BEST PRACTICES IN FREIGHT PLANNING

CENTRAL MIDLANDS REGIONAL FREIGHT MOBILITY PLAN

DRAFT

NOVEMBER 2017

www.CentralMidlandsFreightMobility.org
Table of Contents

1. Introduction ............................................................................................................................................. 1
   1.1 Best Practices in Freight Mobility, Efficiency, Safety and Technology ............................................ 1
       1.1.1 Freight Planning Guidance .............................................................................................................. 1

2. Freight Mobility Best Practices .............................................................................................................. 7
   2.1 Peer Review of National Freight Mobility Plan “Best Practices” Models ........................................... 7
       2.1.1 Savannah Coastal Region MPO Freight Study ................................................................................. 7
       2.1.2 Nashville Regional Freight and Goods Movement Study ............................................................... 9
       2.1.3 Conclusions .................................................................................................................................... 10

3. Freight Technology Trends and Applications ....................................................................................... 13
   3.1 Future Technology Trends and Applications ....................................................................................... 13
       3.1.1 Modal Technology Trends and Applications .................................................................................. 13
       3.1.2 Potential Applications for CMCOG Freight Plan and Region ....................................................... 17

4. Freight Partnerships ................................................................................................................................. 19
   4.1 Best Practices and Opportunities for Public and Private Partnerships ............................................. 19
       4.1.1 Truck Parking (MAASTO) .............................................................................................................. 19
       4.1.2 Truck Parking Electrification ......................................................................................................... 20
       4.1.3 Truck Platooning .............................................................................................................................. 20

List of Tables

Table 1.1: FAST Act Freight Planning Goals ................................................................................................. 2
Table 1.2: National Freight Strategic Plan Strategies for Addressing Freight Bottlenecks ....................... 3
Table 1.3: SCDOT State Freight Plan Goals ................................................................................................ 4
Table 1.4: South Carolina State Freight Plan Policy Recommendations ................................................... 5
Table 3.1: Potential CMCOG Freight Technology Initiatives ................................................................... 18

List of Figures

Figure 3.1: TPIMS Planned Deployment Corridors ................................................................................... 14
Figure 3.2: Truck Platooning Corridor Operations .................................................................................. 16
This page is intentionally blank.
1. Introduction

1.1 BEST PRACTICES IN FREIGHT MOBILITY, EFFICIENCY, SAFETY AND TECHNOLOGY

In recent years, freight planning has become a required element of the transportation planning conducted by states, metropolitan areas, and local governments. Recent legislation – notably the Fixing America’s Surface Transportation (FAST Act) – placed significant emphasis on sound freight planning at the state and regional levels as a way to strengthen economic competitiveness, reduce congestion, improve safety, and reduce the environmental impact of freight movement. States and regions are also increasingly aware of the impact efficient freight transportation can have on economic development outcomes.

This technical memorandum provides a brief overview of freight planning best practices the CMCOG region can use to promote better freight mobility, improve safety, and meet other regional goals. Freight planning best practices can be thought of as innovative techniques that promote efficient goods movement while also optimizing mobility for all users. More specifically, this memo serves as a guidance document to help CMCOG and its partners identify and implement freight projects or policies that are appropriate given the goals and constraints of the Central Midlands region. Specific examples of techniques used successfully in other regions are included, along with technological trends impacting goods movement and potential opportunities for public-private partnerships (P3).

This document provides a best practices foundation for the CMCOG Freight Plan, including recent federal and state freight planning guidance, to ensure that the CMCOG plan is consistent with state and federal freight goals. It also provides an overview of emerging logistics and technology trends that can be used by local planners when evaluating options for freight improvements, and whether there is an opportunity for CMCOG to become involved. Finally, it provides best practice examples from other regions that CMCOG planners may wish to explore and adapt for the Central Midlands region.

1.1.1 FREIGHT PLANNING GUIDANCE

Recent federal transportation legislation, as well as South Carolina’s freight planning efforts, provide important guidance and context for CMCOG’s freight planning efforts.

1.1.1.1 National Guidance

In December 2015, President Obama signed the FAST Act into law. It was the first long-term federal surface transportation spending bill enacted in more than a decade. The FAST Act is a five year, $305 billion bill that reauthorized key federal transportation programs and, for the first time ever, provided a dedicated source of federal funding for freight projects. The legislation established a National Multimodal Freight Policy aimed at maintaining and improving the

---

1 The previous authorization, Moving Ahead for Progress in the 21st Century (MAP-21), was a two-year bill.
condition and performance of the national freight transportation system. It also specified nine key goals to achieve the policy, which are shown in Table 1.1.

### Table 1.1: FAST Act Freight Planning Goals

<table>
<thead>
<tr>
<th>Goal</th>
<th>Details</th>
</tr>
</thead>
</table>
| Economic Competitiveness      | • To strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States  
• To increase productivity, particularly for domestic industries and businesses that create high-value jobs |
| Freight Mobility               | • To improve the reliability of freight transportation  
• To improve the short- and long-distance movement of goods that: Travel across rural areas between population centers; Travel between rural areas and population centers; Travel from the Nation’s ports, airports, and gateways to the National Multimodal Freight Network  
• Reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network |
| Safety, Security, and Resiliency | • To improve the safety, security, efficiency, and resiliency of multimodal freight transportation |
| State of Good Repair           | • To achieve and maintain a state of good repair on the National Multimodal Freight Network |
| Advanced Technology            | • To use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network |
| Economic Efficiency            | • To improve the economic efficiency and productivity of the National Multimodal Freight Network |
| Partnerships                   | • To improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity |
| Environmental                  | • To reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network |
| Administrative Efficiency      | • To pursue the goals described in a manner that is not burdensome to State and local governments |

Source: Fixing America’s Surface Transportation Act, Public Law 114-94, Section 70101(b).

The FAST Act also required the USDOT to develop a National Freight Strategic Plan (NFSP) and update it every five years. The draft NFSP was released for public comment in October of 2015; USDOT is currently addressing comments on the draft and updating it in light of the FAST Act. The draft NSFP identifies three key types of freight bottlenecks:

- **Infrastructure Bottlenecks** are physical locations (e.g., bridges, urban highway interchanges, border crossing facilities, at-grade railroad crossings, truck gates at ports) where the free flow of goods is disrupted. These bottlenecks can be recurring (e.g., capacity chokepoints that are regularly congested during peak demand hours) or non-recurring (e.g., truck or passenger vehicle crash ‘hotspots’).

- **Institutional Bottlenecks** prevent effective decision-making within transportation institutions, agencies, or organizations. Institutional bottlenecks hinder stakeholders’ abilities to effectively plan, oversee, manage, or invest in the freight transportation system, thereby impeding the safe and efficient movement of goods. These types of bottlenecks are often the result of poorly
coordinated project review processes among different agencies or different freight regulations across jurisdictions, which create goods movement inefficiencies.

- **Financial Bottlenecks** present challenges to making adequate, strategic, and effective investments in the freight transportation system. These bottlenecks often revolve around funding programs that are siloed by mode and the difficulty many freight projects have competing for funds within the traditional federal highway programs.²

The draft NSFP includes a number of best practice strategies for mitigating all three types of bottlenecks, which are shown in Table 1.2.

**Table 1.2: National Freight Strategic Plan Strategies for Addressing Freight Bottlenecks**

<table>
<thead>
<tr>
<th>Bottleneck Type</th>
<th>Strategies</th>
</tr>
</thead>
</table>
| Infrastructure  | • Reduce congestion to improve performance of the freight transportation system  
• Improve the safety, security, and resilience of the freight transportation system  
• Facilitate intermodal connectivity  
• Identify major trade gateways and multimodal national freight networks/corridors  
• Mitigate impacts of freight projects/movements on communities  
• Support research and promote adoption of new technologies and best practices |
| Institutional    | • Streamline project planning, review, permitting, and approvals  
• Facilitate multijurisdictional, multimodal collaboration, and solutions  
• Improve coordination between public and private sectors  
• Ensure availability of better data and freight transportation models  
• Develop the next generation freight transportation workforce |
| Financial        | • Enhance existing freight funding sources  
• Develop new freight funding sources |


1.1.1.2 State Guidance

The SCDOT State Freight Plan provides the overall strategic vision and policy framework for freight planning in South Carolina. Among other things, it designated a statewide Multimodal Strategic Freight Network to guide freight planning and investment in the state. In the Columbia region, this network includes Interstates 26, 20, and 77; US Highways 76, 601, and 378; all active rail lines; and Columbia Metropolitan Airport.

The plan also developed six key freight goals for the state as shown in Table 1.3. Many of these correspond closely to the FAST Act freight planning goals.

---

² Although the FAST Act’s freight funding provisions are certainly a positive development in terms of implementing freight projects, use of the funds for non-highway modes remains limited and multimodal grants will still be administered by the various USDOT modal administrations.
Table 1.3: SCDOT State Freight Plan Goals

<table>
<thead>
<tr>
<th>Goal</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility and System Reliability</td>
<td>• Provide surface transportation infrastructure and services that will advance the efficient and reliable movement of people and goods throughout the state</td>
</tr>
<tr>
<td>Safety</td>
<td>• Improve the safety and security of the transportation system by implementing transportation improvements that reduce fatalities and serious injuries as well as enabling effective emergency management operations</td>
</tr>
<tr>
<td>Infrastructure Condition</td>
<td>• Maintain surface transportation infrastructure assets in a state of good repair</td>
</tr>
<tr>
<td>Economic and Community Vitality</td>
<td>• Provide an efficient and effective interconnected transportation system that is coordinated with the state and local planning efforts to support thriving communities and South Carolina’s economic competitiveness in global markets</td>
</tr>
<tr>
<td>Environmental</td>
<td>• Be a partner to sustain South Carolina’s natural and cultural resources by minimizing and mitigating the impacts of state transportation improvements</td>
</tr>
<tr>
<td>Equity</td>
<td>• Manage a transportation system that recognizes the diversity of the state and strives to accommodate the mobility needs of all South Carolina citizens</td>
</tr>
</tbody>
</table>

Source: SCDOT State Freight Plan.

For each goal, the plan provides a set of Guiding Principles and implementation strategies to serve as a framework for plan implementation. Freight performance measures are also proposed for several goals for SCDOT’s use in tracking the performance of the freight system and identifying potential projects. Importantly, the plan made sure the selected goals, strategies, and metrics support those of the South Carolina Multimodal Transportation Plan, which is the state’s long-range transportation plan.

The outreach effort for the State Freight Plan also uncovered a need for a fundamental policy shift to sharpen the state’s focus on the role of freight and how goods movement supports the economy. This new approach would recognize the diversity of decision makers – from public agencies to private businesses and transportation providers – that help guide investment in the system. Specifically, the plan recommended three policies and potential strategies, as shown in Table 1.4.

The State Freight Plan further recommended specific investments on strategic freight corridors that traverse Columbia, including I-26 from Charleston to Columbia and I-20 and I-77 through and around Columbia. It will be important for CMGOG to coordinate closely with SCDOT to ensure that appropriate connecting infrastructure is in place as these corridors are further developed for freight.

---

<table>
<thead>
<tr>
<th>Policy</th>
<th>Potential Strategies</th>
</tr>
</thead>
</table>
| Recognize the Multimodal Freight Transportation System | • SCDOT should focus on supporting its rail division to improve coordination and connections between the highway and rail modes  
• SCDOT should maintain a formal liaison with the Port of Charleston to improve communication between the agencies and raise the profile of landside transportation investments that are hindering port growth, while working to minimize the impact of port-related through freight on communities |
| Approach Freight as a Mode                 | • Include freight as a required prioritization category within Act 114*                                                                                                                                                                                                                                                                                   |
| Dedicate a Flexible Funding Source for Freight Projects | • SCDOT should work to create a specific program to fund projects on the strategic freight network, especially given the higher federal funding shares available for freight projects  
• The state should explore potential revenue enhancements identified by the SCDOT Transportation Infrastructure Task Force as a way to fund freight needs |

*Act 114 dramatically changed the structure of SCDOT and its project prioritization methodology, but it did not provide for freight-specific selection criteria other than the inclusion of truck traffic percentages in project selection.
Source: South Carolina Statewide Freight Plan.

Finally, the State Freight Plan further encourages SCDOT to coordinate freight planning efforts going forward with State Rail Plan updates, statewide long range transportation planning efforts, metro area freight plans, and plans for adjacent states. It also encourages collaborative planning throughout the state’s supply chain including SCPA, Palmetto Railways, and other stakeholders.
This page is intentionally blank.
2. Freight Mobility Best Practices

2.1 Peer Review of National Freight Mobility Plan “Best Practices” Models

This section presents a “best practices” review of two freight plans developed by CMCOG peer regions. To identify peer regions for the best practices review, a short list of regional freight plans was developed. Generally, peer regions were selected for having similar attributes to the CMCOG region, in terms of population and economic structure/industry mix. However, larger or smaller regions were also assessed if it was thought they may offer useful best practices. The peer regions selected for initial assessment included Savannah, GA; Nashville, TN; Cheyenne, WY; Indianapolis, IN; and Tampa, FL. The most recent freight planning efforts of each region were briefly reviewed to assess their relevance to the CMCOG region. In particular, plans were evaluated for best practices in the following key areas important for the CMCOG:

- Freight and land use interaction and mitigating conflicts
- Pass through freight/economic value
- Mode shift strategies

Based on these areas of interest, the Nashville and Savannah freight plans were selected for further review. Both regions experience significant volumes of truck through freight. In Savannah’s case, a large share of that freight is generated by a major seaport. The Savannah region is also roughly similar in population to the CMCOG region. Even though the Nashville area is considerably larger than the CMCOG region, it includes a state capital and sits at the intersection of several Interstate highways that carry heavy freight volumes. The Nashville MPO has also done significant work in coordinating freight and land use planning.

2.1.1 Savannah Coastal Region MPO Freight Study

Savannah was chosen due to its similar population to the CMCOG region and the fact that most of the freight affecting the region is through traffic, much of it port-related. The Port of Savannah is a key East Coast gateway for containerized freight. The recent expansion of the Panama Canal coupled with continued population and economic growth in the Southeast region of the country is contributing to unprecedented growth in freight movement in the region. In the five years ending in September 2016, total container throughput at the Port of Savannah grew by 21 percent, to 3.6 million twenty-foot equivalent units (TEU).

---

4 The four-county Central Midlands region has a population of about 725,000 per the CMCOG web page; the population of the Savannah-Hinesville-Statesboro Combined Statistical Area was about 540,000 in 2016 according to the Census Bureau.

5 http://www.gaports.com/Portals/2/Market%20Intelligence/FY16%20Annual%20Container%20Trade.pdf
In response to these trends, the Savannah, GA Coastal Region (CORE) MPO completed a regional freight study in 2015. Goals of the study included developing a road map to enhance freight mobility and economic competitiveness for the region while preserving the area’s unique quality of life. The plan included a multimodal freight volume forecast for the region that was developed by disaggregating data from the USDOT Freight Analysis Framework (FAF) as well as recommended freight performance measures that will allow the MPO to quantify progress toward meeting regional freight goals. The study also included a scan of freight-related land use and zoning in the region with corresponding land use policy recommendations.

The CORE MPO planning area includes all of Chatham County as well as small parts of neighboring Effingham and Bryan Counties. However, during the study it became clear that regional freight patterns and future growth trends necessitated the inclusion of all of Effingham and Bryan Counties in the freight study. This change was made to guarantee a holistic view of regional cargo flows, and to enable a more regional approach to freight planning and policy making.

The CORE MPO Freight Plan included a freight land use assessment which identified existing land uses and zoning in the study area, non-conforming uses, and tracts of vacant or undeveloped land. For the vacant or undeveloped parcels, thresholds were developed to help identify candidates for future freight growth. Land use and zoning district data were gathered for each county and city in the study area and then cross-walked to ensure consistent definitions of what constitutes freight-related land use. Based on this analysis, two key strategies were developed:

- **Encourage re-use and infill of existing freight land uses.** The study found that there are significant undeveloped or vacant lands within existing freight-related land use and zoning districts, particularly around the Port of Savannah, along the Savannah River, in western Chatham County, and along existing major trade corridors such as I-16 and I-95. Most of them are surrounded by other industrial uses (thus minimizing the potential for conflicts). There are also brownfield sites that may be good candidates for redevelopment, if incentives are provided to developers to undertake environmental remediation. The study recommended focusing future industrial development in these existing freight land uses/brownfields, to the extent possible.

- **Encourage greenfield development along freight network corridors.** As the region continues to grow, it is anticipated that development will expand in the outlying areas. To mitigate this and help avoid conflicts, greenfield industrial development should be targeted towards parcels adjacent to or in very close proximity to the freight network. This will minimize negative externalities while ensuring direct access to the multimodal freight network.

The CORE MPO Freight Plan also assessed freight safety and security in the region by mapping the locations of truck-involved crashes over a five-year period to identify the top ten truck safety hot spots. This list was then shown to the local Freight Advisory Committee (FAC) for their input. The FAC identified several additional problematic areas for truck crashes. A key recommendation of the Freight Plan was to encourage that safety improvements to accommodate truck traffic are included for projects on the freight network.
2.1.1.1 Key Takeaways from the Savannah Coastal Region MPO Freight Study

- When planning for growth in freight-related industries and land uses, regions should maximize their existing freight corridors, especially as new development extends to outlying areas.

- MPOs can also inventory existing land uses and zoning districts to identify and preserve suitable locations for infill and brownfield development. This not only minimizes conflicting uses, but also provides advantageous locations for freight generating businesses.

2.1.2 NASHVILLE REGIONAL FREIGHT AND GOODS MOVEMENT STUDY

The Nashville Area MPO recently undertook Phase III of its Regional Freight and Goods Movement Study. The MPO has been studying goods movement in its region intermittently since the early 2000s. Phase III of the study is focused on improving decision makers’ understanding of current and future freight movement and trends; providing a set of strategies, objectives, and actions to improve the flow of freight in the region; and recommending best practices in urban design and coordinated transportation and land use planning for freight. Nashville was chosen as a peer region because it includes best practices aimed at coordinating freight and land use planning, developing a designated truck route network, and mitigating truck freight/land use conflicts. Stakeholders in the CMCOG region have expressed concerns about freight traffic (especially hazardous materials) moving through residential areas. While these moves are not necessarily illegal, residents are understandably concerned about the impact they have on safety and quality of life.

One of the key outcomes of the Nashville study was the designation of a regional truck route network. This network was developed through a five-step process:

1. Planners assessed where trucks are currently encouraged, discouraged, or prohibited from going in the region. This was done by assembling existing city truck route designations as well as truck prohibited facilities.

2. These facilities were overlaid with freight generators and emerging industrial areas. These areas were identified in previous tasks using existing industrial/warehouse land use data and truck trip generation modeling techniques.

3. Manual adjustments were made to the truck network to balance increased connectivity to freight facilities with decreased overlap with conflicting land uses or facilities. Conflicting land uses were defined as schools, parks, hospitals, or any other land use/facility where high volumes of freight traffic was considered undesirable.

4. Feedback was obtained from truck route users (e.g., the trucking industry) and other stakeholders (e.g., local planners and citizens). The MPO made changes to the draft truck network based on feedback from key stakeholders, including network users (shippers, trucking companies) and affected parties (e.g., local residents).

5. The truck route network was finalized after considering all local input and balancing competing needs appropriately.
The philosophy behind this approach is to define and implement a process whereby affected stakeholder groups can identify where the community wishes to encourage, discourage, and prohibit truck traffic in a way that satisfies the needs of all users. Once a regional truck route network is defined, the region can leverage truck-friendly road designs (e.g., thicker pavements/base layers, wider turning radii, wide lanes and shoulders) to further incentivize trucks to use the network. Cities can also overlay the network with other key data such as bicycle/pedestrian facilities, railroad crossings, schools and hospitals, and future land use designations to identify and mitigate potential problems. Cities may choose to update their zoning designations to encourage industrial development around key truck route corridors, and to ensure industrial land is located close to railroad lines to increase opportunities to use rail. Another strategy is to update development regulations to require adequate buffering/screening between freight-intensive uses and other uses, and ensure that development rules include adequate consideration for industrial site access, truck parking and circulation, and both on- and off-street loading zones.

2.1.2.1 Key Takeaways from the Nashville Regional Freight and Goods Movement Study
- A defined regional truck route network can be used in conjunction with street design standards and zoning and development regulations to encourage trucks to travel on appropriate roadways and minimize conflicts.
- A regional body like an MPO or COG can assist member jurisdictions in reviewing their development codes to identify opportunities for better transportation/land use planning coordination where practical.
- Cities and regions can preserve rail corridors in existing industrial areas and make sure future industrial land uses are located near rail lines to ensure adequate rail access in the future and promote mode shift.

2.1.3 Conclusions
Although freight mode choice, scheduling, facility investment, and supply chain planning are mostly private sector endeavors with limited scope for public sector involvement, there are key areas where a regional body like CMCOG can influence the process. One area where CMCOG’s member jurisdictions have significant influence is the land use development process. As shown in the Savannah and Nashville peer reviews, once a region settles on where it wants freight to move, it can focus more effectively on ways to encourage freight-generating development in the most appropriate places. Cities can also use buffering and screening requirements to mitigate unavoidable conflicts.

Equally important is developing a better understanding of key freight corridors and the specific locations along them that generate the most freight. This information can be used to define a regional truck route network, while also taking local truck restrictions and incompatible land uses into account. Ideally, this network will balance goods movement efficiency with the needs and concerns of area residents. Once a freight network is defined, the MPO or COG can work to ensure freight network roads are designed with large vehicles in mind, for instance by providing for wide turning radii and avoiding the use of roundabouts.
It is critical to gather input from key stakeholders when developing regional freight goals and strategies. This effort should include residents and neighborhoods affected by freight movement, local governments within the region, economic development organizations, and businesses that use the region’s freight infrastructure. For example, the Nashville plan involved a series of interviews with stakeholders including area chambers of commerce, city governments within the MPO region, local economic and community development agencies, and the Tennessee Valley Authority. These interviews provided insight into emerging industrial locations, freight-related land use issues, truck congestion and safety hotspots, and regional truck route issues.

Freight safety and security is another key issue to consider when planning for goods movement. This should be done not only through statistical analysis and mapping of accident data, but also through outreach to logistics firms, shippers, and carriers. This can often be done via a regional Freight Advisory Committee, or through targeted interviews.
3. Freight Technology Trends and Applications

3.1 Future Technology Trends and Applications

This section briefly reviews current trends and best practices in freight technology and Intelligent Transportation Systems (ITS). Technology applications offer opportunities to better understand the freight transportation system, how it operates, and make it more efficient. Both public and private sector technologies are presented. Truck-related technologies form the bulk of the discussion given the importance of trucks in moving freight to, from, and through the region (and their use of public highway infrastructure), however rail trends and best practices are assessed where applicable.

It is important to note that some of these technologies or systems represent private sector opportunities or responsibilities, while others align more under the traditional public sector role.

3.1.1 Modal Technology Trends and Applications

As noted in the draft NFSP, the freight industry is on the cusp of a technological revolution driven by innovations in communication and information technologies. Firms are increasingly using the Internet of Things (IoT), big data applications, automatic vehicle and container identification systems, and satellite navigation systems to find new supply chain efficiencies and drive down costs. Public agencies, for their part, are seeking ways to partner with freight stakeholders to effectively plan for growth, safety and mitigate community concerns. Some key recent developments affecting goods movement and supply chains are discussed below.

3.1.1.1 Improving Freight Throughput and Efficiency

Much of the private sector effort in goods movement technology is centered around improving the efficiency of the supply chain, however there are opportunities for government involvement in key areas as shown below.

- **Truck parking information.** Truckers are required by federal regulations to stop for rest at defined intervals. However, in some regions the supply of safe, truck-friendly parking areas is severely limited, forcing truckers to park in unsafe (and sometimes illegal) places to comply with the regulations. The issue garnered national attention in 2009 when truck driver Jason Rivenburg was murdered in South Carolina after stopping to rest at an abandoned gas station. In response, Congress passed “Jason’s Law” in 2012, prioritizing funding to provide commercial truck parking areas and requiring the USDOT to conduct a survey of truck parking availability by state. Some agencies are undertaking efforts to mitigate truck parking shortages through technology. One innovative project in this area is the Mid-America Association of State Transportation

---

Officials (MAASTO) Truck Parking Information and Management System (TPIMS). This system, which is being funded through a federal TIGER grant and state matching funds, will monitor truck parking availability and provide real-time information to drivers in eight Midwestern states. Information will be delivered by dynamic signs, smart phone apps, and traveler information websites. MAASTO expects full deployment by September 2018. The planned deployment corridors are shown in Figure 3.1.

**Figure 3.1: TPIMS Planned Deployment Corridors**

Source: MAASTO Regional Truck Parking: TPIMS Executive Summary.

- **Intelligent Transportation Systems (ITS) and 511 systems.** Many states and metro regions have developed ITS or 511 systems to provide current traffic and travel information for travelers. In South Carolina, SCDOT maintains a statewide 511 system and an accompanying mobile app. These systems integrate multiple data streams including live traffic cameras, traffic and congestion information, incident reports, road construction, emergency information, and special event information on a single web-based platform. Regional ITS are typically not freight-focused, however they can offer relevant information for freight users. For instance, Houston’s TranStar system offers users the ability to build custom routes, view current/historical traffic and travel times, and set up custom alerts when conditions change. This could be useful for truck drivers that frequently travel the same routes in a region. TranStar also offers a ‘Rail Monitor’ function which provides information on blocked grade crossings. One limitation of regional ITS is that alerts and other information are usually metro area focused for commuters;

---

7 [http://www.maasto.net/TPIMS.html](http://www.maasto.net/TPIMS.html)
8 [http://www.511sc.org/](http://www.511sc.org/)
truckers however often travel up to 500 miles in a day, so they would need to receive notifications well in advance in order to make an informed routing decision.

- **Statewide Freight-Specific ITS.** Some states have also implemented pilot projects aimed at providing freight-specific traveler information. For example, the Wyoming DOT (WYDOT) has developed a Commercial Vehicle Operator Portal (CVOP), which is a free service providing truck operators with road and travel information including customized weather forecasts that predict wind, visibility, and surface conditions on the three Interstates located in Wyoming (I-25, I-80, and I-90), as well as other key truck routes.\(^\text{10}\) Wind speeds were found to be important to the trucking community due to the high risk of tractor-trailer blow-overs in Wyoming. Such information allows truck operators to make more informed routing and scheduling decisions. Wyoming also recently won a USDOT grant to deploy a pilot project that will use vehicle to infrastructure (V2I) and vehicle to vehicle (V2V) technology to improve safety and mobility on the I-80 corridor. The applications will include Freight-Specific Dynamic Travel Planning and Road Weather Advisories and Warnings for Motorists and Freight Carriers, among others.

- **Autonomous trucks and truck platooning.**\(^\text{11}\) Although much of the public discussion surrounding autonomous vehicles (AV) technologies revolves around passenger vehicles, many experts agree that the commercial trucking industry is likely to be the first widespread adopter of AV. This is due to industry economics. Commercial trucking is a fragmented, hyper-competitive industry with low margins, so any technology that offers the potential to cut costs tends to be quickly embraced. Autonomous truck and platooning technologies may partially or fully automate the driving task, thereby saving trucking companies a significant labor cost while also improving safety and saving fuel. Autonomous trucks could also expand industry capacity, as a robotic driver does not require rest. Otto, an autonomous truck startup that was recently purchased by Uber, recently completed a 120-mile beer delivery from Fort Collins, CO to Colorado Springs without human intervention.\(^\text{12}\) In the platooning realm, Peloton Technologies has developed a system that allows two or more trucks to connect wirelessly through V2V technologies such that the following truck(s) mirror what the lead truck does, while still providing flexibility for the driver to take over when needed.\(^\text{13}\) Platooning can lead to significant fuel savings by reducing aerodynamic drag. Figure 3.2 illustrates truck operations on a highway without and with platooning. The City of Columbus, OH is using part of its USDOT Smart Cities Challenge grant to develop and test a truck platooning system.

\(^\text{10}\) https://apps.wyoroad.info/cvop/

\(^\text{11}\) Truck platooning refers to technologies that wirelessly connect several trucks so that they can closely follow one another on the highway, achieving fuel savings and operational benefits. The lead truck has a driver, although it can potentially be operating in a semi-autonomous mode; following trucks typically have a driver controlling the steering while giving over acceleration and braking to an automated system.

\(^\text{12}\) http://ot.to

\(^\text{13}\) http://peloton-tech.com/
Figure 3.2: Truck Platooning Corridor Operations

Source: Smart Columbus Truck Platooning Working Group, presentation delivered December 16, 2016.

- **Logistics Management Systems.** Shippers, carriers, and third party logistics providers (3PLs) are increasingly using sophisticated logistics management systems to model and analyze their supply chains, monitor their fleets, manage workflows, and communicate with drivers. These systems provide the ability to analyze freight routes, travel times, infrastructure capacity, and inventory levels/location, often in real-time or near real-time. This is enabling just in time ‘pull’ supply chain planning where inventory and supply inputs arrive only when needed and freight vehicles effectively become mobile warehouses. This reduces inventory carrying costs and allows for improved situational awareness and decentralized access to supply chain information.14

- **Positive Train Control.** Positive train control (PTC) refers to technologies designed to automatically stop or slow a train before certain accidents occur. PTC is designed to prevent collisions between trains and derailments caused by excessive speed, trains operating beyond their limits of authority, incursions by trains on tracks under repair, and by trains moving over switches left in the wrong position. The Rail Safety Improvement Act of 2008 required railroads to place PTC systems in service by December 31, 2015 on all rail main lines over which regularly-scheduled commuter or intercity passenger trains operate, and on all Class I railroad main lines with over 5 million gross ton-miles per mile annually over which any amount of toxic/poison-by-inhalation hazardous materials are handled. In late 2015, Congress extended the PTC implementation deadline to December 31, 2018. Although they do not provide details of PTC implementation in South Carolina, Norfolk Southern and CSX both report they are making progress to implement PTC on their networks as quickly as possible.15,16

3.1.1.2 **Regulatory**

One key public sector role in freight movement is the enforcement of truck size and weight, hazardous materials, and safety regulations. In South Carolina, this is the responsibility of the State Transport Police, a division of the Department of Public Safety. However, SCDOT issues permits for the movement of oversize/overweight (OS/OW) loads.17 Some states are using Virtual Weigh Stations (VWS) to

---

14 Examples of these systems include Omnitracs (www.omnitracs.com) and Quetica (http://quetica.com); there are many others.
17 http://www.scdot.org/doing/permits_OSOW.aspx
remotely monitor truck traffic at key strategic locations. Others have developed systems that allow for mostly automated OS/OW permitting and/or routing decisions.

- **Virtual Weigh Stations.** VWS are sites equipped with weigh-in-motion (WIM) and truck identification systems that can provide real-time data streams for use in commercial vehicle enforcement and traffic surveillance. Typically, WIM scales are combined with optical character recognition technology that identifies a truck’s license plate and/or DOT numbers. These data are then provided to enforcement personnel using a laptop, mobile device, or desktop computer. The goal is to provide a means to focus limited enforcement resources on trucks that are likely to be overweight, rather than stopping and weighing every truck. VWS can also be used to monitor trucks on known weigh station bypass routes. Since the data can be transmitted over a wireless or cellular network, officers in the field or at a fixed enforcement site can monitor the VWS remotely and dispatch enforcement resources as needed. South Carolina does not appear to have any VWS at this time, although SCDOT has installed WIM scales in the past. The FHWA has developed a Concept of Operations (ConOps) for VWS that provides best practice information for setting up such a system.\(^{18}\) Examples of commercially available VWS include International Road Dynamics\(^{19}\) and Intelligent Imaging Systems.\(^{20}\)

- **Automated OS/OW routing and permitting.** Many states including South Carolina maintain OS/OW web portals that allow for some level of automation in OS/OW routing and permitting. These systems are usually built around commercial software packages that allow commercial vehicle operators to log in, enter shipment details, and self-issue a permit for loads that fall within certain parameters. This improves convenience and customer service for trucking companies while freeing up agency staff time to focus on ‘superloads’, which nearly always require some level of manual intervention. Advanced capabilities include multi-state permit issuance and bridge load/clearance analysis. SCDOT maintains an Automated Routing and Permitting System (ARPS) which allows carriers to obtain permits and generate routes through an online portal.\(^{21}\)

### 3.1.2 Potential Applications for CMCOG Freight Plan and Region

As shown above, freight technology is wide-ranging and evolving rapidly. However, a regional body like CMCOG may not wish to involve itself in all these areas. For example, while the shipment, routing, and commodity data leveraged by logistics management systems would be invaluable for planners, it is often proprietary and therefore unavailable to public agencies. Similarly, PTC implementation is being undertaken by the railroads in coordination with the Federal Railroad Administration. Nonetheless, CMCOG can work with its partners to advance strategic technology applications when a common goal can be achieved.

Freight safety and security is an important issue in South Carolina and in the CMCOG region. Although detailed truck-involved accident statistics are not available for the CMCOG region specifically, some counties in the region experience relatively high numbers of traffic collisions generally, including those

---


\(^{21}\) [https://www.scdot-scarps.org/](https://www.scdot-scarps.org/)
involving heavy vehicles. Certain shippers in the region also produce significant hazmat shipments which have special safety considerations.

There are some ITS solutions that can help mitigate freight safety issues. CMCOG has adopted the South Carolina DOT’s Statewide ITS Architecture as the ITS Architecture for the COATS MPO. The COATS 2040 Long Range Transportation Plan highlights several safety-related ITS and operations strategies including Dynamic Message Signs to suggest alternate routing in the event of an incident on the regional Interstate system and deployment of an Advanced Traffic Management System. CMCOG should continue to support these efforts in partnership with SCDOT, and deployments should coordinate closely with other resources such as the State Highway Emergency Program (SHEP) Columbia patrol zone, which provides incident management services in the area. From a freight standpoint, it may be beneficial to provide advance warning of incidents in the CMCOG region to truckers who may be outside of the region, to give them time to adjust their route if necessary. Likewise, a truck parking information system may help improve safety for both truck drivers and other motorists. As implementations move forward, CMCOG should look for opportunities to involve key freight and hazmat stakeholders in the region, determine their needs, and develop solutions to meet those needs. Overall the goal should be to balance safety and security needs with promoting efficient commerce.

Table 3.1 summarizes key technology initiatives that CMCOG may want to explore further. This list is neither exhaustive nor prescriptive; it is merely meant to generate ideas and spur discussion.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Potential Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight-focused ITS</td>
<td>• Consider developing a freight-focused traveler information portal</td>
</tr>
<tr>
<td></td>
<td>• CMCOG could work with SCDOT to leverage the state’s 511 system, work zone ITS, and incident management resources</td>
</tr>
<tr>
<td>Truck Parking</td>
<td>• Engage SCDOT and potentially neighboring states to develop and deploy a regional truck parking system</td>
</tr>
<tr>
<td></td>
<td>• Communicate truck parking availability via Dynamic Message Signs, Highway Advisory Radio, and mobile devices</td>
</tr>
<tr>
<td>Autonomous Trucks and Truck Platooning</td>
<td>• Monitor the development of this technology and look for opportunities to participate in pilot tests, for example with port-driven truck freight using I-26*</td>
</tr>
<tr>
<td>Virtual Weigh Stations</td>
<td>• Work with SCDOT to evaluate the regional/state highway system for potential VWS sites</td>
</tr>
</tbody>
</table>

*Note that South Carolina has not yet introduced or passed legislation regarding autonomous vehicles.
4. Freight Partnerships

4.1 BEST PRACTICES AND OPPORTUNITIES FOR PUBLIC AND PRIVATE PARTNERSHIPS

Although the physical movement of goods is largely a private sector activity, it often makes use of public infrastructure (e.g., highways) and/or private infrastructure that intersects frequently with public road networks (e.g., freight railroads). Moreover, private sector decisions about mode choice, shipment and delivery windows, and freight facility siting have important implications for public health, safety, and welfare. This intersection of public and private interests provides opportunities for public-private partnerships (P3). P3 can be most broadly thought of as a cooperative arrangement between the public and private sectors to achieve some common goal or set of goals. Typically, the idea is to provide a public good more quickly and at lower cost than an agency could on its own, while earning some type of return or benefit for the private partner. This section identifies some best practices in freight P3s that could be implemented in the CMCOG region.

Three best practice examples of freight P3s are provided below with potential opportunities for CMCOG to pursue partnerships with local and regional stakeholders.

4.1.1 TRUCK PARKING (MAASTO)

As noted in Section 3.1.1.1, the Mid America Association of State Transportation Officials (MAASTO) is implementing a multi-state truck parking information management system (TPIMS) in eight Midwestern states. Michigan, Ohio, Kentucky, and Iowa are all including private truck stops in the effort to better meet their truck parking needs. TPIMS will provide real time parking availability information at these facilities as well as public ones so truckers can make more informed decisions about when and where to stop for rest. This is expected to reduce emissions, improve safety, reduce infrastructure maintenance costs due to illegal parking on shoulders and ramps, and promote more efficient movement of freight while freeing up law enforcement officers to focus on higher value targets rather than enforcing illegal parking. Data generated by the project will also provide parking facility owners with better intelligence regarding the magnitude and timing of demand on their facilities.

CMCOG may wish to assess truck parking on the key Interstate corridors leading into the city, perhaps including other states given the distances typically traveled by commercial vehicles. A logical place to start would be to inventory existing truck parking along I-20, I-26, and I-77, both public and private. Private truck stops could then be engaged to assess whether there are opportunities to improve truck parking information, for example by distributing location and/or availability information through the SCDOT 511 system.
4.1.2 Truck Parking Electrification

Truck parking electrification projects provide truck drivers with necessary services such as heating, ventilation, air conditioning, and electricity while they are stopped at a private rest area without requiring them to idle their engines. This reduces harmful diesel emissions while saving fuel. Although the facilities and electrification equipment (both in and outside the truck) are typically owned by the private sector, there are grant opportunities available to finance some of the costs.

According to the Department of Energy’s Alternative Fuels Data Center, there are only three electrified truck stops in South Carolina, none of which are in the Columbia region. CMCOG may wish to pursue such a project if it can identify a regional truck stop that wants to participate.

4.1.3 Truck Platooning

Truck platooning may offer efficiency and emissions improvements, particularly for long-haul through trucks operating in the CMCOG region. Peloton Technology, for instance, has demonstrated fuel savings of up to 4.5 percent for the lead truck and 10 percent for the following truck in a two-truck platoon operating at highway speeds. Peloton’s system establishes a wireless vehicle to vehicle (V2V) link between two or more trucks equipped with radar-based forward collision avoidance systems, thereby synchronizing each following truck’s acceleration and braking functions with those of the lead truck. This permits safe following at distances as close as 30 feet, reducing drag and saving fuel.

Peloton is currently partnering with the USDOT and the City of Columbus, Ohio to demonstrate truck platooning as part of the Columbus Smart Cities program. The demonstration will enable up to ten participating trucks from fleets operating in the region to platoon on area limited access freeways. This will be combined with Freight Signal Priority technology on key freight arterials, which will adjust signal phase timing so that trucks intending to platoon can reach the freeway relatively uninterrupted and together to begin the platooning operation. (Note that Freight Signal Priority can be deployed independently of truck platooning, provided the participating trucks have the proper communications equipment installed).

It is not clear whether current South Carolina law would permit such a demonstration (many states have minimum following distance laws that would preclude a platoon test, and in any case South Carolina has not yet passed any laws regarding autonomous vehicles). However, CMCOG may want to become engaged in any discussions in the state about such technologies going forward. This could potentially involve SCDOT, major research universities and institutions, and ITS industry associations. Such engagement will position CMCOG to participate in any potential future tests or deployments.

---


23 Columbus received a $40 million USDOT Smart Cities Challenge Grant in 2016. Part of its program involves truck platooning.