRAIN is to secure and maintain **passenger rail** service from Grand Rapids to communities along the Pere Marquette line to Chicago, Illinois and beyond.

The WESTRAIN Collaborative has also worked closely with Amtrak on a number of initiatives to increase awareness of and traffic on the Pere Marquette rail line. Utilizing special promotions, give-aways, and other marketing strategies, WESTRAIN serves to continue to help attract new riders to the **passenger rail** experience.

**Midwest Rail Initiative**

The Midwest Regional Rail Initiative (MWRRI) is a cooperative effort between Amtrak, the Federal Railroad Administration, and nine states—Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin—to develop an improved and expanded **passenger rail** system in the Midwest (see Map 11). In September 2004, MWRRI released a report conducted by their consultant, Transportation Economics & Management Systems, Inc., which outlines a new vision for **passenger rail** travel in the Midwest. This vision is a transportation plan known as the Midwest Regional Rail System (MWRRS), a 3,000-mile rail network serving nearly 60 million people.

MWRRS would operate as a hub-and-spoke system providing through-service in Chicago to locations throughout the Midwest. Trains operating at speeds up to 110 mph would link Chicago with Milwaukee, Madison and Minneapolis; Des Moines and Omaha; St. Louis and Kansas City; Indianapolis and Cincinnati; Grand Rapids and Detroit; Toledo and Cleveland; as well as many smaller cities and towns. Increased speeds and service efficiencies would reduce travel times dramatically. The Chicago-Detroit trip, for example, would drop from the current five hours, thirty-six minutes to less than four, Chicago-Twin Cities from the current eight plus to less than six, and St. Louis-Kansas City from five hours, 40 minutes to just over four hours. The nearly eight-plus-hour Chicago-Cincinnati trip would be cut in half.
The total capital investment for the MWRRS, including infrastructure and rolling stock, is estimated to be $7.7 billion (in 2002 dollars). The rolling stock for the entire system will cost approximately $1.1 billion. Infrastructure improvements required to implement the MWRRS are estimated to cost $6.6 billion, or about $2 million per mile. This compares favorably with typical highway costs of $10 million per mile.

The funding plan consists of a mix of funding sources, including federal loans and grants, state funding, general funds, and capital and revenue generated from system-related activities, such as joint development proceeds. Federal funding will be the primary source of capital funds. MWRRS funding is based on the establishment of an 80/20 federal/state funding program similar to those that already exist for highways; implementation will remain the responsibility of the states. The State of Michigan would contribute $873 million for infrastructure and $234 million for train equipment.

As of 2014, the MWRRI is still an active initiative. However, most recently, states have been focused on completing work that has been awarded through FRA’s High Speed Intercity Passenger Rail Grant Program. And as technologies have emerged and priorities have changed, a second initiative has surfaced that is specifically focusing on the feasibility of high speed rail.

Coast-to-Coast Initiative

In recent months an effort to study the feasibility of passenger rail service between Holland and Detroit has been established. The “Coast-to-Coast” initiative is being touted as a means to ignite innovation by providing a conduit for new partnerships between the world-class medical centers, and over a dozen colleges and universities along its tracks, provide workers access to jobs along the corridor and make their commutes more pleasant and productive, breathe new life into our centers of arts and entertainment by giving out-of-town visitors a reliable and relaxing way to reach new cultural experiences, help Michigan attract and retain more of the talented workers the state needs to prosper in the future.

The initiative is being headed by the Ann Arbor Area Transportation Authority and the Michigan Department of Transportation. A federal grant has been secured to study the feasibility of added service along the corridor. The next step in the process is to select a consultant and work toward a full recommendation.

Further information on this effort can be found at: http://mibyrail.wordpress.com/coast-to-coast-line/
Amtrak is the sole provider of passenger service in the area. There are three rail passenger stations in the area located in Buffalo, Depew, and Niagara Falls with service to Toronto, the Northeast, and Midwest via their Maple Leaf, Empire, and Lake Shore Limited routes.

On behalf of the Government of Canada, VIA Rail Canada operates the country’s national passenger rail service. VIA provides intercity passengers with fast, convenient, and affordable service, downtown-to-downtown between Canada’s largest business centers. Each day, VIA Rail/AMTRAK service operates service between Buffalo and Toronto with stops in Oakville, Aldershot, Grimsby, St. Catharines, and Niagara Falls.

GO Transit is an inter-regional public transit system in Southern Ontario, Canada. GO Transit (GO Train and GO Bus) provides multiple departures between Niagara Falls, Ontario, and Toronto each day using bus/train combination service or all-train service.

Rail travel between Buffalo and Toronto involves a US/Canadian border crossing and may be subject to delays due to customs and immigration procedures.
In December 2012, Amtrak began operating intercity passenger rail service to the Southside of Hampton Roads, complementing the existing service on the Peninsula. Trains serve a new multi-modal station at Harbor Park in Norfolk and provide direct service to cities in the Northeast Corridor. Although the Norfolk station is currently served by a single train daily, plans include adding up to two additional trains each day.

This new Amtrak service to the Southside contributed to a continued increase in regional passenger levels. There were a total of 215,600 passengers who boarded or departed Amtrak trains in Hampton Roads in Federal Fiscal Year (FFY) 2014. The number of passengers boarding or departing Amtrak trains in Hampton Roads decreased slightly from FFY 2013 to FFY 2014, but increased 66% over the last decade.

There are a number of major plans to further improve intercity passenger rail transportation to and from Hampton Roads, as detailed below:

**Southeast High Speed Rail**

The Southeast High Speed Rail Corridor (SEHSR) is one of eleven proposed high speed passenger rail corridors designated by the U.S. Department of Transportation. It is part of an overall plan to extend service with maximum speeds of 110 mph from the existing high-speed rail on the Northeast Corridor to points in the Southeast. The corridor was originally designated as running from Washington, D.C. to Charlotte through Richmond and Raleigh, with a spur between Richmond and Hampton Roads (which is addressed further under the Richmond to Hampton Roads Rail Project). Extensions to the corridor have been added to South Carolina, Georgia, and Northern Florida.

Currently, work is under way on a Tier II Environmental Impact Study (EIS) and preliminary engineering for the 123 mile section between Washington, D.C. and Richmond. The $55-million EIS and preliminary engineering project is
slated for completion in late 2017. This compliments the final Tier II EIS that has been completed on the section between Richmond and Raleigh.

In addition, the North Carolina-Virginia Interstate High-Speed Rail Compact Commission, which includes five General Assembly members from each state, meets on a regular basis to focus on coordinating the development of the SEHSR corridor in the two states.

**Richmond to Hampton Roads Rail Project**

Beginning in 2009, the Virginia Department of Rail and Public Transportation (DRPT) began investigating improved passenger rail service between Richmond and Hampton Roads as an extension of the Southeast High Speed Rail Corridor. The resulting Richmond/Hampton Roads Tier I Final Environmental Impact Statement was approved by the Federal Railroad Administration (FRA) in August 2012 and the Record of Decision for the Tier I EIS was approved by FRA in December 2012.

The Tier I Final EIS recommends increased frequency and higher speed passenger rail service between Richmond and Hampton Roads. The preferred alternative provides for three daily roundtrip trains operating at a maximum speed of 79 mph on the current Peninsula route, and six daily round-trip trains in a new higher speed passenger rail service between Richmond and Norfolk through Petersburg and Bowers Hill. This higher speed passenger rail service would have a maximum speed of 90 mph.

**Hampton Roads Passenger Rail Vision Plan**

To complement DRPT’s work in the Richmond to Hampton Roads passenger rail corridor, the HRTPO Board approved a resolution to support High-Speed and Intercity Passenger Rail in 2009. The resolution supported the designation of a high speed rail corridor along the Norfolk Southern/Route 460 rail corridor from Norfolk to Richmond, and endorsed enhanced intercity passenger rail service along the CSX/I-64 rail corridor from Newport News to Richmond.

The resolution also identified the need to procure consultant services to advise the HRTPO on necessary steps to position Hampton Roads to be competitive for future rounds of federal passenger rail funding, and to develop a regional high-speed and intercity passenger rail vision plan.

Based on the HRTPO board’s resolution, a consultant team specializing in passenger rail planning was secured for the HRTPO, in coordination with DRPT and VDOT, to evaluate the potential of high speed and enhanced passenger rail service alternatives in the designated corridors. Additionally, a Passenger Rail Task Force was created to provide input and direction to the consultant team at key decision making points throughout the planning process.
Four technical reports have been produced by the consultant and approved by the HRTPO Board:

- **Phase 1A – Preliminary Vision Plan** - In the Phase 1A document, the consultant evaluated the concept and established the case for **high speed rail** in Hampton Roads. The preliminary assessment indicated that both the Peninsula CSX and Southside Norfolk Southern corridors are economically and financially feasible for providing **high speed** rail service between Hampton Roads, Richmond, and Washington D.C., as they meet the thresholds established by the Federal Railroad Administration for a public/private partnership.

- **Phase 1B – Blueprint Study** - In Phase 1B, the consultant developed a “blueprint” for the implementation of the project and its funding. The Blueprint Study sets out a 15-20 year program to bring **high speed rail** to the Hampton Roads-Richmond-Washington D.C. corridor. It provides the steps that are required to implement the program, the short and long term timing of steps, key milestones, critical actions and funding requirements. The Blueprint Study also identifies a number of issues that will need to be addressed.

- **Phase 2A – Data Collection** - The Phase 2A effort established and assembled the needed databases for developing the Service Development Plan application for the Norfolk-Richmond **passenger rail** corridor, and the analysis of the market, routes, technology, and environmental conditions needed to apply for Federal Railroad Administration **passenger rail** project funding.

- **Phase 2B – Alternatives Analysis** - This report focuses on the various alternatives from the vision plan and evaluates the financial and business impacts of each alternative. The Phase 2B study determined that Option 4 was the best of the alternatives examined, which combines the Richmond Direct Option 3 with increased service on the Peninsula.

A final report, titled the Hampton Roads **High Speed Passenger Rail** Vision Plan, was also produced by the consultant in 2014, which tied together the information included in the four technical reports.

The Hampton Roads Regional Transit Vision Plan also includes plans for **commuter rail** and **high/higher speed** rail in the region. The Transit Vision Plan is described in detail in the Public Transportation section of this report.

EXPLAINING THE ISSUES

FINDINGS > Intercity Rail > MTP Notable Practices

AGENCY: Houston-Galveston Area Council
METRO AREA: Houston, TX
PLAN TITLE: Bridging Our Communities: 2040 Regional Transportation Plan
LAST UPDATED: March 2016

> Future Vision
In addition to the MAG studies described above, MAG participated in the Tucson-Phoenix Regional Passenger Rail Service (and blended Commuter Rail Service) Study conducted by the Arizona Department of Transportation. From 2011 to 2016, this thorough, joint Federal Railroad Administration (FRA) - Federal Transit Administration (FTA) project study assessed the potential for passenger rail service between Phoenix and Tucson, with a focus on: (1) connecting downtown Phoenix to downtown Tucson, and (2) ensuring system connectivity, including commuter rail extensions to Buckeye and Surprise. Two corridor alternatives and a no-build alternative for implementing a passenger rail system were evaluated as part of the study process. A Draft Tier One Environmental Impact Statement (Project Level EIS) was completed in the spring of 2016 and a Recording of Decision (ROD) on the minimum operating segment (MOS) was expected by early 2017 from the FRA. There is currently no construction schedule and no dedicated capital or operating funding source has been identified for a passenger rail system between Tucson and Phoenix.
> The Region’s Existing Transportation System > Passenger Travel Beyond the Region

Each mode of transportation best serves a specific trip distance, providing its own unique characteristics and values for interstate and international mobility. The vast majority of intercity passenger movements occur by automobile, especially on the National Highway System roads maintained by MnDOT and other states. The Twin Cities region is also served by **Amtrak passenger rail** service and a number of intercity bus companies and airlines.

**Amtrak** provides connections to Portland, Seattle, and Chicago. Trains arrive and depart once a day in each direction. Starting in the early 1970s, **Amtrak** served the region from a single station in the Midway area of Saint Paul. In mid-2014, **Amtrak** relocated its platform and services to the newly renovated Union Depot in downtown Saint Paul. Target Field Station along the BNSF tracks in downtown Minneapolis currently serves the Northstar **Commuter rail**, but could also be utilized by intercity passenger trains in the future. Both Target Field Station and the Union Depot renovation have been constructed as multi-modal stations since the last Transportation Policy Plan was adopted in 2010.

MnDOT has primary responsibility for planning **intercity passenger rail** in Minnesota; the Council participates on advisory committees to assure that any new or upgraded rail service is consistent with other regional plans. MnDOT is currently studying several potential new **high-speed rail** services to link the Twin Cities with Chicago, Duluth, and Rochester. For information on these studies see the MnDOT **passenger rail** webpage. Other recent proposals would increase the number of conventional-speed train trips to serve increasing demand for passenger travel to eastern Wisconsin and Chicago, as well as to and from the Bakken oil fields in western North Dakota and Montana.
> Intercity Travel > Regional and State Involvement

The Missouri Department of Transportation (MoDOT) supports passenger rail service for the Kansas City-St. Louis corridor and continues to improve the reliability and travel time between the two metros. As part of the Midwest Regional Rail System, the Kansas City-St. Louis corridor is eligible for federal high-speed rail program funding as a component of the Chicago-hub network. Since 1996, this group of nine state departments of transportation has worked to plan and implement a 3,000-mile, high-speed rail system with Chicago as its central hub.

MoDOT has expressed the need for Missouri to develop, over time, a high-speed rail project that would provide faster rail service on the existing Union Pacific line. Capacity improvements are being made incrementally as funding becomes available and as planning and design work with Union Pacific is completed.

In 2006, MoDOT, Union Pacific and Amtrak embarked on a program to improve this corridor and ensure its survival. Since then, Union Pacific has completed a $26 million project to add double tracks to the Gasconade River Bridge and built a second bridge across the Osage River. MoDOT, Union Pacific and Amtrak broke ground on a new rail siding (an extra track that runs parallel to the main rail line so that trains can pass each other without stopping) at California, Missouri. Several other siding and “universal crossover” projects have been completed or are in the planning stages, including a rebuilt approach to the Merchants Bridge over the Mississippi River at St. Louis.

Kansas supports efforts to study the potential for state-supported passenger rail, and the Kansas Department of Transportation (KDOT) is planning for the future. KDOT completed the Amtrak Expansion Feasibility Study in March 2010 as a foundation for future expansion of state-supported passenger rail. This study evaluated the potential costs of state-supported, intercity passenger rail between Kansas City, Oklahoma City and Fort Worth. It identified infrastructure, capital and operating costs necessary to start and support the service. KDOT’s comprehensive service development plan augments the findings of the Amtrak Expansion Feasibility Study.

The KDOT rail plan includes passenger, freight and short-line rail components. The plan is required to seek federal grants for passenger rail service. This updated plan positions KDOT to develop a passenger rail program if it is authorized and funded and to make the state eligible to apply for other federal grants if it implements expanded passenger rail.
> The Transportation System > Passenger Rail > Inter-City Rail

National Railroad Passenger Corporation (Amtrak)

Since 1971, Amtrak has been the provider of inter-city, long-distance passenger rail service in the NYMTC planning area. Amtrak operates three services in the region:

- **Acela/Northeast Regional Service**: Frequent service along the Northeast Corridor (NEC) between Boston and Washington D.C. (Recently through service to Virginia has been added.) Acela service uses a dedicated fleet of trains to provide higher-speed express service along the corridor, while Northeast Regional trains use standard Amtrak equipment and generally make more stops. In recent years, the Acela line has been exceedingly popular, with over 3.5 million passengers in 2014 and a 10.4 percent increase in ticket revenue from 2013.

- **Empire Corridor Service**: Frequent service between New York City and Albany with more limited but daily service to Buffalo and Niagara Falls. An additional train, the Ethan Allen Express, serves the New York-Albany corridor and continues north to Rutland, VT.

- **Long distance routes**: Other services originating or passing through New York Penn Station include trains to northern Vermont, Montreal, Toronto, Chicago, Pittsburgh, New Orleans, North Carolina, and Florida.

Amtrak serves four stations in the NYMTC planning area: Penn Station New York, New Rochelle, Yonkers, and Croton-Harmon. Penn Station New York served over 10 million Amtrak passengers beginning or ending their trips in 2016. Additional stations immediately surrounding the NYMTC planning area are in Stamford, CT; Bridgeport, CT; New Haven, CT; Poughkeepsie, NY; Newark, NJ; Newark Liberty International Airport, NJ, and Metro Park, NJ. Limited service is also provided to New Brunswick, NJ. Table 3.4 displays ridership data for these stations since 2008.

Amtrak ridership has increased in recent years. In 2016, Amtrak carried over 31 million passengers. That same year, the Northeast Corridor (NEC) also had its highest ridership ever, with combined ridership on the Acela Express and Northeast Regional services totaling 11.9 million. Projected growth in population and transportation demand in the Northeast has placed increasing pressure on the Northeast Corridor (NEC), the country’s busiest rail artery. This has posed challenges in terms of accommodating more trains, reducing trip time, and increasing train speed and ensuring service reliability. To address this outlook, Amtrak is undertaking the following planning initiatives:
NEC Future is the Northeast Corridor’s long term capital planning program which is developing funding options and priorities for improving service. Initiated in 2012, this initiative has included extensive intergovernmental and public outreach culminating in the release of a Tier 1 Environmental Impact Statement (EIS) in December 2016. Funding and implementation priority will be given to elements of the program that would have the largest impact on improving reliability, increasing capacity, and reducing trip times, in order to generate the revenue and capital needed for additional elements of the program.

The Gateway Program is a related Amtrak planning initiative in partnership with USDOT, the Port Authority, NJT and the states of New Jersey and New York. Gateway is a comprehensive program of strategic rail infrastructure improvements designed to improve current services and create new capacity that will allow the doubling of passenger trains running under the Hudson River. The program will increase track, tunnel, bridge, and station capacity, eventually creating four mainline tracks between Newark, NJ, and Penn Station, New York, including a new, two-track Hudson River tunnel.

### Empire Corridor

NYSDOT and the Federal Railroad Administration are evaluating potential improvements to intercity passenger rail service on the Empire Corridor from New York City to Buffalo via Albany, a distance of 463 miles. Work has been ongoing on a Tier I EIS analyzing a range of alternatives for introducing higher speed passenger service.

A Draft EIS for public review was released in January 2013 and a Final EIS is anticipated by the end of 2017. Following completion of the Final EIS, its recommendations will include specific improvement projects that may be analyzed further in Tier II.
Amtrak, the National Railroad Passenger Corporation, provides service to Northeast Ohio via two lines: the Capitol Limited and the Lake Shore Limited. Both lines have once-daily service in both directions at stations in Cleveland and Elyria. The Capitol Limited provides services to Chicago; Toledo; Pittsburgh; Washington, D.C.; and points in between. The Lake Shore Limited provides service to Chicago, Toledo, Buffalo, Boston, New York City, and points in between.

The Cleveland Lakefront Station, located downtown, is near the GCRTA green and blue rapid lines, connecting visitors to the entire GCRTA system throughout Cuyahoga County and to locations in Lake and Medina counties. The station is also accessible to the downtown Cleveland sidewalk network, the Cleveland Lakefront Bikeway, and the Interstate Highway System.
The North Central Texas region has been identified as a potential hub for passenger rail routes serving distant regions. Federal and state plans indicate a need for high-speed passenger rail service to, through, and within the region. Corridors traveling through North Central Texas include proposed service to Oklahoma City; Austin; San Antonio; Houston; Shreveport, Louisiana; and Little Rock, Arkansas. Alignments have not been determined, but planning is progressing for some of these corridors.

Four proposed corridors would provide service from Oklahoma City to south Texas, Fort Worth to Shreveport, Fort Worth to Dallas, and Dallas to Houston. Recommendations for Mobility 2040 include at-grade and grade-separated high-speed rail service within the region, as identified in Exhibit 6-20. The recommendations identified in this exhibit were thoroughly discussed with the Regional Transportation Council’s (RTC) Multimodal/Intermodal/High-Speed Rail/Freight Subcommittee.

The RTC determined the recommendations would include stations in downtown Fort Worth, Arlington, and downtown Dallas. In addition, the RTC determined the most effective and efficient plan for the region would provide a seamless service – a “one seat ride” – for passengers, meaning passengers would not be required to transfer to reach their destination. High-speed rail service within the Dallas-Fort Worth region is not necessarily intended to be a stand-alone service; rather, service within the Dallas-Fort Worth region is an integral component of a larger statewide and national network.

The Dallas to Houston corridor has been identified as having the most potential for high-speed passenger rail service. An effort led by the private sector is analyzing the corridor for environmental impacts, alignment options, station locations, and funding options. The Dallas to Houston corridor is recommended as a grade-separated high-speed rail service corridor, as shown in Exhibit 6-20.
FINDINGS > Intercity Rail > MTP Notable Practices

AGENCY: Ohio-Kentucky-Indiana Regional Council of Governments
METRO AREA: Cincinnati, OH
PLAN TITLE: 2040 OKI Regional Transportation Plan
LAST UPDATED: June 2016

> Public Transportation > Public Transit Vision Plan > Ohio Hub Passenger Rail / Midwest Regional Rail

Rail service to Cincinnati and Hamilton, Ohio is currently provided three days per week by Amtrak's Cardinal route, operating between Chicago and Washington, D.C. Like many of its routes, Amtrak uses single level passenger equipment pulled by diesel locomotives for the Cardinal route. The Cincinnati station, located in the Union Terminal Museum Center, provides full service to passengers, including a ticket office and special considerations for the physically disabled. CSX Transportation trackage is used for most of the Cardinal’s route between Chicago and Washington, D.C. Included in Amtrak’s operating agreement with CSX are provisions for the Cardinal route to be given priority over freight trains. This priority treatment helps maintain an on-time schedule.
The proposed corridor extending from Oklahoma City to south Texas also exhibits high ridership potential, particularly segments south of Fort Worth. Initial planning indicates a need for at-grade high-speed rail service from Fort Worth to Oklahoma City. From Fort Worth southward, grade-separated high-speed rail service has been identified as the appropriate technology. Additional analysis is needed to refine the corridor alignment and service types.

Planning for the proposed corridor, extending eastward from Dallas to Shreveport, Louisiana, indicates a need for at-grade passenger services.

Within the Dallas-Fort Worth region, both at-grade and grade-separated high-speed rail service is recommended from Fort Worth to Dallas. The recommended Fort Worth to Dallas grade-separated service includes stations in downtown Fort Worth, Arlington, and downtown Dallas as identified in Exhibit 6-20. By connecting the identified grade-separated high-speed rail corridors, a “one seat ride” can be achieved from south Texas to Houston through the Dallas-Fort Worth region.

Cost estimates for grade-separated high-speed rail within the Dallas-Fort Worth region are provided in Exhibit 6-21. The Fort Worth to Austin and Dallas to Houston corridors will be funded with private sector initiatives. The Fort Worth to Dallas project will be funded with a public-private partnership. Exhibit 6-22 displays characteristics and typical costs for the passenger rail categories included in Mobility 2040, including grade-separated high-speed rail and at-grade high-speed rail.

The high-speed rail corridors that have been recommended for at-grade service are located in active freight rail corridors. Project sponsors will work with corridor owners to accommodate passenger rail service. Although high-speed passenger rail service is recommended in these corridors, the RTC does not intend to degrade current or future freight rail service, but rather to enhance transportation options for the traveling public. Negotiations between the freight rail operators and the providers of high-speed passenger rail are expected to explore many options to implement high-speed passenger rail service in the same corridors.
ADOT has recently prepared a Tier 1 Environmental Impact Statement (EIS) for passenger rail service between Tucson and Phoenix. According to ADOT’s Draft Arizona Passenger Rail Corridor Study: Tucson to Phoenix:

ADOT has identified a need for an alternative transportation mode to help meet existing and future travel demand in the Pima, Pinal, and Maricopa tri-county area. By 2035, the travel time between Tucson and Phoenix via Interstate 10 (I-10) is projected to take 26 percent longer than the travel time in 2010 and, by 2050, 59 percent longer, even if the highway is widened to 8 lanes. The Arizona Passenger Rail Corridor Study (APRCS), led by the Federal Railroad Administration (FRA), builds on statewide and regional planning efforts and initiatives to investigate alternative approaches to implementing passenger rail service between Tucson and Phoenix, Arizona’s two largest cities.

In the Tier 1 draft EIS, ADOT recommends a passenger rail study corridor from the Tucson International Airport to Surprise and Buckeye in the Phoenix metro area for future Tier 2 environmental analyses as shown on page A70. The Tier 1 EIS narrowed down the wide-range of potential study corridors that exist between Phoenix and Tucson for further study. The recommended study corridor provides a general framework to identify, evaluate and compare specific alignment alternatives in future Tier 2 environmental studies.
While still very preliminary, the EIS discusses both an intercity service, with few stops between Tucson and Phoenix, and a commuter service which would stop more frequently to serve local or regional trips. ADOT estimates over 3,300 daily intercity riders and nearly 17,000 commuter travelers, reducing Vehicle Miles Traveled by 566,000 on the corridor every day.

If completed, the Tucson to Phoenix passenger rail corridor would potentially form part of a broader Southwestern U.S. passenger rail network, as outlined in the high-level conceptual Southwest Multi-State Rail Planning Study developed by the FRA.

For more information about the Tucson to Phoenix Passenger Rail Study, visit: http://www.azdot.gov/planning/CurrentStudies/PassengerRail/overview. The FRA Study can be found here: https://www.fra.dot.gov/eLib/Details/L16012.
Intercity passenger rail and intercity passenger bus provide long-distance transportation and connections for all types of trips. These services connect the region to a national system of passenger rail and bus terminals. The region benefits from having both long-distance passenger trains and buses and a federally designated high-speed rail corridor.

The Pacific Northwest Rail Corridor, a federally designated high-speed rail corridor, has received federal, state and local funding to improve travel times on the corridor. The corridor runs from Eugene, Oregon in the south, through Tacoma-Seattle- Everett, to Vancouver, British Columbia and encompasses the primary north-south passenger rail route through the state of Washington. In addition to the intercity Amtrak Cascades rail service provided currently between Oregon and British Columbia on the high-speed corridor, Amtrak’s long distance trains from Seattle to California (Coast Starlight) and to Chicago (Empire Builder) also operate on rail corridors in the region.

Washington state is committed to a high-quality intercity passenger rail service which offers an alternative to automobile and air travel and can help reduce the congestion, energy use, and environmental impacts of highways. The state is implementing this through incremental improvements to the intercity rail passenger service provided by Amtrak Cascades. The objective is to provide safer, faster, more frequent and reliable north-south passenger rail service through western Washington, as a more desirable and convenient mode of transportation (compared to air and highway travel).

The long-term goal for intercity passenger rail service provided by Amtrak Cascades is planned to include 13 trains per day between Seattle and Portland, and four trains per day between Vancouver, B.C., and Seattle (three of which continue to Portland). Travel time between Seattle and Portland will be reduced by a quarter to approximately 2.5 hours, and travel time between Vancouver, B.C. and Seattle will be reduced by a third to just over 2.5 hours. The plan to increase service frequency and improve train speeds requires a number of capital investments in train station facilities, new train equipment, continued use of existing tracks owned by BNSF Railway, and improved track crossings and signalization.
The region will pursue *intercity passenger rail* improvements as detailed in the 2006 Washington State long-range plan for *Amtrak* Cascades and the Washington State Rail Plan: Integrated Freight and *Passenger Rail* Program 2013-2035. As of June 2017, 18 of 20 *high speed rail* projects have been completed on the *Amtrak* Cascades corridor, and the state is monitoring program outcomes, which include travel time reductions, number of round trips between Seattle and Portland, and on-time performance in the corridor. Washington State Department of Transportation is planning for the next increment of *intercity passenger rail* improvements through an update of the Washington State *Intercity Passenger Rail* Plan in 2018. Although the scope of the update has not been determined, future plans include an assessment of equipment needs, accessibility, and growth projections for *intercity rail* in the state. Washington State Department of Transportation is also studying ultra-high speed transportation (250 mph or greater) options along the *high-speed rail* corridor.
The Intercity Passenger Rail Operating and Capital (IPROC) Fund provides operational funding for four state supported Amtrak Routes, consisting of six state-supported Amtrak trains. The Passenger Rail Investment and Improvement Act of 2008 required states with Amtrak services less of than 750 miles to pay for the routes or cease operation. This fund enables the Commonwealth to continue those services. It is also the source of funds for passenger rail equipment upgrades and capital improvements.
The Richmond region is located at the juncture of two of the nation’s most important rail corridors. It is located at the southern end of Amtrak’s Northeast Corridor (NEC) which runs from Boston to Newport News and Lynchburg via New York, Philadelphia, Baltimore, Washington D.C., and Richmond. Within Virginia, the NEC service comprises over 350 miles, and includes stops at Alexandria, Franconia/Springfield, Woodbridge, Quantico, Fredericksburg, Ashland, Richmond (Staples Mill Road/Greendale Station and Main Street Station), Williamsburg and Newport News, Charlottesville and Lynchburg. Investment in passenger rail benefits the surface transportation system by providing more reliable passenger service, increased highway capacity for goods movement, reduced fuel consumption per passenger mile, and a reduction in highway system impacts.

Main Street Station

The Main Street Station, located in downtown Richmond, has been undergoing restoration for multiple years and is a TPO Regional Transportation Priority Project. The project has been divided into three phases. The first phase was completed in December 2003, coinciding with the ending of a 28-year hiatus of having rail service into the City of Richmond’s central business district. Phase two was completed in September 2007 and included the purchase of the remainder of the Main Street Station property and the rehabilitation of the head house.

The two phases, with a total investment of $39.3 million, were funded primarily by federal funds with other funding by the City and $2 million in RRTP CMAQ allocations. The development schedule for Phase 3 is targeted for completion in 2017 and includes the restoration of the train shed, development of the seaboard buildings, and other improvements in support of the proposed Broad Street Bus Rapid Transit (BRT) project.

Richmond area residents are served by three primary north-south routes operated by Amtrak:

- Boston-New York-Washington-Richmond-Norfolk (Northeast Regional service) – this Amtrak route includes five northbound and five southbound trains operating each day along this route allowing for travel from Central Virginia to points along the Northeast Corridor.

- New York-Washington-Raleigh-Jacksonville (Silver Meteor/Silver Star/Palmetto service) – This Amtrak route includes 175 miles in Virginia, with stops at Alexandria, Quantico, Fredericksburg, Richmond, and Petersburg. Three southbound and three northbound trains operate each day along this route, resulting in 21 weekly northbound and 21 weekly southbound trips.

- New York-Washington-Raleigh-Charlotte (Carolinian service) – The Carolinian service traverses 175 miles in Virginia, with stops in Alexandria, Quantico, Fredericksburg, Richmond, and Petersburg. One train trip is made daily in the northbound and southbound directions.
The Richmond region is also located at the northern end of the Southeast High Speed Rail (SEHSR) Corridor; one of the five original national corridors designated under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) which authorized a program of high-speed rail corridors nationwide. The SEHSR corridor was first designated by the U.S. Department of Transportation in 1992, and ran from Washington D.C. to Charlotte, N.C. via Richmond and Raleigh, N.C. Its original designation was extended to include South Carolina, Georgia and Florida. The SEHSR corridor has also been extended to include a link between Richmond and Hampton Roads. The status of SEHSR corridor improvements and higher speed rail studies is described in the next section.

Southeast High Speed Rail

The Southeast High Speed Rail Corridor (SEHSR) is a passenger rail project to extend high-speed passenger rail services from Washington, D.C. south through Richmond to Petersburg with a spur to Norfolk (Hampton Roads region) and to Raleigh, Durham, Greensboro and Charlotte in North Carolina, through Greenville, South Carolina, terminating in Atlanta. Virginia DRPT has been working with North Carolina, South Carolina, and Georgia to advance this project.

In October 2010, Virginia received $44.3 million in federal high speed rail funds to complete the Tier I EIS for the portion of SEHSR between Richmond and Washington, D.C. With these funds, the DC2RVA Tier II Environmental Impact Statement (EIS) was initiated in the fall of 2014 by DRPT. The study will analyze specific rail infrastructure improvement alternatives and service upgrades intended to improve the travel time, service frequency, and on-time performance of passenger trains operating between Washington, D.C. and Richmond, VA. The DC2RVA corridor is one component of a broader east coast rail system, extending from Atlanta to Boston, undergoing rail improvement studies endorsed by the Federal Railroad Administration (FRA).

Required by the National Environmental Policy Act (NEPA), the EIS describes the potential impacts of proposed activities or projects on the natural and physical environment. The EIS is a tool for decision-making which evaluates multiple project alternatives, and is generally phased into two or more rounds – or “tiers” – of environmental review. In Tier I, the EIS analyzes a project on a broad scale, considering...
general environmental conditions and levels of impact with little to no site-specific detail. In Tier II, the EIS examines project alternatives in greater detail, and impacts are addressed with potential mitigation measures. Upon approval of Tier II documentation, the decision on a preferred alternative leads to an official Record of Decision (ROD) which ultimately allows for permitting, final design, right-of-way acquisition and construction to move forward.

The DC2RVA segment of the SEHSR corridor is a vital lynchpin between the Northeast Corridor (NEC), an electrified railway line that runs from Boston through New York City, Philadelphia, and Baltimore to Washington, D.C., and the greater SEHSR corridor. Each segment comprising the overall NEC and SEHSR system is at various stages in the NEPA/EIS process as visualized in the following map (Conceptual Location of NEC and SEHSR Corridors under Study) and described below:

- **NEC** – The Northeast Corridor, the most heavily traveled rail corridor in the U.S., is under study as part of the NEC FUTURE Tier I EIS. The FRA launched NEC FUTURE in February 2012 to determine a long-term vision and investment program for the NEC, in addition to meeting NEPA requirements. The Tier I EIS and Vision are expected for completion in 2016.

- **DC2RVA** – The Washington, D.C. to Richmond segment was initially studied and proceeded through the Tier I EIS process as part of the October 2002 Record of Decision (ROD) for the entire Washington, D.C. to Charlotte SEHSR corridor. DRPT has begun work on the Tier II EIS focused on the DC2RVA segment, with a final document anticipated in 2017.

- **Richmond to Raleigh** – The Richmond to Raleigh segment also proceeded through Tier I as part of the October 2002 ROD for the Washington, D.C. to Charlotte corridor. The Draft Tier II EIS for Richmond to Raleigh was completed in 2010, at which point FRA, NCDOT and Virginia DRPT undertook an extensive public engagement and review process. The Final Tier II EIS was recently completed and signed by FRA in September 2015, with a Record of Decision expected in 2016.

- **Richmond to Hampton Roads** – The Richmond to Hampton Roads spur of SEHSR was studied in a separate Tier I EIS process from the Washington, D.C. to Charlotte corridor. In 2010, the Commonwealth Transportation Board (CTB) selected a preferred alternative for enhanced passenger rail service between the two regions. The preferred alternative addressed both Peninsula service between Richmond and Newport News as well as Southside service between Richmond and Norfolk. The Final Tier I EIS was approved by FRA in August 2012, and approval of the Record of Decision followed in December 2012.

- **Raleigh to Charlotte** – The Raleigh to Charlotte segment of SEHSR has advanced through Tier II and is now under construction. The rail improvements along this segment were largely funded through federal stimulus money from the American Recovery and Reinvestment Act (ARRA).
• Charlotte to Atlanta – The Charlotte to Atlanta segment is an extension of SEHSR, building on the prior study of the Washington, D.C. to Charlotte corridor. The Tier I EIS for Charlotte to Atlanta is currently underway and is anticipated for completion in 2017.

Next Steps

As of publication of plan2040, the Tier II EIS document and Record of Decision for the DC2RVA segment of SEHSR had yet to be finalized. Upon adoption by FRA, the RRTPO will be in position to consider possible investments in projects of independent utility to advance implementation of this project.
Intercity Rail service also serves as part of the Sacramento region’s transportation system, linking passengers to cities within the region as well as other parts of the state and nation. In California, Amtrak operates all state-supported intercity rail service. Caltrans provides operating funds for the three Amtrak in-state routes: the Capitol Corridor (Auburn to San Jose); the San Joaquin (Bay Area/Sacramento to Bakersfield); and the Pacific Surfliner (San Luis Obispo to San Diego). These routes connect with each other and with Amtrak’s four long-distance train routes that link California to other states: the Coast Starlight (Los Angeles to Seattle), California Zephyr (Emeryville to Chicago), Southwest Chief (Los Angeles to Chicago), and Sunset Limited (Los Angeles to New Orleans). Many passengers use the state-supported Amtrak routes for intercity travel within California, or as part of longer rail trips. Figure 5C.1 shows intercity rail services in northern California.

The Capitol Corridor provides daily rail service between Auburn, Sacramento, Oakland/San Francisco and San Jose. The Sacramento to Oakland segment has 16-weekday round trips and 11 weekend/holiday round trips. One daily round-trip train serves Auburn, plus there are bus connections at other times of the day. Seven round trips continue south to San Jose. The Capitol Corridor carried over 1.7 million passengers in the federal fiscal year 2011 and is expected to top 2 million annual passengers by the close of federal fiscal year 2012. It is the Amtrak route with the best on-time performance (94 percent) in the nation.

The Capitol Corridor is operated by Amtrak and administered by the Capitol Corridor Joint Powers Agency (CCJPA) which is made up of representatives along the 100-mile corridor. SACOG is a member of the CCJPA Staff Coordinating Group, which serves as an advisory body to the CCJPA concerning ongoing operations and planning of the service. The partnership between the CCJPA, Amtrak, the California Division of Rail and Union Pacific railroad is considered a national example of successful implementation of passenger rail services.
Operations are funded through the California Public Transit Account, city funds, and fares, which covered 50 percent of the operating costs in federal Fiscal Year 2010-11. Capital costs have been funded through state bond measures, more recently with Federal Railroad Administration grants, and through ongoing maintenance by the rail line owner, Union Pacific. The stations are all owned by the cities along the route.

While the State largely funds the Capitol Corridor and SACOG primarily plays a planning role, some capital improvements are included in the MTP/SCS. These include: design, environmental clearance, and construction of a third track between Sacramento and Roseville to improve service frequencies to Roseville and a new rail alignment through the Sacramento Railyards to allow for smoother operations of freight and passenger rail trains and reduce congestion on the route. A second phase of that project is expected to improve the new train platforms with a newly built station.

The San Joaquin Route provides intercity rail service between the Bay Area and Sacramento and Bakersfield, with bus connections to Los Angeles, Redding, Yosemite National Park and Las Vegas, Nevada. The Sacramento-to-Bakersfield segment has two daily roundtrips. Four daily round trips between Oakland/San Francisco and Bakersfield are also accessible by Sacramento and Elk Grove riders through Amtrak connecting buses. Amtrak buses also serve the Davis station to allow riders to connect to all San Joaquin trains. The San Joaquin route and connecting points are shown in Figure 5C.1. The San Joaquin exceeded one million annual riders in September 2011. The San Joaquin shares rail equipment, train crews, and maintenance facilities (in Oakland) with the Capitol Corridor. The route is at maximum passenger capacity and additional trains are needed to meet demand.

SACOG staff also participates in the management of this route, as Sacramento County’s non-elected appointee to the San Joaquin Valley Rail Committee. The committee meets quarterly to advise Caltrans, Amtrak and the host railroads on improvements to the service.
The California **High-Speed Rail** Authority is proposing to construct, operate, and maintain a statewide California **High-Speed Train** Program (CHSTP). When completed, the system would span nearly 800 miles with highspeed electrified train service between the Bay Area, Central Valley, Sacramento, and Southern California. The new system would be grade-separated from road vehicle traffic, and operate almost exclusively on separate, dedicated tracks, with top design speeds of up to 250 miles per hour (MPH) and an operating speed of up to 220 MPH.

Phase 1 would construct about 520 miles of rail between San Francisco and Anaheim. When completed, Phase 1 would provide a 2-hour and 40-minute service between San Francisco and Los Angeles via Merced and Bakersfield. Subsequent phases include a southern extension (Los Angeles to San Diego via the Inland Empire) and a northern extension (Merced to Sacramento). While the MTP/SCS does not specifically address **high-speed rail**, SACOG’s approach has been that it could provide significant benefits in replacing short-distance business and recreational airplane trips with train travel, but should avoid negative consequences of mainly creating Central Valley commuter suburbs by focusing on mixed-use, transit-supportive development, especially at stations in the Central Valley where few jobs currently exist. Figure 5C.2 shows the proposed route for the high-speed rail system.
Los Angeles-San Diego-San Luis Obispo (LOSSAN) Rail Corridor

The COASTER, AMTRAK, and Metrolink rail corridor is the nation’s second busiest. Premier passenger rail services connect the San Diego region to Los Angeles and other points north and east. The Regional Plan builds on this corridor by adding more track capacity and improved stations. These enhancements also will benefit shipping, because the LOSSAN corridor serves as the region’s main freight rail line. Figure 2.10 illustrates the Southern California intercity and commuter rail services.

High-Speed Train Service

In coming years, our state will be home to a high-speed rail line connecting Northern and Southern California. The first legs of this exciting rail system are being built now in the Central Valley. When completed, high-speed trains will connect San Diego, Los Angeles, San Francisco, and Sacramento. In San Diego, high-speed trains will arrive at the future Intermodal Transportation Center to be located adjacent to the San Diego International Airport. This is a project funded by the State of California.
Appendix A: Transportation Projects, Costs and Phasing

Figure A.10
Planned California High-Speed Train Overview
October 2015

Two alignment options are currently under consideration by the California High-Speed Rail Authority: Corridor 4 (left) and Inland (right).
In 2012, Amtrak provided intercity passenger rail service in Southeastern Wisconsin using track owned by Canadian Pacific Railway, with stops within the Region at the Milwaukee Intermodal Station in downtown Milwaukee, General Mitchell International Airport, and Sturtevant. Under contract with the State of Wisconsin and the State of Illinois, Amtrak operated seven daily Hiawatha Service trains (six on Sundays) in each direction between Milwaukee and Chicago, with intermediate stops at General Mitchell International Airport, Sturtevant, and Glenview. As part of its national network of train service, Amtrak operated one daily Empire Builder train in each direction between Seattle/Portland, Minneapolis-St. Paul, and Chicago, with intermediate stops in La Crosse, Tomah, Wisconsin Dells, Portage, Columbus, Milwaukee, and Glenview. East-bound Empire Builder trains stop at Milwaukee Intermodal Station only to drop off passengers, and west-bound Empire Builder trains stop at Milwaukee Intermodal Station only to pick up passengers.

By comparison, in 2001, under contract with the State of Wisconsin and the State of Illinois, Amtrak operated six daily Hiawatha Service trains (five on Sundays) in each direction between Milwaukee and Chicago and one daily Empire Builder train in each direction between Seattle/Portland, Minneapolis-St. Paul, Milwaukee, and Chicago. In 1991, nearly two years after the State of Wisconsin and the State of Illinois began contracting with Amtrak to provide the Hiawatha Service, Amtrak operated five daily Hiawatha Service trains (six on Fridays and Saturdays) in each direction between Milwaukee and Chicago and one daily Empire Builder train in each direction between Seattle/Portland, Minneapolis-St. Paul, Milwaukee, and Chicago. In 1972, Amtrak—which had assumed operation of most intercity passenger trains from the private railroad companies on May 1, 1971—operated three daily trains in each direction between Milwaukee and Chicago, two daily trains in each direction between Milwaukee, Chicago, and St. Louis, and two weekday trains in each direction between Chicago, Milwaukee, Minneapolis-St. Paul, and Seattle.

In 1963, intercity passenger trains in the United States were operated by private railroad companies and still provided extensive service in southeastern Wisconsin. At this time, passenger train service in the Region was provided by three railroads: the Chicago, Milwaukee, St. Paul and Pacific Railroad (known as the Milwaukee Road and predecessor to Canadian Pacific Railway); the Chicago and North Western Railway (predecessor to the Union Pacific Railroad); and the Soo Line Railroad (predecessor to the Canadian National Railway). Also during 1963, the Chicago, North Shore, and Milwaukee Railway (North Shore Line), one of the last electric interurban railways in the United States, ceased operations.
**Amtrak** Hiawatha Service Ridership

Ridership on Amtrak’s Hiawatha Service between 1990 and 2012 is shown in Figure 4.11. Ridership on the Hiawatha Service increased from 312,404 in 1991 to 832,500 in 2012, a 166 percent increase. Following an increase in service from five daily trains (six on Fridays and Saturdays) in each direction to seven daily trains (six on Sundays) in October 1991, Hiawatha Service ridership increased from 312,404 in 1991 to 457,680 in 1994, a 47 percent increase. By 1996, Hiawatha Service ridership declined to 327,616, a 28 percent decrease, due in part to a significant reduction in service. In early 1995, as a result of an Amtrak system-wide restructuring and cost-cutting plan, Hiawatha Service fares were increased 50 percent and service was reduced from seven to four daily trains in each direction. By mid-1995 Hiawatha Service frequencies were increased to six daily trips per day (five on Sundays) in each direction. The Hiawatha Service maintained this level of service through 2002, and ridership increased from 327,616 in 1996 to 426,652 in 2000. Due in part to an economic recession, Hiawatha Service ridership declined slightly to 397,518 in 2002. Following a service increase to seven daily trips (six on Sundays) at the end of 2002, Hiawatha Service ridership increased from 397,518 in 2002 to 766,167 in 2008, a 93 percent increase. During this period, WisDOT added a new Hiawatha Service stop at General Mitchell International Airport in 2005, the Village of Sturtevant constructed a new station to replace its former station in 2006, and WisDOT opened the renovated Milwaukee Intermodal Station in downtown Milwaukee in 2007. Due in part to an economic recession, Hiawatha Service ridership declined to 741,780 in 2009. Hiawatha Service ridership steadily increased from 2010 to 2012, reaching 832,500 in 2012.
Southern California is served by an ever expanding *passenger rail* network, including intercity, commuter and freight services, and this network is expanding and improving in terms of capacity, efficiency and safety. Many capital, operational and safety improvements are underway and planned throughout this existing network, including transportation corridors currently not served by rail.

The region’s *passenger rail* network, along with the number of passengers and service levels, has steadily grown since 1990, except for a dip during the Great Recession. In 1990, the only *passenger rail* service operating in the region was the Pacific Surfliner and *Amtrak’s* long-distance trains such as the Coast Starlight and Southwest Chief. Metrolink began *commuter rail* service in October 1992, and it continues to expand its network and levels of service. The Pacific Surfliner, which carried 2.7 million passengers in FY2013-14, operates 11 daily round-trips between Los Angeles and San Diego, five round-trips between Los Angeles and Santa Barbara/Goleta, and two round-trips north to San Luis Obispo. The Pacific Surfliner is *Amtrak’s* second busiest corridor, behind the Northeast Corridor between Washington, D.C. and Boston. The line’s average speed is 46 miles per hour (mph).

The Southern California Regional Rail Authority (SCRRA), the operator of Metrolink, operates 165 weekday trains on seven lines and the system carried 11.7 million passengers in FY2013-14. Weekend service provides 34 trains on Saturdays and 28 on Sundays. Metrolink operates two roundtrip express trains: one round-trip on the San Bernardino Line and one round-trip on the Antelope Valley Line (to Palmdale only). System-wide average speed is 37 mph.

Notable recent efforts include the first Metrolink e-ticketing program rollout in 2016. Also, the LOSSAN Rail Corridor (Los Angeles–San Diego–San Luis Obispo Rail Corridor) received a Cap-and-Trade Transit and *Intercity Rail* Capital Program grant in the spring of 2015 to re-establish a cooperative fare agreement with local connecting transit agencies for free transfers to and from the Pacific Surfliner. This program had never been fully developed by Caltrans Division of Rail (DOR), and recently it had been discontinued.

These cooperative fare agreements and media efforts include effective marketing across *passenger rail* markets and transit riders. Metrolink has been successful with its special service trains for both Dodgers’ and Angels’ games and other special events. These types of services introduce *passenger rail* to the general public and can lead to new regular customers.
In July 2015, Metrolink started a pilot fare project on the Antelope Valley Line. It included a 25-percent reduction in fares (except for the weekend day pass) and allowed station-to-station travel for just $2.00. Due to the success of this pilot program, on January 1, 2016 Metrolink implemented a $3.00 station-to-station fare system-wide. (The $2.00 station-to-station program was discontinued on the Antelope Valley Line, however the 25 percent fare reduction was extended to June 30, 2016.) Since 2012, Metrolink has offered its successful weekend pass, allowing unlimited travel throughout the entire Metrolink system on both Saturday and Sunday for just $10.00. (The fare has since increased to $10.00 per weekend day.) Monthly pass holders can take unlimited trips on the weekend.

The renaissance of rail travel in our region is exciting. However, significant challenges are keeping our commuter and intercity rail networks from realizing their full potential to help reduce highway congestion, and cut air pollution and lower greenhouse gas emissions. Among these challenges:

More than half of the commuter and intercity rail network operates on one track, some of which is owned by freight railroads that maintain priority for their own operations. Passenger trains are assigned “slots,” meaning that they are allowed to move in a particular direction for a fixed time period. This results in the relatively slow average speeds noted above, reducing the incentive for commuters to use the train system (and instead prompting them to commute by car), as well as reducing the number of passenger trains that can serve our region.

One-track operations present other challenges. Even a minor delay can lead to a train losing its slot, thereby causing cascading delays throughout the network and throughout the day. Commuter and intercity rail networks in Chicago and on the East Coast have much higher service frequencies than we do in our region, mainly because they have fewer single-track segments and fewer conflicts with freight railroads. Our region has a large list of rail improvements either in the planning phases or which are ready for construction. These improvements include adding double-tracking, sidings, station improvements and grade separations to increase speed and service levels. However, there is no dedicated long-term funding for commuter and intercity rail to move these projects forward.
In addition to freight rail, the region also has intercity rail service via Amtrak. Amtrak operates approximately 120 daily trains through Pennsylvania, including the following trains through Pittsburgh:

- The Capitol Limited (daily Washington-Pittsburgh-Chicago)
- The Pennsylvanian (daily New York-Philadelphia-Harrisburg-Pittsburgh)

From the period of 2006 - 2014, the Amtrak stations in Southwestern Pennsylvania saw significant increases in passenger activity. While Amtrak reported that total Pennsylvania station usage declined 3.8% between federal fiscal years 2013 and 2014, the stations in this region showed more use by travelers (Figure 4.12).

Since 2008, Amtrak has completed the P.R.I.A Section 224 Pennsylvania Rail Feasibility Report, which includes an examination of the potential for expanded passenger rail service between Pittsburgh and Harrisburg, Pennsylvania. The report concluded that the expansion of conventional rail service between the two cities faced considerable hurdles based on right-of-way ownership; use of the corridor by an estimated 40 freight trains each day; and, regional topography. A 2014 report produced by the Pittsburgh Downtown Partnership and Western Pennsylvanians for Passenger Rail, On Track to Accessibility, suggested that service on the Pennsylvanian route could be tripled primarily with investment in train equipment and more frequent service as compared to the cost of investment in track.
Goal 2: A Connected Regional Economy Accessible to National and Global Markets

- Improve the average speed of existing passenger rail service between New Orleans, Louisiana and Charlotte, North Carolina as an extension of the Southeast High Speed Rail Corridor and maintain a local station.
> Introduction > Guiding Statements > Multimodal Integration

Provide an integrated transportation network that encourages use of all modes by offering travel choices that are accessible to all segments of the region’s population.

Planning transportation infrastructure to guide growth in a way that enhances quality of life is not easy. In the past, transportation planning focused on improving highways and major roads, but these improvements can help only so much. Strategic investment in major roadways must be balanced with improvements to the bicycle, pedestrian, transit, rail, and aviation networks to keep people and goods moving, allow better access for residents and visitors, and enhance the quality of life in the Jacksonville area. Multimodal Integration projects seek to:

- Develop bicycle and pedestrian priorities in concert with transit and roadways;
- Create coordinated transit improvements and strategies for system maintenance;
- Promote the expansion of passenger rail and intercity bus; and
- Support economic vitality.
Goal 2: Balanced Multi-Modal System

**Intercity Rail** – Establish the Orlando Urban Area as a major hub for the statewide *intercity rail* system by providing strong multimodal connections to the region.
> Vision, Goals and Strategies > Regional Goals & Objectives

Goal 3: Enhance Economic Competitiveness by Improving Private Sector Performance

- Keep the region connected to national and global markets by improving travel times on US Interstates, upgrading intermodal connections to water, air, and rail freight systems, and by ensuring Middle Tennessee is included in plans for national high speed passenger rail.
AGENCY: Alamo Area Metropolitan Planning Organization  
METRO AREA: San Antonio, TX  
PLAN TITLE: Mobility 2040  
LAST UPDATED: December 2014

> Congestion Management Process > Goals and Objectives

Goal 2: Reduce congestion through a project implementation process that encourages the use of other modes of transportation.

Objective 2.4: Continue efforts with TxDOT, the Alamo Regional Mobility Authority (ARMA), VIA Metropolitan Transit, the Advanced Transportation District (ATD), and others to finance major congestion relief projects including passenger rail service, high capacity transit (including bus rapid transit, streetcar, light rail, and busways), and roadways.
This project, which has been under study since at least 1994, is currently undergoing an Environmental Assessment to qualify for federal funding. In 2010, the State was awarded $40 million in stimulus funds to double-track a ten-mile stretch of the line between New Britain and Newington. It is expected that the State will apply in the near future for a further $400+ million to complete more substantial upgrades to the line that will enable intercity and, by extension, commuter rail, along the line. Figure 7 depicts the route and stations of this line. Next steps to follow are:

- DOT and associated consultants finish the Environmental Assessment and accelerate subsequent phases of the project (e.g., funding application, full design, construction). Currently underway.

- DOT begins operations, including through trains to New York City, Boston, and/or northern New England, and reconfigures local bus routes to fit service. Starts once construction is complete.

- Berlin, CCRPA, and/or DOT develop, study, and, pending feasibility and favorable evaluation, implement projects to improve the area around, access to, and patronage of Berlin-Kensington station. Starts post-adoption of this Plan.
West Loop Transportation Center

The West Loop Transportation Center is a proposed transportation terminal located between the Eisenhower Expressway and Lake Street in Chicago. The terminal structure for the West Loop Transportation Center is envisioned to improve transfers between intercity rail, potential high-speed rail, commuter rail, rapid transit, and bus services. The proposal also includes increased capacity for Chicago Union Station, which serves several commuter and intercity passenger rail services.

This project will provide a focal point and a gateway into the Chicago region and facilitate movements and connections throughout the region. Incorporating and integrating seamless transit connections with elements of urban design focused on this transit center will be important to facilitating the Chicago region as the Midwest hub for high-speed rail, as well as increasing transit usage and promoting economic development opportunities.

Travelers from outside the region can safely arrive at this station and have a number of connection options at their discretion to access the city or the suburbs. For those residents within the region, this project will offer easier access from Metra commuter trains and various points within the city whether by bus or El line.
High Speed Rail

As part of ARRA, in January of 2010, U.S. DOT announced the award of $8 billion nationally to develop a program of high-speed intercity passenger rail service. Recognizing that Chicago is the preferred hub for the Midwest portion of such a network, IDOT was awarded $1.1 billion to develop passenger rail service from Chicago to St. Louis, operating at speeds of up to 110 mph. Improvements include upgrades to track, signal systems, and existing stations; implementation of positive train control technology; and upgrades to rail cars. The improvements will allow Chicago to St. Louis customers to reach their destination 30 percent faster than is now possible by rail and 10 percent faster than driving. On-time performance will also be improved. GO TO 2040 recognizes the need for the region to aggressively pursue high-speed rail and has included in its list of capital projects the West Loop Transportation Center in the City of Chicago. This transportation hub would bring together Amtrak services, both high-speed and conventional, Metra commuter rail, CTA rapid transit, and bus service. A facility of this nature is necessary if Chicago is to be successful as a Midwest hub for high-speed rail.

> Increase Commitment to Public Transit > Implementation Action Areas

Implementation Action Area #3: Pursue High-Priority Projects

| Increase federal investment in high-speed rail | The initial round of funding for high-speed rail assisted with necessary improvements, but considerably more is needed to actually implement a functioning system. A continued federal commitment is necessary for this. The region’s Congressional representatives should make this a high priority, as should U.S. Department of Transportation (U.S. DOT) staff. However, federal funding for high-speed rail should not come at the expense of funding for regional public transit improvements. |
| Link high-speed rail with regional transit and land use planning | Advance the West Loop Transportation Center, which improves the connections between Metra and the CTA, as well as proposed high-speed rail service, and plan for supportive nearby land use. Plan for direct and convenient links between high-speed rail, Metra, and CTA in this location. Also, identify additional station locations within the region and plan for supporting transit services and land use. |

- Strengthen megaregional cooperation and collaboration, build partnerships, and recognize that Greater Philadelphia benefits from a broader economic unit. Support efforts to improve mobility within megaregions, particularly through the provision of high speed inter-regional rail.
Support efforts to establish high-speed passenger rail service on the Empire Corridor.

Improved passenger rail service between Buffalo and Albany (with connections to Toronto and New York City) that is faster and more reliable than current Amtrak service should be provided as it offers the opportunity to increase connections within the larger megaregion. As part of this, the Rochester Intermodal Transportation Center (i.e., Downtown Train Station) is being built and the development of a station in central Wayne County should be considered. To be feasible, this service must save time for existing riders, attract new riders from other modes, and not interfere with freight operations. NYSDOT has undertaken planning for proposed higher speed passenger rail service along the Empire Corridor. Once the associated corridor-wide Environmental Impact Statement is drafted, the Region will be able to consider whether the proposed service meets future transportation needs.
Strategy D2

The Council will coordinate with other agencies planning and pursuing transportation investments that strengthen connections to other regions in Minnesota and the Upper Midwest, the nation, and the world including intercity bus and passenger rail, highway corridors, air service, and freight infrastructure.

Other agencies and private companies are largely responsible for planning and implementing the transportation investments that connect the region to the rest of Minnesota, the Upper Midwest, the nation, and the world. For example, MnDOT and counties are responsible for the major highway corridors that connect the Twin Cities to other regions within the state and to other states, and support cars, trucks, and private intercity bus providers such as Greyhound and Jefferson Lines. Amtrak provides intercity passenger rail, and MnDOT is responsible for planning additional intercity passenger rail services. The Metropolitan Airports Commission works with the airlines provide the region’s air service connections. MnDOT works with the private freight railroads that are responsible for freight rail service and infrastructure, and also with barge companies, port authorities and the Army Corps of Engineers, which provide infrastructure and serve freight service along the Mississippi. The Council will work closely with these partners to ensure that their planned improvements are coordinated with regional investments and that regional needs are considered in the prioritization of these investments.
> Intercity Travel > Strategies

16-2: Intercity rail travel

a. Support efforts to sustain current levels of service on the **Amtrak** Missouri River Runner between St. Louis and Kansas City.

b. Support efforts to sustain current levels of service on the **Amtrak** Southwest Chief in Kansas.

c. Support efforts to upgrade and improve existing **passenger rail** service in Kansas and Missouri.

d. Partner with Kansas and Missouri to study opportunities for expanded **passenger and high-speed rail** service in the Kansas City region.
FINDINGS > Intercity Rail > MTP Notable Practices

AGENCY: North Central Texas Council of Governments
METRO AREA: Dallas / Fort Worth, TX
PLAN TITLE: Mobility 2040
LAST UPDATED: March 2016

> Mobility Options > Public Transportation > Policies

TR3-005
Support the planning and development of high-speed rail to, through, and within the North Central Texas region by leading project development efforts and coordinating with federal and state initiatives as appropriate.

TR3-011
Establish policies fostering high-speed rail system interoperability resulting in a “one seat ride” system operation to, through, and within the North Central Texas region.

TR3-012
Establish policies encouraging regional access by identifying grade separated high-speed rail station locations in downtown Fort Worth, Arlington, and downtown Dallas.

TR3-013
Support the planning and development of sustainable land uses near grade-separated high-speed rail locations by coordinating with the cities of Fort Worth, Arlington, and Dallas.

TR3-014
Support the planning and development of sustainable land uses near at-grade high-speed rail station locations by coordinating with the cities hosting stations.
Policy: Support road, transit, and bridge expansion investments that are supportive of MTP/SCS land use patterns.

Strategy: Support the development of new inter-city rail services, including increased Capitol Corridor services to Placer County and high speed rail along the Altamont corridor, all the while advocating for cost-effective implementation options and Blueprint-supportive compact and mixed-use developments adjacent to the rail stations.

Policy: Prioritize transit investments that result in an effective transit system that serves both transit-dependent and choice riders.

Strategy: When planning high-quality transit along light rail, regional rail and high speed rail corridors, also plan for supportive features that include sidewalks and walkways, passenger shelters, or transfer stations, next-bus notification signs, signal preemption and park-and-ride lots.
The 2016 RTP/SCS proposes three main passenger rail strategies that will improve speed, service and safety and provide an attractive alternative to driving alone. They are:

- Improving the Los Angeles–San Diego–San Luis Obispo Rail Corridor (LOSSAN Corridor)
- Improving the existing Metrolink system
- Implementing Phase One of the California High-Speed Train

The state’s High-Speed Train will provide an additional intrastate transportation option in California, offering an alternative to air and auto travel and providing new capacity for travel on the state’s highways and airports. The California High-Speed Rail Authority (CHSRA), in partnership with the Federal Railroad Administration (FRA), which has provided $3.6 billion in High-Speed and Intercity Passenger Rail funding, have chosen to begin construction in the San Joaquin Valley. The system will then be built south to our region, connecting to Palmdale, Burbank Bob Hope Airport, Los Angeles Union Station and Anaheim by 2029. This is consistent with the CHSRA’s adopted 2014 Business Plan and Draft 2016 Business Plan.

Existing passenger rail facilities in Southern California and the Bay Area (the “bookends” of the Phase One system) will also be improved to provide immediate, near-term benefits while laying the groundwork for future integration with High-Speed Train. This “blended approach” to deliver the full integrated system, through phased implementation over time, will help reduce costs and environmental impacts. With the adoption of the 2012 RTP/SCS, the region and the CHSRA committed to spending $1 billion in Prop. 1A funds and other fund sources on these early investments in the “bookends.”

This commitment by CHSRA and the transportation agencies was formalized in the memorandum of understanding (MOU) between CHSRA, Metrolink, SCAG, San Diego Association of Governments (SANDAG), Metro, Riverside County Transportation Commission (RCTC) and the City of Anaheim. The MOU includes a candidate project list to which $1 billion will be programmed in order to provide interconnectivity to the California High-Speed Train project and improve the speed, capacity and safety of our existing passenger rail network. The list includes 74 projects totaling nearly $4 billion and it shows the need for capital investments to improve the speed and service of the existing rail network regionwide. The top six projects on this list are each of the five county’s (Los Angeles, Orange, Riverside, San
Bernardino and San Diego) top projects—plus the Southern California Regional Interconnector Project (SCRIP, formerly called the Los Angeles Union Station Run-Through Tracks).

SCRIP is number one on the list because it will deliver regional benefits for all counties. Los Angeles Union Station was originally designed as a “stub” rail facility, with tracks only leaving the station in a northerly direction and no through-train operation capability. Up to six tracks will be built to extend out of the south of Union Station and across U.S. Route 101 to connect with the main tracks along the Los Angeles River. These additional tracks will increase Union Station’s capacity by 40 to 50 percent, enabling the scheduling of many more through trains with improved running times. They will also result in sharply reduced air pollution and greenhouse gas emissions from idling locomotives.

Several additional strategies are designed to increase rail ridership in our region by making rail travel more attractive as an alternative to commuting alone by car. These strategies will serve three distinct rail markets: commuter, intercity and interregional. The first is served by Metrolink, the second by Amtrak and the third will be served by California High-Speed Train service. However, the three carriers can be attractive to multiple rail travel markets. Passenger rail strategies for these markets include:

Increase Speed and Service

As noted above, the high-speed rail system MOU partners are in the process of planning and implementing the MOU capital projects to improve capacity, speed and service, bringing at least some segments of our rail network up to the federally defined high speed of 110 miles per hour or greater and to implement a blended system of rail services. In addition to the MOU project list, these projects are detailed in the LOSSAN Strategic Implementation Plan for 2030 and the Metrolink 2015 Strategic Assessment that looks out 10 years to 2025. As speeds and service levels improve, these services will become more competitive with SOV travel and as a result ridership will continue to grow. Further, their schedules should be adjusted once the state’s High-Speed Train project is implemented, so that all rail services complement and feed one another.

Improve Accessibility and Connectivity

This strategy includes establishing rail connections to our region’s airports, and improving transit, bicycling and walking accessibility and connectivity to rail stations. Burbank Bob Hope Airport is presently the region’s best-served airport by rail, and will soon host two rail stations in the near future with service provided by two Metrolink lines, Amtrak and the state’s High-Speed Train in the future. Ontario International Airport (ONT) is not directly served by rail, although SCAG together with Metro, SANBAG and CHSRA are studying various options to provide direct rail service to the airport. LAX is also currently not served by any rail, but will be within the next decade via the Crenshaw Line and the Airport Metro Connector. Improving transit bicycling and walking accessibility to our region’s passenger rail stations is also critical. Increasing rail feeder bus services in our region to passenger rail stations would reduce the incentive for SOV travel. Establishing more transit services such as OCTA’s Stationlink service would provide this incentive. Finally, there is still little BRT or BRT-Lite service in our region outside of Los Angeles County, and
establishing more BRT routes to serve rail stations such as the current Omnitrans sbX Green Line and the Riverside Transit Agency’s future RapidLink Line 1 will help meet this goal.

Secure Increased Funding and Dedicated Funding Sources

Passenger rail has traditionally lacked dedicated funding streams. Amtrak is funded annually by the U.S. Congress, usually resulting in funding amounts insufficient to meet state of good repair needs or to increase Amtrak’s levels of service and expand the network. With local control of the Pacific Surfliner now complete, the State of California has guaranteed funding levels to maintain current service levels (but not to increase service levels) for the first three years. One new funding source is California’s Cap-and-Trade Transit and Intercity Rail Capital Program, which received $25 million in FY2014-15 and 10 percent of annual Cap-and-Trade auction proceeds beginning in FY2015-16. This FY2015-16 allocation is currently estimated to be more than $200 million. Similarly, the CHSRA has been given a dedicated Cap-and-Trade funding stream of 25 percent of funds, beginning in FY2015-16 (for FY2014-15 CHSRA received $250 million). FY2015-16 funding is estimated at more than $600 million.

Support Increased TOD and First/Last Mile Strategies

Increased TOD and first/last mile planning and investments are crucial to passenger rail station area planning. Increased and effective TOD improves our region’s jobs/housing balance, and it reduces VMT, air pollution and greenhouse gas emissions. First/last mile investments also reduce VMT, air pollution and greenhouse gas emissions and encourage rail users to access rail stations with options other than driving alone.

Implement Cooperative Fare Agreements and Media

Cooperative fare agreements and media also offer opportunities for increasing rail ridership and attracting new riders. For example, the Rail2Rail pass allows Metrolink monthly pass riders who have origin and destination points along the LOSSAN corridor to ride Amtrak. In 2014, the North County Transit District (NCTD) reached an agreement with Caltrans Division of Rail (DOR), in which five daily Pacific Surfliner trains stop at all non-Pacific Surfliner Amtrak (Coaster) stops in San Diego County. This service has proven quite popular and successful. Agreements like this one could be expanded once the California High-Speed Train is built.
The California High-Speed Train will provide people with an additional option for traveling within the state, offering an alternative to flying and driving. This will be especially important as highways and airports continue to become more congested and constrained as California’s population continues to grow. Phase One of the system, approved by voters, extends from the Kern County line in our region through Palmdale and Burbank to Los Angeles Union Station and Anaheim. Phase Two, extending from downtown Los Angeles to San Diego, will link many urban areas and other destinations within our Southern California region via the San Gabriel Valley and the Inland Empire. This corridor is about 160 miles long and it traverses Los Angeles, Riverside, San Bernardino and San Diego counties. With more than 21 million residents, these four counties make up about 56 percent of the state’s current population. And they’re projected to grow significantly by 2050.

Upon completion, Phase Two will provide important access to planned and existing regional centers, including Ontario International Airport, the March Inland Port, and potentially San Bernardino International and Corona airports—helping to meet SCAG’s long-term goal of regionalizing air travel in Southern California. Eventually, Phase Two is expected to be the basis for further high-speed rail extensions into Nevada and Arizona.

Phase One and Two of the California High-Speed Train will provide excellent regional connectivity to our region by connecting with a robust network of intercity and commuter rail, subway, light rail, modern streetcars and fixed route transit systems. Integrated planning will allow these regional and local transportation networks to complement the High-Speed Train. Commuter, intercity and interregional rail services and transit serve distinct travel markets, but coordinating their schedules will further increase the region’s rail and transit ridership by attracting new and crossover passengers to these different market segments.

XpressWest

In addition to the California High-Speed Train, our region has other important high-speed rail projects in development. XpressWest is a high-speed rail service that will connect Victorville and Las Vegas along the Interstate 15 corridor and connect via the High Desert Corridor to Palmdale and California High-Speed Train Phase One. It will use “steel wheel on steel rail” electric multiple unit train technology, at speeds of up to 150 miles per hour (mph). That would result in a trip between Victorville and Las Vegas lasting only 80 minutes. XpressWest has secured federal environmental Records of Decision and authorization to construct and operate. In November 2015, XpressWest was awarded the franchise to construct and operate high-speed rail service within Nevada between Southern California and Las Vegas by the Nevada High Speed Rail Authority.
Southwest High-Speed Rail

In September 2014, the Federal Railroad Administration (FRA) released the Southwest Multi-State Rail Planning Study. This study analyzed candidate high-speed rail corridors in several southwest states. California, Nevada and Arizona are included as the “primary” area and New Mexico, Utah and Colorado are included as the “extended” area. The study includes:

1. “Core Express” with top speeds greater than 125 mph
2. “Regional” with top speeds of 90 mph to 125 mph
3. “Emerging/Feeder” with top speeds up to 90 mph

The California High-Speed Train and XpressWest corridors were identified as Core Express corridors in the study. The study also recommended a particular emphasis on the Phoenix to Southern California corridor as a future high-speed rail market to be studied.

> Looking Ahead > The 2016 Strategic Plan > Expanding Our Region’s Commuter Rail System

Both the Amtrak Pacific Surfliner and Metrolink are forecast to significantly increase their ridership and number of daily trains through 2040. The Constrained Plan of this 2016 RTP/SCS includes funding the first $1 billion of the Southern California High-Speed Rail Memorandum of Understanding (MOU). However, this $1 billion investment only funds the top 12 projects on the project list, which contains 74 projects totaling $4 billion. Metrolink recently completed its long-range Strategic Assessment in 2016 and it forecasts growth in the number of daily trains from 165 current weekday trains today to 240 weekday trains by 2025. In addition, the 2012 Los Angeles–San Diego–San Luis Obispo Rail Corridor (LOSSAN) Strategic Implementation Plan (SIP) forecasts up to 310 weekday Metrolink trains by 2040. For the Amtrak Pacific Surfliner, the SIP forecasts up to 18 daily round trips between downtown Los Angeles and San Diego, and additional round trips between downtown Los Angeles and Santa Barbara and San Luis Obispo. Additionally, the SIP includes:

- New East Ventura to Santa Barbara commuter service with four round trips per day
- New Los Angeles to San Diego commuter service with five round trips per day (operations split between Metrolink and Coaster)
- New express service with four round trips per day (operations split between Metrolink and the Pacific Surfliner)
- New Metrolink service to San Jacinto with eight round trips per day

Today, the average speed for Metrolink is about 37 mph, and the average speed for the Pacific Surfliner is 46 mph. Average speeds vary by line, and while top speeds are 79 mph (and a segment of 90 mph through Camp Pendleton), predominant one-track operations in our region greatly reduce the average system speed. Even if all 74 of the MOU projects are built, our region will still have large portions of its rail network constrained by one-track operations. This
reinforces the need to fund capital projects in order to speed up service and make passenger rail more attractive to the commuter who drives alone. SCAG’s Strategic Plan vision for speed and service improvements to Metrolink and Pacific Surfliner calls for an intensive investment in capital projects to further increase speed and service levels over and above the Constrained Plan. The Strategic Plan results in even more segments of the network operating at speeds of 110 mph or more. These projects include additional double tracking, sidings, station improvements, grade separations and grade crossings. Not only will this benefit commuter rail trips in our region, it will benefit Amtrak intercity and California High-Speed Train interregional trips also, as the three systems feed and complement one another. While these rail networks serve three distinct travel markets, improving all three will encourage people to consider and use all three in their travel decisions, rather than be limited to any single mode of transportation.

In addition to capital improvements, our strategic vision calls for considerably more express trips, regular special event services, and implementation of new Bus Rapid Transit (BRT) services that directly connect with Metrolink and the Pacific Surfliner.
The Michigan Department of Transportation (MDOT) has initiated a program to evaluate route alternatives on 300 miles of passenger rail improvements for the Chicago-Detroit/Pontiac passenger rail corridor. The study is being prepared in partnership with the Indiana Department of Transportation (INDOT) and the Illinois Department of Transportation (IDOT), in consultation with the Federal Railroad Administration (FRA). The goal of this corridor improvement includes an improved passenger rail system; introduction of modern, high-speed trains operating at speeds up to 110 mph; and multimodal connections to improve system access. It is anticipated that overall development of this passenger rail system will offer businesses and leisure travelers shorter travel times, additional train frequencies, improved reliability and connections between urban centers and smaller communities along the corridor and adjacent areas. The ongoing preliminary alternative analysis phase is expected to cost about $4 million, 80 percent of which will be Federal Rail Administration funds, with the 20 percent match coming from participating state agencies. The study is expected to be completed by 2015.
Recommendation 2.5: Improve intercity transit services and expand the destinations served

Intercity rail and bus services provide transit connections between the Region and destinations outside Southeastern Wisconsin. Because the primary focus of intercity transit services is to connect communities within the Region to communities in other parts of the State and the remainder of the Midwest, the Commission uses long-range plans completed by WisDOT as the basis of the Commission’s recommendations for intercity transit services. VISION 2050 recommends that the number of intercity bus services be expanded and that existing services be enhanced with increased service frequencies. Two new intercity rail lines are recommended, one connecting Chicago to Minneapolis and St. Paul via Milwaukee and Madison, and another connecting Chicago to Green Bay via Milwaukee and the Fox Valley. Both services would be operated as extensions of the existing Amtrak Hiawatha service from Chicago, and all three lines would operate at speeds up to 110 miles per hour. Map 1.10 shows the segments of the intercity services recommended by WisDOT that are within the Region, and the stations that would be served within the Region.
Economic Development

- Work with RIDOT, AMTRAK and P&W Railroad to establish reasonable access fees and freight charges on the AMTRAK main line, especially on sections of track added through the FRIP. Support bridge clearance programs in other states that open up new markets for freight rail.

Planning

- Continue addressing regional transportation issues, including high-speed rail, bus/rail/air connections, intercity bus, interstate transit/paratransit connections, and commuter rail service to Boston as well as to Connecticut locations. Support a “North-South Rail Link” in Boston to improve regional passenger rail connections. Work directly with other states to coordinate regional changes in freight/passenger rail service.

Intermodal

- Continue existing commuter rail service to Providence through the Pilgrim Partnership. Extend Boston-Providence commuter rail service south in incremental steps to T.F. Green State Airport and Wickford Junction under a Phase I start-up service. Additional sites in Cranston, East Greenwich, Kingston, Pawtucket/Central Falls, Westerly, and West Davisville should be considered and evaluated based on demand, operations, infrastructure requirements, site availability, economic development opportunities, community support, and cost. Long term passenger rail opportunities may include Blackstone Valley and Aquidneck Island. Support extension of MBTA commuter service to Fall River. Use the FRIP track for passenger rail service.

- Work with Amtrak, private ferry service operators, and the travel industry to develop streamlined procedures for carrying bicycles on trains and ferries, and to provide integrated route and schedule information and reservation services oriented toward touring bicyclists.
PARTNERSHIPS AND PILOTS
Transit agencies face an uncertain future with rapid changes in transportation technology and the emergence of new shared mobility travel options over the past decade. Even the fundamental definition of what constitutes public transportation is being called into question. Should it be restricted to the traditional definition that focuses on public sector funded bus and rail services? Or should it be expanded to include other modes of travel, such as bicycles, ridehailing and scooters, that facilitate last mile door-to-door travel capabilities, even if those options are increasingly provided by the private sector? The lines are becoming increasingly blurred.

Across the country, many transit agencies are boldly facing this new reality by approaching these other travel options as a way to complement and improve their core services, not as competitors. This section documents several of the unique partnerships and pilot programs which have been forged between the various players. Many of these initiatives remain in the trial and evaluation phases, so there is not yet a comprehensive body of knowledge to establish best practices in negotiating future partnerships.

The examples which follow are provided simply to serve as a guide for what might be possible and hopefully provide other transit operators the inspiration needed to think differently about the mobility role they play within their jurisdiction. The review was by no means comprehensive and emphasis was placed on identifying notable practices from FTA Region IV, although several examples are presented from around the rest of the nation.

This section concludes with a curated list of relevant news media articles from 2018. Again, this set of articles is not comprehensive and only those articles which emphasize initiatives involving one or more public transit agencies were selected for inclusion. The timeframe was also rigidly constrained to make the compilation a more manageable undertaking. It also serves as recognition that the topic of shared use mobility and transportation technology is extremely volatile and most such articles have a limited shelf life before the information becomes outdated.
PARTNERSHIPS AND PILOTS > Notable Initiatives

1. FTA Mobility on Demand Sandbox
2. Pinellas Suncoast Transit Authority MOD Sandbox Project
3. Municipal Mobility Working Group (Altamonte Springs, FL / Lake Mary, FL / Longwood, FL / Maitland, FL / Sanford, FL / Uber)
4. Hyperlink (Hillsborough Area Regional Transit / TransDev)
5. StarMetro Paratransit Pilot Program
6. Arlington, Texas (Arlington / Via)
7. Summit, New Jersey (Summit / Lyft)
8. West Sacramento, California (West Sacramento / Via)
9. DART Paratransit Pilot Program (DART / Lyft / MV Transportation)
10. Amtrak / Lyft
Program Name

Mobility on Demand Sandbox Program

Implementation Partners

- Federal Transit Administration
- Multiple local grant recipients

Overview

The market for personal mobility is changing rapidly due to changing social and cultural trends, as well as technological advances such as smart phones, information processing, and widespread data connectivity. New mobility concepts and solutions, from bike- and car-sharing systems to demand-responsive bus services, are providing travelers with flexible and convenient transportation options. These developments are impacting the traditional transit market, and could also disrupt current business and funding models.

FTA is conducting research on new service options in combination with available technologies that allow for greater individual mobility. Goals include:

- Improve transportation efficiency by promoting agile, responsive, accessible and seamless multimodal service inclusive of transit through enabling technologies and innovative partnerships.

- Increase transportation effectiveness by ensuring that transit is fully integrated and a vital element of a regional transport network that provides consistent, reliable and accessible service to every traveler.
Enhance the customer experience by providing each individual equitable, accessible, traveler-centric service leveraging public transportation’s long-standing capability and traditional role in this respect.

FTA developed the MOD initiative to envision a multimodal, integrated, automated, accessible, and connected transportation system in which personalized mobility is a key feature. MOD allows for the use of on-demand information, real-time data, and predictive analysis to provide travelers with transportation choices that best serve their needs and circumstances. MOD leverages technologies that allow for a traveler-centric approach that provides better mobility options for everyone.

FTA’s MOD Sandbox Demonstration Program provides a venue through which integrated MOD concepts and solutions - supported through local partnerships - are demonstrated in real-world settings. FTA seeks to fund project teams to innovate, explore partnerships, develop new business models, integrate transit and MOD solutions, and investigate new, enabling technical capabilities such as integrated payment systems, decision support, and incentives for traveler choices.

Importantly, the MOD Sandbox also provides FTA the opportunity to measure project impacts and assess how existing FTA policies and regulations may support or impede these new service transportation models through evaluation of all project efforts.

Funding

$7.9 million awarded to 11 recipients in October 2016

Additional Information

FTA Mobility on Demand Sandbox Website
Funding Recipients, Project Descriptions and Funding Amounts

Of the 11 recipients in the initial round of funding, only one is located within FTA Region IV, a $500,000 commitment to the Pinellas Suncoast Transit Authority. This initiative is highlighted on the next pages of this report. Information on others around the rest of the country is available on the FTA MOD Sandbox website.
Program Name

Paratransit Mobility on Demand Demonstration

Implementation Partners

- Pinellas Suncoast Transit Authority
- Lyft
- United Taxi
- CareRide

Overview

Pinellas Suncoast Transit Authority (PSTA) has assembled a unique multi-partner service with the goal of demonstrating an innovative approach to more effective and efficient paratransit by utilizing new technology available through transportation network companies (TNCs) to provide on-demand service. The project will leverage existing partnerships with United Taxi and CareRide and foster a new key partnership with Lyft to develop and demonstrate a model that will provide cost-effective, on-demand door-to-door paratransit service. Lyft will participate as an additional on-demand ambulatory and wheelchair accessible vehicle platform to complement the existing three partners.

The primary goals of the Public-Private-Partnership for Paratransit Mobility on Demand project are to improve the mobility of paratransit customers and their overall access to the community, and to demonstrate that on-demand trips can be provided cost effectively. PSTA currently provides service to over 12,500 eligible ADA paratransit customers, performing over 275,000 annual paratransit trips through its Demand Response Transportation (DART) Program. As reported in the 2013 - 2017 Pinellas County Transportation Disadvantaged Service Plan, this represents more than 10% of the population who have been qualified for paratransit service through the Americans with Disabilities Act. To achieve the project goals, PSTA will utilize a new centralized dispatching technology that will allow PSTA to offer a rider multiple transportation provider options, including TNCs, taxis, and wheelchair vans if necessary, based on estimated arrival time and cost.
PTSA Presentation Slides

Sandbox Project
- Collaborative federal research grant focused on the use of our TNC partnership model
- One of 11 agencies to receive this grant, and awarded $500,000
- Will demonstrate the cost effectiveness and reliability of emerging on-demand technologies
- Development of performance measures

FTA Sandbox Project
- Capitalize on success with other TNC programs by partnering with Lyft, United Taxi, and Care Ride.
- Piloting with a portion of PSTA’s 12,500 eligible paratransit customers
- Real-time trips to work, school, medical, and shopping areas

Sandbox Project
- Selected 9 participants to test the program
- API/software integrations taking much longer than expected
- Contract/communication challenges
- Data requirements for FTA/ internal planning

Additional Information

FTA Mobility on Demand Sandbox Program Fact Sheet
PARTNERSHIPS AND PILOTS > MMWG

Program Name

Municipal Mobility Working Group

Implementation Partners

- City of Altamonte Springs, Florida
- City of Lake Mary, Florida
- City of Longwood, Florida
- City of Maitland, Florida
- City of Sanford, Florida
- Uber

Overview

Altamonte Springs, Florida, a suburb of Orlando, was the first city in US to pay a portion of Uber fares for all trips within city limits made by its residents. The program pilot started in March 2016, with a budget of $500,000, which included both public and private sector funds. Under the program, the City paid for 20% of the cost of all Uber trips and 25% of those which either began or ended at the local SunRail station. The intent was to save money on expensive traditional public transportation and road maintenance and construction activities.

The program expanded in August 2017 to include four other cities - Lake Mary, Longwood, Maitland, and Sanford - and the Municipal Mobility Working Group was formed. Under the agreement, each city also agreed to pay 20% of the fare of any trip which began in another city and ended in theirs.

Reported data has shown a 74% increase in Uber trips during the first year of the program since expanding to the five cities, although other reports have indicated more mixed results, with the program being more successful in some communities than others. Critics have charged that the service is financially unsustainable, it disadvantages individuals without internet access, and that
there is lack of transparency in the results being achieved by the expenditure of public tax dollars. Concerns have also been expressed regarding the impacts of regular Lynx public transportation services.

Additional Information

City of Altamonte Springs Website
City of Lake Mary Website
City of Longwood Website
City of Maitland Website
City of Sanford Website
Program Name

HyperLINK

Implementation Partners

- Hillsborough Area Regional Transit Authority
- Florida Department of Transportation
- TransDev North America

Overview

HyperLINK allows individuals to request an on-demand ride within certain zones of the HART service area. During the trial program, the service is available within a three-mile radius of four locations: 1) University Area Transit Center, 2) Temple Terrace City Hall, 3) Westfield Brandon Mall, and 4) Brandon Regional Hospital. The cost is $1 to or from a designated HART fixed route bus stop, or $3 to anywhere within the three-mile radius zone. This fee is in addition to the regular transit fare. Rides are available from 5:30 AM to 10:30 PM and can be requested either via a smartphone app or by phone. Service is not exclusive, as up to four passengers may be accommodated by the on-demand vehicle at any time. All vehicles are ADA accessible Tesla SUVs. The program initiated in November 2016 and is ongoing at the time of this review.

The pilot program is subsidized by the Florida Department of Transportation. The vehicles are operated by TransDev, a private sector company, under contract with HART. Based on the partnership experience with HART, TransDev is considering other similar microtransit services around the country.

Additional Information

HART HyperLINK Website
PARTNERSHIPS AND PILOTS > HyperLINK

University / Temple Terrace Service Area

HART HyperLINK - University/ Temple Terrace Areas

[Map of the University / Temple Terrace Service Area showing HART routes and service zones.]
PARTNERSHIPS AND PILOTS > HyperLINK

Brandon Service Area

HART HyperLINK - Brandon Area
Program Name

StarMetro Paratransit Pilot Program

Implementation Partners

- To be determined

Overview

StarMetro, the public transit agency serving Tallahassee, Florida, is in the process of implementing a one-year rideshare pilot program to provide demand-response (Dial-A-Ride) customers with an alternative mode of transportation.

The pilot is designed to offer many new benefits to existing customers such as lower wait times, same-day bookings and more direct trips. The goal is to improve response capabilities when customers have unplanned schedule changes and create flexibility in service delivery by reducing advance notice required to schedule trips (currently the day before) and provide same day service options. Since 2011, DAR has experienced an average six percent annual increase in the number of trips provided. The ride share pilot is expected to reduce costs per trip and improve on-time-performance.

StarMetro plans to solicit 100 volunteers to participate in the rideshare pilot. These volunteers will be selected from their most frequent users who do not require special adapted vehicles. The program will run from 7 a.m. to 7 p.m. and operate seven days a week. Initial funding will be from private sector contributions.

Additional Information

Not yet available
Program Name

Arlington Rideshare Transit

Implementation Partners

- City of Arlington, Texas
- Via

Overview

The City of Arlington contacted the FTA Region VI office in March 2017 to discuss the option of partnering with Bridj to provide an on-demand ridesharing transit service. FTA met with the City of Arlington in early May 2017, but by that time same time, Bridj had ceased operations, so the City of Arlington began searching for a similar platform. FTA provided guidance on the requirements for the use of JARC funds for the service, as well as the requirements for meeting the definition of public transportation.

In April 2018, FTA awarded $730,000 in Section 5307 JARC Capital Cost of Contracting ($500,000) and Operating Assistance ($230,000) funds to support the operations of a demand-response service by Via for a one-year trial period, with annual renewal options for an additional four years. The City is contributing a match of $322,500 for the first year. Service began in April 2018. The FTA determined the project was eligible as a JARC activity as it is designed to meet the needs of low income individuals and persons trying to access jobs and employment services; that it is a shared-ride service and meets the definition of public service.

This funding supports the Via Rideshare program, which increases the public transportation options for the City by providing demand rideshare trips for the low income and transportation challenged persons to work and training locations as well as providing the general public with a convenient mobility option. Via operates a fleet of ten Mercedes vans that are used exclusively for the service. For a $3 fare or a weekly $10 pass, they will pick up passengers and drop them off anywhere within an area of central Arlington. Rides are shared with up to six passengers at a time. Rides can be requested either through a smartphone...
app or by calling a phone number. The service is generally offered between 6 a.m. and 9 p.m. Monday through Friday and between 9 a.m. and 9 p.m. on Saturday, but does have extended hours during special events.

As of mid-June 2018, there have been over 30,000 trips completed and over 4,800 accounts have been established on the app. The average trip is about 5.2 miles in length and about 60% of trips have been shared between two or more passengers. About two-thirds of the rides start or end in the University of Texas at Arlington area, with other major destinations including the CentrePort commuter rail station and retail businesses near AT&T Stadium.

The City of Arlington is planning to expand the service area during the summer of 2018 to include additional retail, medical and low income residential areas.

Additional Information

City of Arlington Website
Via Website
PARTNERSHIPS AND PILOTS > Summit, New Jersey

Program Name
Summit, New Jersey and Uber Partnership

Implementation Partners
- City of Summit, New Jersey
- Uber

Overview
In October 2016 the suburban town of Summit, New Jersey, about 30 miles west of New York City, announced the launch of the state’s first subsidized commuter program. Under the arrangement, Uber offered free or deeply discounted rides to commuters who have struggled to find parking at Summit’s New Jersey Transit station. The City subsidized the rides, paying Uber directly to cover the costs of the trips. The intent was to help free up parking spots at the transit station to avoid the need to spend millions of dollars for construction of additional parking.

There are currently five parking lots around the Summit train station that are consistently over-crowded. At the pilot program’s outset, 100 commuters who purchased parking passes were eligible for free Uber rides to and from the station, while others could opt-in for $2 trips each way. Parking passes at the Summit station are $4 per day.

The contract with Uber expired in December 2017 and the City has since contracted with Lyft to provide the service. The program was expanded to include an additional 50 people on a wait list. Trips must begin or end within Summit or at the train station and service is available Monday through Friday between 5 a.m. and 11 p.m.

The City estimates that an average of 25 to 30 spaces opened up daily as a result of the partnership with Uber. The gross cost to the City was about $5,500 per month to subsidize slightly more than 100 trips per day. About one-third of the cost was offset by increased revenue from higher turnover at the newly
opened parking spaces. The goal is to free up approximately 100 spaces, which would require participation by 300 to 400 commuters in the program.

Additional Information

City of Summit Website
Program Name
West Sacramento, California and Via Partnership

Implementation Partners
- City of West Sacramento, California
- Via

Overview
In November 2017, the City of West Sacramento announced the selection of New York-based rideshare company, Via, to implement a citywide on-demand public transportation service. The 1-year pilot program, officially launched in May 2018, allows users to book a shared ride anywhere in the City for a fare of $3.50. Senior citizens pay $1.75. The program connects multiple passengers using 10 six-passenger vans, allowing riders to share a vehicle with others who are headed in the same direction. The program also includes a partnership with UC Berkeley’s Transportation Sustainability Research Center (TSRC) to evaluate the performance of the service. The program launched in May 2018.

Riders book a seat by using a smartphone app or by making a phone call. Working with Via and the Yolo County Transportation District (YCTD), the City is also exploring free or reduced fares to and from transit stops, as well as bikeshare stations, and major events to better connect residents to a range of mobility options. Customers requiring a wheelchair accessible vehicle can go to the “Promo Codes” menu on the Via app and enter code RIDEWAV, or contact a customer service representative.

Additional Information
City of West Sacramento Website
Via Website
Program Name
DART Paratransit Pilot Program

Implementation Partners
- Dallas Area Rapid Transit
- Lyft
- MV Transportation

Overview
DART has partnered with paratransit service provider, MV Transportation, and rideshare service provider, Lyft, to offer on-demand paratransit service in Dallas, Texas. This pilot supplements MV Transportation’s operation of DART’s paratransit program, enabling 160 participating paratransit riders to book free Lyft rides for their travel needs. Ride costs are covered under the existing contract between DART and MV Transportation, and the program will be operated on a month-by-month basis. This partnership expands the system’s paratransit capacity by 7% and aims help elderly and disabled users access timely rides when needed.

Additional Information
- DART Website
- MV Transportation Website
Program Name

Amtrak / Lyft Rideshare Partnership

Implementation Partners

- Amtrak
- Lyft

Overview

In August 2017, Amtrak and Lyft announced a partnership which allows customers to use the Amtrak mobile app to directly access the Lyft app to request a ride to or from the station. New Lyft users receive $5 off each of their first four rides by using a promo code (AMTRAKLYFT). Over 97% of Amtrak stations are within communities served by Lyft.

Additional Information

Amtrak Website
RESOURCES
On the following pages is a curated list of websites, case studies, research reports and white papers related to the intersection of public transportation services and shared use mobility. As with the partnerships and pilot projects highlighted in the previous section, this information is likely to become dated very quickly, so only websites which are actively maintained and/or documents published within the past two years are included.
RESOURCES > Notable Examples

FEDERAL

1. Shared Mobility Website (FTA)
2. Mobility on Demand On-Ramp Technical Assistance Website (FTA/SUMC)
3. Integrating Shared Mobility Into Multimodal Transportation Planning (USDOT/FHWA)
5. TCRP 188: Shared Mobility and the Transformation of Public Transit (TRB)
6. TCRP 195: Broadening Understanding of the Interplay Between Public Transit, Shared Mobility and Personal Automobile (TRB)
RESOURCES > Notable Examples

OTHER

7. Shared-Use Mobility Reference Guide (SUMC)
8. Shared Mobility Policy Database (SUMC)
9. Shared Mobility Mapping and Opportunity Analysis Tool (SUMC)
10. UpRouted: Exploring Microtransit (ENO Foundation)
12. Private Mobility, Public Interest (TransitCenter)
13. Shared Mobility Principles for Livable Cities Website
15. Other Recent News Articles of Interest
RESOURCES > FTA Shared Mobility Website

Resource Name
Shared Mobility Website

Sponsor Organization
Federal Transit Administration

Description
This website provides official information on FTA’s positions and initiatives related to shared mobility. The site includes definitions of key terms (many of which were presented in the Methodology > USDOT Recognized Definitions section of this document), a set of frequently asked questions, and links to the Mobility on Demand Sandbox program and the Shared Use Mobility Center’s Policy Database, both of which are highlighted elsewhere in this document.

Link
FTA Shared Mobility Website
The On-Ramp program, part of a partnership with FTA, provides an opportunity for public transportation agencies and other transportation providers with promising MOD concepts to receive expert assistance to develop business plans and other project-building strategies. The selected participants will engage in a comprehensive, year-long process that will assist with project development through supported engagement, peer mentoring, research, and other activities.

Participants will receive support to:

- Conduct workshops in their communities to determine local mobility needs and set parameters for projects;
- Participate in a national community of practice with peer agencies and related experts as well as access to in-person workshops;
- Utilize research and analysis from SUMC and other experts;
- Collaborate one-on-one with peers and identify resources to meet challenges; and
- Develop feasible MOD business plans.
In June 2018, the Shared-Use Mobility Center announced the selection of six public transportation agencies who will receive free technical assistance to develop mobility-on-demand projects through the On-Ramp program. Independent evaluators from both public agencies and private firms, in consultation with FTA, selected the six projects from a pool of nearly 30 proposals from around the country.

- **Capital Metro (Austin, TX)** is helping a rapidly growing region address the challenges of sprawl, congestion, and changing travel patterns. They are examining shared, electric, and autonomous vehicles—what they term “smart mobility”—to connect to high frequency/high capacity transit service and to provide transportation for riders with disabilities.

- **MDOT MTA (Baltimore, MD)** is developing a plan for microtransit to better connect high-opportunity job centers in the suburbs and low-income residential populations in the city.

- **IndyGO (Indianapolis, IN)** is developing strategic plans for integrated mobility hubs in a series of “mobility districts,” selected according to their urban typology. Each plan will focus on connecting hubs to their existing transit network.

- **Tompkins County (Ithaca Region, NY)** is largely rural area contiguous with the Ithaca metropolitan area. The county, with a consortium of mobility operators, human service agencies, and mobility managers, is proposing a Mobility as a Service (MaaS) pilot, to both reduce solo driving trips and provide equitable transportation access to its residents.

- **MATA (Memphis, TN)** plans to develop a demand-responsive service to transport riders from their doorstep to arterial routes in selected corridors of the city. The program seeks to improve service to both people in disadvantaged neighborhoods and paratransit riders.

- **BART (San Francisco Metropolitan Area, CA)** is aiming to create an on-demand wheelchair accessible vehicle (WAV) ride-hailing service. The rides would be staged at BART stations, and would provide either short, single-leg trips, or first/last mile trips to the stations.

**Link**

[Mobility On Demand On-Ramp Website](#)
New shared mobility services driven by technological advancements have become increasingly common and important modes of travel in U.S. cities but transportation planning practices are only beginning to adapt in response. These innovations show potential to improve mobility and address transportation challenges. However, failure to integrate shared mobility with the established system of roads, public transit, and other modes and services could diminish this potential, create greater challenges, or limit progress toward public goals.

This white paper provides a framework and examples to assist transportation agencies in anticipating and planning for shared mobility as part of a higher-performing regional multimodal transportation system. It synthesizes noteworthy practices in 13 metropolitan areas as of spring/summer 2017 collected from online research and conversations with planning practitioners, identifies challenges and opportunities, and provides recommendations for future research needed to improve planning practices related to shared mobility.
MPOs, local governments, transit agencies, and states are positioned to each play different, complementary roles in shared mobility planning. For example, regulation of shared mobility operations is typically the purview of local and state governments. Transit agencies have shown an ability to form partnerships with shared mobility providers. MPOs are uniquely positioned to lead regional coordination and consensus building activities because of their traditional role as a regional convener.

Each region examined in this research is taking a different approach to addressing shared mobility in the planning process but the white paper provides four general models to conceptualize how this is occurring:

- **Lighthouse Model**: Leadership from an individual or agency to formulate an approach to integrating shared mobility which inspires others to follow a similar path
- **Strategic Model**: Focusing first on a high-level strategic vision intended to drive more specific planning efforts later
- **Operational Partnership Model**: Engaging with shared mobility companies to experiment and pilot innovative approaches to working together to address regional goals
- **Watch and Learn Model**: Focusing on research and thought leadership while seeking more information about how to incorporate shared mobility into planning processes

Transportation agencies in the studied metropolitan areas identified several issues associated with shared mobility, several of which present both opportunities as well as challenges. Many agencies see potential for shared mobility to help improve safety and mobility for people who do not own a vehicle, for increasing transit access, and providing new transportation options. However, many agencies are somewhat uncertain or conflicted on other topics, noting that shared mobility may have either positive or negative consequences for goals such as social equity, congestion reduction, air pollution and climate change mitigation, land-use sustainability, and infrastructure finance (see table below).

The intersection of shared mobility with a broad range of transportation planning goals is in itself a challenge for MPOs and their partners, creating a situation where it is difficult to coordinate, even internally, and to stay connected to everything the agency and partners are doing on shared mobility.
Several MPOs and their partners are beginning to engage in new practices to approach these issues, and are developing insights about future developments. In general, these emerging practices and strategies, discussed in detail in the white paper, can be grouped in the following topics:

- Data access and sharing between the private and public sector
- Regulation of the use of public infrastructure by shared mobility services
- Implications of shared mobility on strategic and long-range transportation planning
- Operational partnerships for the use of shared mobility to promote public goals
- Publicly operated shared mobility services
- Integrating shared mobility into modeling and forecasting
- Providing technical assistance to local government

**Link**

[USDOT Website]
4

RESOURCES > Shared Mobility Practices and Principles

Resource Name


Sponsor Organization

USDOT / FHWA

Description

Note: The following text was extracted from the Executive Summary section of the report.

Shared mobility - the shared use of a vehicle, bicycle, or other mode - is an innovative transportation strategy that enables users to gain short-term access to transportation modes on an as-needed basis. The term shared mobility includes various forms of carsharing, bikesharing, ridesharing (carpooling and vanpooling), and on-demand ride services. It can also include alternative transit services, such as paratransit, shuttles, and private transit services (called microtransit), which can supplement fixed-route bus and rail services. With diverse options for mobility on the rise, smartphone apps that aggregate these options and optimize routes for travelers are also proliferating. In addition to these innovative travel modes, new ways of transporting and delivering goods are also emerging. These courier network services have the potential to change the nature of the package and food delivery industry, as well as the broader transportation network. Shared mobility is having a transformative impact on many global cities by enhancing transportation accessibility, while simultaneously reducing driving and personal vehicle ownership.

In the context of carsharing and bikesharing, vehicles and bicycles are typically unattended and concentrated in a network of locations where information and communication technology (ICT) and other technological innovations facilitate the transaction of vehicle or bicycle rental. Typically, carsharing and
bikesharing operators are responsible for the costs of maintenance, storage, parking, and insurance and fuel (if applicable). With classic ridesharing (carpooling and vanpooling) and on-demand ride services, such as ridesourcing (e.g., Lyft and UberX) or “transportation network companies” or “ride-hailing” and app-enabled taxi services (e.g., Curb, Flywheel), many providers also employ ICT to facilitate the matching of riders and drivers for trips.

A number of environmental, social, and transportation-related benefits have been reported from the use of shared mobility modes. Several studies have documented reduced vehicle use, ownership, and vehicle miles/kilometers traveled. Cost savings and convenience are frequently cited as popular reasons for shifting to a shared mode. Shared mobility can also extend the catchment area of public transit, potentially helping to bridge gaps in existing transportation networks and encouraging multimodality by addressing the first- and-last-mile issue related to public transit access. Shared mobility can also provide economic benefits in the form of cost savings, increased economic activity near public transit stations and multimodal hubs, and increased access by creating connections with origin points not previously accessible via traditional public transportation.

This Shared Mobility Primer provides an introduction and background to shared mobility; discusses the government’s role; reviews success stories; examines challenges, lessons learned, and proposed solutions; and concludes with guiding principles for public agencies. The primer aims to provide an overview of this emerging field and current understanding—as in the years to come, shared mobility will continue to evolve and develop. In light of this evolution, ongoing tracking and longitudinal analysis are recommended to support sound planning and policymaking in the future.

Link

USDOT Website
Technology is transforming transportation. The ability to conveniently request, track, and pay for trips via mobile devices is changing the way people get around and interact with cities. This report examines the relationship of public transportation, including paratransit and demand-responsive services, to shared modes, including bikesharing, carsharing, microtransit, and ridesourcing services provided by companies such as Uber and Lyft. The research included participation by seven cities: Austin, TX; Boston, MA; Chicago, IL; Los Angeles and San Francisco, CA; Seattle, WA; and Washington, DC.

Some transportation observers have predicted that, by creating a robust network of mobility options, these new modes will help reduce car ownership and increase use of public transit, which will continue to function as the backbone of an integrated, multimodal transportation system.

The objective of TCRP Project J-11, Task 21 was to examine these issues and explore opportunities and challenges for public transportation as they relate to technology-enabled mobility services, including suggesting ways that transit professionals can learn from, build upon, and interface with these new modes.
To accomplish this task, the study draws on several sources of information, including:

- In-depth interviews with transportation officials;
- A survey of shared mobility users;
- Analysis of transit and ridesourcing capacity, demand, and comparative travel times;
- An assessment of practices and regulations relating to paratransit provision; and
- A compilation of current business models and public-private partnerships that build on new technologies from the emerging shared mobility sector.

Together, these elements provide a snapshot of a rapidly widening mobility ecosystem at an early moment in its evolution, and form the basis for a number of recommendations for balancing the benefits of innovation with public agencies’ responsibility to the common good.

**Key Findings**

- **Among survey respondents, greater use of shared modes is associated with greater likelihood to use transit frequently, own fewer cars, and have reduced transportation spending.** Supersharers (people who routinely use several shared modes, such as bikesharing, carsharing, and ridesourcing) report the greatest transportation savings and own half as many cars as people who use transit alone.

- **Shared modes largely complement public transit, enhancing urban mobility.** On some routes and at certain times of day, however, shared modes may compete with transit. Ridesourcing services are most frequently used for social trips between 10:00 p.m. and 4:00 a.m., times when transit runs infrequently or is unavailable. Bikesharing plays a peak-hour role in augmenting transit systems, while carsharing is mostly used off peak. The car-based shared modes likely substitute more for taxi or automobile trips than for transit trips. Transit is most competitive when it travels in its own right of way and provides frequent service.

- **Because shared modes are expected to continue growing in significance, public entities are encouraged to identify opportunities to engage with them to ensure that benefits are widely and equitably shared.** Transit agencies can improve urban mobility for the entire spectrum of users through collaboration and public-private partnerships, including greater integration of service, information, and payment methods.
Public-sector agencies and private mobility operators are eager to collaborate to improve paratransit using emerging approaches and technology. Although regulatory and institutional hurdles complicate partnerships in this area, technology and business models from the shared mobility industry can help lower costs, increase service availability, and improve rider experience.

Emerging business models include new forms of public-private partnership for provision of mobility and related information services. Public entities, including transit agencies and local transportation departments, already are engaging with private operators and using new technologies from the shared mobility world. Public agencies can look to many examples for insight. Key areas of collaboration include cross-modal trip planning, reservations, and payment application (app) integration; microtransit/dynamic demand response; private access to public rights-of-way; and service links and hand-offs.

Conclusions

TCRP Research Report 188 concludes by presenting actions that transit agencies, transportation departments, and other local and regional agencies can take to promote useful cooperation between public and private mobility providers. It also suggests regulatory enhancements, institutional realignments, and forms of public-private engagement that would allow innovation to flourish while providing mobility as safely, broadly, and equitably as possible.

Link

TRB Website
Note: The following text was extracted from the Summary section of the document.

Urban mobility is rapidly evolving in the United States, particularly since the introduction of app-based transportation network companies (TNCs) such as Uber and Lyft. As these services become more widespread, many have begun to question what effect they are having on the cities where they operate, including on public transit ridership, single occupancy vehicle trips and traffic congestion. In the face of widespread declines in public transit ridership after a decade or more of growth nationally, these questions have become especially pressing. Speculation has grown around whether TNCs are leading to real changes in how people use public transit and private automobiles, or if these fluctuations are caused by other factors.

This report—an extension of TCRP Research Report 188: Shared Mobility and the Transformation of Public Transit (2016)—attempts to address these questions by further exploring evidence of how TNCs are affecting the use of public transit and personal automobiles in several regions.

The report’s findings draw on several sources, including TNC trip origin-destination data for five regions provided by a major TNC and similar modeled information for the city of San Francisco provided by the San Francisco County Transportation Authority (SFCTA). These regions—Chicago, Los Angeles, Nashville, Seattle and Washington, DC—represent a variety of demographic, transportation, and land use characteristics. Additionally, the report references a survey of more than 10,000 transit and shared mobility users conducted by the researchers (referred to here as the Shared Mobility Survey), as well as rider surveys about TNC use administered by four large public transit agencies (the Four-Agency Survey).
Key findings from this research include:

1. **The heaviest TNC use across the regions in this study is during evening hours and weekends.** Reaffirming the findings from TCRP 188, TNC trip data for the five regions, along with modeled data for the city of San Francisco, shows that the greatest levels of TNC use are on Friday and Saturday evenings. The busiest time in most cities is between 7pm and midnight.

2. **Most TNC trips in the study regions are short and concentrated in downtown core neighborhoods.** Across the five regions represented in the TNC trip data, the mean TNC trip was between 2 and 4 miles. Many took place within a single zip code tabulation area. Peak-hour usage was concentrated primarily in urban cores, along relatively short, contiguous corridors between dense neighborhoods. The only notable exceptions were airports, which were the highest non-core areas of TNC activity in most of the study regions.

3. **There is no clear relationship between the level of peak-hour TNC use and longer-term changes in the study regions’ public transit usage.** From 2010 to 2016, Seattle, San Francisco, and Nashville—representing high, medium, and low peak-hour TNC usage, respectively—all saw transit ridership increase. Meanwhile transit ridership in Chicago and Los Angeles (high and medium peak-hour TNC use, respectively) decreased, and Washington, DC’s (high peak-hour TNC use) fell by the greatest percentage, according to National Transit Database reporting. The changes in transit ridership between 2010 and 2016 in these regions do not appear to be related to the regions’ levels of peak-hour TNC usage.

4. **Among survey respondents, people who use transit or commute by driving solo do so as part of a routine; TNCs are used on a more occasional basis.** Frequent TNC use (weekly or more often) is much less common than frequent transit use or frequent driving. This and other evidence from both the Shared Mobility Survey and the Four-Agency Survey suggests that for most users, TNCs are one part of a transportation menu, filling gaps or serving specific needs, but not providing the central mode for most users.

5. **Transit travel and wait times were top concerns of survey respondents who replaced transit trips with TNC trips.** Faster travel and lower wait times were overwhelmingly cited by Four Agency Survey respondents as the top reasons for choosing a TNC over transit on the occasions when they did so. The proportions were higher among people who substituted TNCs for transit,
ranging from 57-87%, compared to 40-61% for those who connected to transit. Reliability was also cited as a major concern for riders who substituted TNCs for transit trips in Washington, DC. Only among the heaviest users of TNCs was commuting a major reason for use; most TNC use took place for recreation.

6. **TNC usage takes place in communities of all income levels.** The TNC trip data shows that individual TNC trips were widespread across each of the study regions, suggesting that TNCs are used to some degree by people in communities across the socioeconomic spectrum. While urban core areas had the highest volume, TNC trips originated in nearly every zip code in the core counties of the study regions.

7. **TNC use is associated with decreases in respondents’ vehicle ownership and single-occupancy vehicle trips.** Among respondents to the Shared Mobility Survey, the combination of postponed purchase, deciding not to purchase, and selling a car without replacement outweighed the respondents in each region who acquired a car to become a TNC driver. Respondents also reported net decreases in solo driving. Frequent TNC users reported owning less than one car per household, in line with those of frequent transit users, and people who used a combination of transit and TNCs owned even fewer cars. Due to limitations of the data available to the researchers, TNCs’ net impact on vehicle ownership and vehicle miles traveled (VMT) are not addressed by this study. (See Section IV for more information.)

The report also provides a range of recommendations to help inform public transit agencies and other public entities in large, midsized and smaller urban areas in their attempts to engage with TNC services. These include:

- **Transit agencies in large urban areas** should continue to prioritize rail, bus rapid transit, bus-only lanes, and other transit-centered approaches that move large numbers of people efficiently and effectively. Recommended strategies for transit agencies that wish to engage with TNCs include designating curb space or other specific locations for TNC pick up/drop offs to minimize conflict near transit stops or stations, and pursuing cost savings through public-private partnerships on late night, call-and-ride, and paratransit services.
• **Transit agencies in midsized urban areas** may want to explore first/last mile partnership opportunities with TNCs to help attract new riders and increase the utility of public transit in lower-density areas. Transit agencies in midsized areas may also be able to find ways to work with both TNCs and large employers on behavior change efforts to encourage area residents to leave cars at home and make alternative transportation choices. Components of such efforts can include carpooling/guaranteed ride home programs, parking policy changes and other transportation demand management (TDM) strategies.

• **Transit agencies in smaller urban areas** often have challenges beyond the farebox when it comes to providing frequent and full coverage of their service areas, and thus may be interested in partnering with TNCs to provide alternatives to unproductive routes or provide service across greater time spans or geographic areas. These efforts should focus on allowing transit agencies to concentrate their resources on key routes while also bringing new riders to transit through explicit linkages to service gaps in time or geography, such as late nights, weekends, and unserved areas.

Transit agencies of all sizes might consider exploring opportunities for fare integration, co-marketing and other strategies that encourage multimodal lifestyles. Additionally, local and state governments should be encouraged to create a predictable framework within which a variety of private providers can operate in the public interest. This includes policies that encourage and prioritize TNC trips that are concurrently shared by multiple riders, thus reducing possible congestion and VMT impacts from additional private vehicles on the street. TNCs can be good partners by providing data, promoting their services in a way that complements the efforts of transit agencies, and working together with cities on efforts to increase mobility, reduce traffic congestion, mitigate carbon emissions, and increase access to underserved communities. Business initiatives that demonstrably serve the public good should also be encouraged.

**Link**

[TRB Website](#)
Note: The following text was extracted from the Introduction section of the document.

The United States is currently experiencing a seismic shift in transportation norms. Breakthroughs in mobile technology, an influx of new urban mobility options and changes in travel behavior have significantly altered today’s transportation landscape — a trend that is likely only to accelerate in the years ahead.

The use of new, shared forms of transportation - from carsharing and bikesharing to dynamic, IT-enabled shuttle services and carpooling apps - has increased exponentially. At the same time, drivers’ licensing rates among younger generations have declined as the national perspective shifts from “I own and use my own transportation” to “I access a menu of mobility options to meet my needs.”

These new services also offer opportunities to:

- Provide more mobility choices
- Offer first- and last-mile solutions to help riders connect with transit
- Reduce traffic congestion, vehicle miles traveled and greenhouse gas emissions
- Lessen parking pressures and free up land for new uses
- Create independence for those who cannot afford to buy and maintain a vehicle
- Reduce transportation costs for households
Provide new opportunities to earn extra income by renting out excess vehicle capacity
Increase efficiency and convenience, especially when these modes are linked together

This disruption in the transportation industry has also raised important new questions about how we get from point A to B, with far-reaching implications for auto manufacturers, tech companies, cities, transit agencies and communities.

The guide includes:

- Recommended definitions for new shared modes of transportation
- Updates on the latest industry trends
- Analysis of shared-use mobility’s potential and impacts
- Evaluation of changing local government roles and policy choices
- Suggestions for ways to better connect shared-use mobility with transit
- Recommendations for growing shared mobility services to serve all residents

It is also important to note that this document represents a snapshot in time. As the industry continues to evolve, SUMC will update this reference guide with new information on the benefits of shared-use mobility, opportunities for integration, service gaps in specific cities, strategies to ensure equitable access to transportation and more.

Link

Shared-Use Mobility Center Website
**Resource Name**

Shared Mobility Policy Database

**Sponsor Organization**

Shared-Use Mobility Center

**Description**

The Shared Mobility Policy Database is a comprehensive library of nearly 1,000 shared mobility policies, plans, and studies from across the United States and Canada. In addition to serving as an information clearinghouse, the database also offers in-depth analysis of key policies and best practices. It represents an ongoing effort and will continue to grow alongside innovative developments in the transportation sector.

Information in the database is searchable by topic, tag, location, regulatory agency or type of document. Selecting one of the search results provides a summary with key information, along with the original policy document as available.
Sample Query Result

<table>
<thead>
<tr>
<th>Shared Mobility Policy Database</th>
</tr>
</thead>
</table>

**Uber and MARTA Partnership, Atlanta, Georgia, 2017**

- **Type:** MOD Partnership
- **Date launched:** July 23, 2017
- **Location:** Atlanta, Georgia, US
- **Regulatory agency:** Transit Agency/Authority
- **Status:** Active

**Summary**

MARTA (Metropolitan Atlanta Rapid Transit Authority) has partnered with Uber to launch the "Last Mile Campaign". The campaign is aimed at improving the first/last mile links, particularly guaranteed-ride home programs and late-night services. MARTA passengers can link directly to Uber's site from the MARTA app. In turn, Uber drivers have information about when the bus or train will arrive so that the car will be waiting.

For more information see Uber and [Metro Magazine](https://www.metroatlanta.gov/metro-magazine).

Contributed through a partnership between the [Shared-Use Mobility Center, ITS America](https://www.shared-usemobility.org) and the [Federal Transit Administration's Mobility on Demand Program](https://www.fta.dot.gov/mobilityondemand).

**Updated March 2017**

**More information**

**Tags:** MOD Partnership, Ridesourcing/ridessharing, First/Last Mile

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**Link**

[Shared Mobility Policy Database](https://www.sharedmobility.org)
Resource Name

Shared Mobility Mapping and Opportunity Analysis Tool

Sponsor Organization

Shared-Use Mobility Center

Description

This interactive mapping site pinpoints shared mobility vehicle locations in more than 50 North American cities. The tool also incorporates census data, transit quality, and other information to help cities better understand where greater service is needed, and what shared modes the market can support.

Information in the database is searchable by the city, the type of program or the purpose of the program. Selecting one of the cities results in a map with basic demographic data, including population, the average number of vehicles per household, and the square mileage. Based on this information, the selected area is assigned a shared-mobility opportunity level which indicates if it is amenable to first/last mile type services only or if it has a medium or high potential for a variety of shared-use mobility options.
RESOURCES > Shared Mobility Mapping Tool

Sample Query Results

Link

Shared Mobility Mapping Tool
In the United States, public transportation agencies are experimenting with on-demand, shared, and dynamic models to augment traditional fixed-route bus and train services. These services—referred to as microtransit— are enabled by technology similar to the mobile smartphone applications pioneered by privately operated transportation network companies. As interest in this technology grows, it is critical for public transportation agencies and departments of transportation to understand the benefits and challenges of incorporating components of these innovations into publicly funded services.

The experiences of several public transportation providers reveal important lessons to be applied to the future public operation of flexible route, on-demand microtransit. First, agencies seeking to test microtransit or dynamic, on-demand options need to prioritize customers’ needs ahead of the novelty of new technology and think critically about how to design, develop, and implement a pilot that puts the customer first. Second, agencies should utilize a contracting mechanism that empowers those most familiar with the pilot to make quick decisions outside of the standard processes, in order to be able to fail fast and iterate quickly. Third, the success or failure of the application should be determined based on performance metrics that go beyond ridership changes and farebox recovery, such as improved mobility, increased safety, and enhanced customer experience. Fourth, agencies should establish their goals up-front and work
with potential technology vendors to design a microtransit project within those parameters. Finally, agencies should invest in robust marketing and outreach in order to ensure that all current and potential customers understand how to use the service.

There is an opportunity for traditional public transit agencies to leverage the potential of flexible route, on-demand microtransit. However, it is critical to keep in mind that technology cannot solve all of public transportation’s challenges. Regardless of the technology available, the customer should remain in the forefront when considering service adjustments and new service models. Agencies should be intentional and deliberate in identifying the problem they are looking to solve or the question they seek to answer when testing microtransit.

Link

Eno Center Website
Overview

Note: The following text was extracted from the Purpose section of the document.

The rapid and potentially widespread introduction of ride-sourcing services will have some impact on existing public transit services but also provide opportunities to improve mobility options by responding to new demands for customized, flexible, on-demand public transportation. To help inform transit system managers, NYPTA created a working group to investigate challenges and opportunities with TNCs operating outside NYC, and to develop a white paper with guidance and recommendations for working with TNCs. The goal is to position New York transit systems as leaders in pursuing partnerships with TNCs, and leverage TNC operations to improve mobility and support the growth of our communities.

This white paper includes:

- A brief review of the experience of some other transit systems nationally
- Results of a NYPTA survey of NYS transit systems on their expectations
- A list of issues and concerns for NYS transit systems dealing with TNCs
- Opportunities to coordinate and partner with TNCs
Potential barriers to achieving coordination with TNCs
Recommended principles and practices to improve the success of transit/TNC coordination

Appendices include a summary of the New York State TNC legislation, key findings from a TCRP Report - “Shared Mobility and the Transformation of Public Transportation”, a list of specific partnership best practices of some transit systems and cities with TNCs, and the results of the NYPTA survey of New York State transit systems.

Link

NYPTA Website
Emerging mobility services like bikeshare, carshare, on-demand transit, and transportation network companies provide more transportation options for customers to choose how to get where they want to go.

**Partner to reinforce transit’s strengths**

- Emerging mobility services allow for greater transportation efficiency by creating opportunities for more flexible planning by public agencies. If agencies can reduce the cost of providing equivalent or better service in inefficient transit markets, they can reallocate savings to improve service elsewhere.
- Emerging mobility and other third-party data providers hold robust and valuable data that can be used to improve agency planning efforts. Agencies should identify their needs and seek access to these data accordingly, which will in many cases result in stronger reporting requirements.
- Emerging mobility services have not yet transformed public transportation. They will not replace high-quality, fixed-route transit as the most efficient means of moving people along dense urban corridors, and focusing on emerging mobility services is not a substitute for designing walkable, mixed-use neighborhoods or engaging in pedestrian- and transit-oriented planning.
Leverage agency-controlled assets

- The public sector controls valuable assets, like parking spaces and street right-of-way, that can be used to negotiate for contracted services, access to data, or equitable geographic coverage, for example.
- Agencies can subsidize customer trips using emerging mobility providers in order to achieve desired transportation outcomes, such as increased average vehicle occupancy or increased first- or last-mile transit transfers.

Plan for a streamlined user experience

- Agencies who provide high quality open data, especially real-time transit data, and use open data and technology standards will enable more rapid innovation toward streamlined customer trip-planning and payment systems.
- Integrated fare payment system implementation is a valuable leverage point for agencies working with emerging mobility providers.

Be open to new ways of providing useful transit

- Agencies need to proactively start to break down barriers to collaboration with emerging mobility providers—barriers like restrictive procurement processes, work rules, or agency traditions—by creating clear pathways to working together.
- There is a substantial gap between current practice and the anticipated potential for on-demand transit and transportation network companies to serve paratransit trips and other markets that are particularly expensive to serve using fixed-route transit. Public agencies can close this gap by starting with targeted pilot programs with emerging mobility providers.
- As new and existing providers continue to test different business models and growth strategies, public agencies must also experiment and share lessons learned with one another and with emerging mobility providers.

Link

TransitCenter Website
Resource Name

Shared Mobility Principles for Livable Cities

Sponsor Organization

N/A

Overview

In February 2018, a coalition of non-profit organizations, government agencies and transportation and technology firms announced a voluntary set of 10 principles to serve as a guide for how shared mobility services should be managed in order to help cities grow in a sustainable, inclusive, prosperous and resilient manner. The principles are non-binding and are designed to serve as a guide for policy officials and stakeholders involved in transportation and urban design issues.

THE PRINCIPLES

1. WE PLAN OUR CITIES AND THEIR MOBILITY TOGETHER.
The way our cities are built determines mobility needs and how they can be met. Development, urban design and public spaces, building and zoning regulations, parking requirements, and other land use policies shall incentivize compact, accessible, livable, and sustainable cities.

2. WE PRIORITIZE PEOPLE OVER VEHICLES.
The mobility of people and not vehicles shall be in the center of transportation planning and decision-making. Cities shall prioritize walking, cycling, public transport and other efficient shared mobility, as well as their interconnectivity. Cities shall discourage the use of cars, single-passenger taxis, and other oversized vehicles transporting one person.
3. WE SUPPORT THE SHARED AND EFFICIENT USE OF VEHICLES, LANES, CURBS, AND LAND. Transportation and land use planning and policies should minimize the street and parking space used per person and maximize the use of each vehicle. We discourage overbuilding and oversized vehicles and infrastructure, as well as the oversupply of parking.

4. WE ENGAGE WITH STAKEHOLDERS. Residents, workers, businesses, and other stakeholders may feel direct impacts on their lives, their investments and their economic livelihoods by the unfolding transition to shared, zero-emission, and ultimately autonomous vehicles. We commit to actively engage these groups in the decision-making process and support them as we move through this transition.

5. WE PROMOTE EQUITY. Physical, digital, and financial access to shared transport services are valuable public goods and need thoughtful design to ensure use is possible and affordable by all ages, genders, incomes, and abilities.

6. WE LEAD THE TRANSITION TOWARDS A ZERO-EMISSION FUTURE AND RENEWABLE ENERGY. Public transportation and shared-use fleets will accelerate the transition to zero-emission vehicles. Electric vehicles shall ultimately be powered by renewable energy to maximize climate and air quality benefits.
7. WE SUPPORT FAIR USER FEES ACROSS ALL MODES.
Every vehicle and mode should pay their fair share for road use, congestion, pollution, and use of curb space. The fair share shall take the operating, maintenance and social costs into account.

8. WE AIM FOR PUBLIC BENEFITS VIA OPEN DATA.
The data infrastructure underpinning shared transport services must enable interoperability, competition and innovation, while ensuring privacy, security, and accountability.

9. WE WORK TOWARDS INTEGRATION AND SEAMLESS CONNECTIVITY.
All transportation services should be integrated and thoughtfully planned across operators, geographies, and complementary modes. Seamless trips should be facilitated via physical connections, interoperable payments, and combined information. Every opportunity should be taken to enhance connectivity of people and vehicles to wireless networks.

10. WE SUPPORT THAT AUTONOMOUS VEHICLES (AVS) IN DENSE URBAN AREAS SHOULD BE OPERATED ONLY IN SHARED FLEETS.
Due to the transformational potential of autonomous vehicle technology, it is critical that all AVs are part of shared fleets, well-regulated, and zero emission. Shared fleets can provide more affordable access to all, maximize public safety and emissions benefits, ensure that maintenance and software upgrades are managed by professionals, and actualize the promise of reductions in vehicles, parking, and congestion, in line with broader policy trends to reduce the use of personal cars in dense urban areas.

Link

Shared Mobility Principles Website
### Resource Name

- A Survey of Ridehailing Passengers in Metro Boston (Report)
- Share of Choices: Further Evidence of the Ridehailing Effect in Metro Boston and Massachusetts (Research Brief)

### Sponsor Organization

Metropolitan Area Planning Council

### Overview

*Note: The following text was extracted from the Executive Summary section of the website.*

The ride-hailing industry, led by Uber and Lyft, has seen explosive growth in recent years. As more and more travelers choose these on-demand mobility services, they have the potential to transform regional travel patterns. These transformations may become even more profound if widespread adoption of autonomous vehicles makes on-demand mobility even less expensive and more efficient. Either way, it is likely that the use of ride-hailing today is but the tip of the iceberg, with an even greater expansion of these services to come.

This transformation in personal mobility is likely to bring a host of changes: some positive, others less so. For public agencies, planning for that transformation is made difficult by the paucity of information about ride-hailing trips. Conventional transportation surveys have been slow to measure the change in behavior; and transportation network companies see their data as a valuable commodity and are unwilling to provide it to transportation planners.

Public sector access to these data is essential. Only with a better understanding of this new mode of transportation can analysts develop better forecasts of travel behavior and infrastructure needs, measure the region’s progress toward a more sustainable future, and establish more efficient operations and management practices for existing roadways.
In an effort to begin filling those gaps in our understanding of the ride-hailing industry and its users, MAPC surveyed nearly 1,000 ride-hailing passengers in late 2017 and asked about their demographics, the nature of their trip, and why they chose ride-hailing over other modes of transportation.

The results confirmed many common assumptions about ride-hailing users; they also provided striking new insight into the ways that the services are changing travel behavior and affecting our existing transportation system. Not surprisingly, the survey found that most ride-hailing users are under the age of 35, that most of them use the service on a weekly basis, and that most don’t own a car. Less predictably, we found that reported rider incomes are similar to the region overall, and a substantial number of trips are made by people from households earning less than $38,000 per year. (And no, they’re not all students; most of those lower-income riders are in the workforce.)

The survey results also provide some hard data about the types of trips made via ride-hailing. Most trips start or end at home, but nearly one-third (31%) are from one non-home location to another. Ride-hailing usage is distributed throughout the day; the evening hours from 7:00 P.M. to midnight see the greatest frequency of trips, but about 40% of weekday trips take place during the morning or afternoon commute periods. People also like to travel by themselves: only one-fifth of customers opt for a truly shared ride (e.g., UberPOOL), and the majority of travel is for a single passenger. Riders are willing to pay a substantial premium for the convenience and predictability of ride-hailing. Nearly two thirds of trips cost more than $10, and one in five costs more than $20.

While the services are justifiably popular, their growing use may result in negative outcomes for traffic congestion, transit use, and active transportation. When asked how they would have made their current trip if ride-hailing hadn’t been an option, 12% said they would have walked or biked, and over two-fifths (42%) of respondents said they would have otherwise taken transit. Some of this “transit substitution” takes place during rush hours. Indeed, we estimate that 12% of all ride-hailing trips are substituting for a transit trip during the morning or afternoon commute periods; an additional 3% of riders during these times would have otherwise walked or biked. Overall, 15% of ride-hailing trips are adding cars to the region’s roadways during the morning or afternoon rush hours.

Notably, we found that this “transit substitution” is more frequent among riders with a weekly or monthly transit pass. Those who ride transit more often are more likely to drop it for ride-hailing, even while doing so at a huge cost differential, and even when they have already paid for the transit.
Riders without a transit pass opting for ride-hailing, on the other hand, means less fare revenue for the MBTA. After accounting for transit pass availability and substitution options, we estimate that the average ride-hailing trip represents 35 cents of lost fare revenue for the MBTA. This lost revenue exceeds the amount of the legislatively mandated 20 cent surcharge on each ride. That surcharge itself represents a remarkably small fraction of trip costs. When compared to reported fares, the surcharge amounts to less than 2% of the cost for most rides. Because it is a fixed fee, long and expensive rides that may have the greatest impact on traffic congestion and air quality pay 1% or less.

These findings begin to provide a better understanding of this evolving mobility option that will undoubtedly continue to change the way people travel around the region. Our results raise concerns about how users are becoming accustomed to on-demand mobility, and what that means for the future of the region’s transportation system. Even if future ride-hailing vehicles were fully electric and autonomous, the region’s roadways could not accommodate unchecked growth in single-occupant vehicle travel. It is essential to ensure that the region has a reliable and effective transit system that—from the rider’s perspective—is competitive with and complementary to on-demand mobility services. For transit to thrive, it must change, perhaps by incorporating the types of on-demand response and real-time information that riders value.

Meanwhile, there is a great need to understand the effects of ride hailing and to ensure a balance of benefits and costs resulting from these commercial services. Ride hailing is already having substantial impacts on congestion and transit revenue, the costs of which are not recouped by the small surcharge. A higher fee would provide more resources to mitigate the negative effects of ride hailing without substantially affecting rider costs. Even more preferable would be a fee structure proportional to the impacts of each ride on the transportation system. To the extent possible, such fees should also be structured to incentivize shared trips, thereby reducing overall impacts on the transportation system while also accommodating ride-hailing preferences. Of course, effective policy requires better data about when, where, and why ride-hailing trips are taking place. Only by understanding the current adoption of ride-hailing and on-demand mobility can we plan for its successful and sustainable future.

Link
MAPC Website
During the course of research conducted for this document, several timely articles in the national media were identified which addressed various issues and initiatives related to shared use mobility. Most articles highlight recent developments in technology or policy debates which are broadly applicable to the entire industry and all metro areas. Some present an innovative partnership which is in the early launch stages and for which sufficient information was not yet readily available at the time of this report to highlight as a notable practice in the previous section. All are directly relevant to the future of public transportation.

Because of the rapidly evolving nature of shared use mobility, the list below is limited to articles published in 2018. This will help ensure the information remains relevant and useful for as long as possible, even though it is inevitable that most will be considered “old news” within a matter of months.

**HEADLINE:** Patients Can Now Ride-Hail to the Hospital  
**DATE:** March 2, 2018  
**SOURCE:** City Lab

**HEADLINE:** Lyft deal with Allscripts lets 180,000 doctors call rides for their patients  
**DATE:** March 5, 2018  
**SOURCE:** USA Today

**HEADLINE:** Lyft is testing a Netflix-style monthly subscription plan  
**DATE:** March 15, 2018  
**SOURCE:** The Verge

**HEADLINE:** Coming soon to the Uber app: bikes, rental cars, and public transportation  
**DATE:** April 11, 2018  
**SOURCE:** The Verge
RESOURCES > Other Recent Articles of Interest

HEADLINE: Three contracts awarded to firm to design MicroTransit service
DATE: April 26, 2018
SOURCE: The Source (LA Metro Blog)

HEADLINE: Transit app now aggregates available electric scooters in 4 cities
DATE: April 27, 2018
SOURCE: Smart Cities Dive

HEADLINE: New Mobility Survey Finds Over 1/3 of Americans are Combining Public Transit with Ridesharing
DATE: May 8, 2018
SOURCE: Masabi

HEADLINE: DART’s ‘Go’ services reimagining public transit
DATE: May 24, 2018
SOURCE: Metro Magazine

HEADLINE: BMW’s ReachNow partners with apartment building to offer dedicated fleet of car-sharing vehicles
DATE: June 5, 2018
SOURCE: GeekWire

HEADLINE: Lyft redesigns app to highlight shared rides and public transit
DATE: June 7, 2018
SOURCE: engadget
HEADLINE: As scooters, bikes, and transit startups flood the streets, cities need to control the curb
DATE: June 13, 2018
SOURCE: Curbed

HEADLINE: Uber is experimenting with letting riders wait longer in exchange for cheaper fares
DATE: June 18, 2018
SOURCE: Quartz Media
CLOSING THOUGHTS
Closing Thoughts for FTA Region IV Consideration

This report concludes with a brief list of potential future actions which the leadership of FTA Region IV could pursue based on the research findings. Some could be initiated internally and require no coordination with or approval by FTA Headquarters, while others would need to be officially advanced and vetted with USDOT Headquarters in some manner.

All suggestions are solely those of the author and do not constitute the position or express the intent of FTA or USDOT.

Procedural Next Steps

- Coordinate with detailee to conduct a series of voluntary “lunch and learn” sessions with FTA staff and others to discuss selected shared mobility concepts of greater interest in more detail.

- Share the full document as a non-policy resource with other FTA regional offices, FHWA, MPOs, state DOTs and other partner transportation agencies.

- Technology is evolving rapidly and MTPs are updated regularly, so the contents of this report will rapidly become dated. Explore opportunities through ARC or the Association of Metropolitan Planning Organizations (AMPO) to assume ownership of the document to maintain it and continue to improve the content and applicability to partner agencies. Another option is to have a future FTA intern or detailee conduct regular internet scans (every six months or annually) to identify new plans which have been developed compared to the ones reviewed during this inaugural scan.

Longer Term Considerations

- Discuss establishing common definitions for keyword terms from this report with FTA Administration and other USDOT functional areas. This will help USDOT, MPOs, state DOTs, local providers and other agencies use common terminology in their plans and work programs to minimize confusion among practitioners, the public and elected officials.

- Use this document during quadrennial MPO certification reviews to provide examples of how other regions have addressed these emerging topics in their planning documents and work programs.

- Locating and downloading MTP documents required a surprising amount of time and investigative skill, especially in determining what constituted the final “public facing” document. MTPs should be made accessible from a central online national library to facilitate future similar research by other MPO staff, federal agency staff or other interested agencies.