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FULTON INDUSTRIAL BOULEVARD IMPROVEMENT DISTRICT

# FREIGHT CLUSTER PLAN

## Best Practices Review

FULTON INDUSTRIAL BOULEVARD IMPROVEMENT DISTRICT

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# INTRODUCTION

The Boulevard Community Improvement District (CID) is undertaking a Freight Cluster Plan (FCP) to understand how the CID's transportation infrastructure is being used for the handling of freight. The purpose of the FCP is to address transportation planning, traffic operations, and related planning needs, and to identify and recommend projects and policy changes to address those needs. This technical memorandum provides a review of examples of freight planning efforts at the subregional level that have taken place across country. These studies will potentially provide insights and ideas that are useful to the Boulevard CID and the Metro Atlanta region as a whole.

The objective of the Best Practices Review is to examine existing notable practices in freight planning projects, literature, and data sets; assess the degree to which data, tools and processes in these efforts are available and meet the technical needs of this study; and recommend additional data collection and analysis to support subsequent tasks. The review covers topics including local freight planning methods, technology and transportation innovations that impact freight transportation, land use, and supply chain and logistics innovations that impact the transportation system. While the review features a more focused discussion on local freight planning methods and land use best practices, the discussion on innovative technologies and supply chain practices is woven throughout the document. A brief overview of technology applications is included in the review, but a more focused discussion on technology and transportation innovations (including logistics and supply chains) will be included in Task 4 (Inventory and Assessment) as part of the assessment of emerging freight trends.

The remainder of the document following this introduction, is organized into three sections. Section 2 provides an overview of the Boulevard CID as well as some of the key challenges faced by freight clusters. Section 3 presents a series of useful examples of freight planning at the freight cluster level. Using the information presented in section 3, section 4 identifies lessons-learned and best practices that may be applied to the Boulevard CID FCP and to future freight cluster planning initiatives.

# FREIGHT IN THE BOULEVARD CID

The Boulevard CID is the largest industrial and business complex in the Atlanta region. It is a major contributor to the Atlanta regional economy and home to many of the major industrial and freight-intensive businesses that help create economic wealth for the region and jobs for thousands of residents. This was reflected in the Atlanta Regional Commission's 2016 Regional Freight Plan Update which identified the Boulevard CID as one of the region's major freight clusters.

Though it did not focus specifically on freight, the CID's 2013 Master Plan did make note of challenges faced by the CID as it pertains to freight. For instance, the 2013 Master Plan observed that changing economic conditions, shifts in global and regional manufacturing and distribution trends, and intensified competition had taken a toll on the preeminence of the Fulton Industrial area and its competitiveness for attracting industrial businesses. It also noted that two of the CID's main corridors, SR 70/Fulton Industrial Blvd. and SR 6/Camp Creek Pkwy., were characterized by high truck volumes with traffic projections indicating that those volumes would substantially increase over the long-term. The Master Plan also observed that those corridors had relatively high crash rates and experienced damage to medians, curbs, pavement, and other roadway components due to the prevalence of truck traffic.

In performing a review of best practices in freight planning, particularly at the cluster or sub-regional level, emphasis was placed on several common key challenges experienced by freight clusters. These include:

- **Truck Parking and Staging.** Truck parking challenges in freight clusters are typically driven by both long-term parking and short-term staging needs. Metro Atlanta has insufficient truck parking capacity for the volume of freight traffic originating in, destined for, and passing through the region. As a result, long-haul trucks making a pick-up or delivery in Metro Atlanta must find overnight parking at facilities at the boundaries of the region. The lack of overnight parking and the region's congestion contribute to short-term staging challenges in freight clusters. Without dedicated staging areas, trucks arriving early to their destinations must stage on streets, parking lots of nearby businesses, or other, potentially unauthorized areas that contribute to localized congestion and safety challenges.
- **Safety.** In addition to being characterized by high truck volumes, the main corridors serving freight clusters also tend to carry even larger volumes of commuter traffic. As a result, these corridors often exhibit crash rates that exceed statewide averages for similar roadways. For corridors that must also serve transit and other roadway users, such as Fulton Industrial Boulevard, safety challenges are even more pronounced. As a result, safety is a common challenge for freight clusters and is a focus area of the best practices review.
- **Multimodal Options.** The lack of multimodal transportation options is also a common challenge for freight clusters. As employment centers, freight clusters rely on multiple transportation modes for getting employees back and forth to work. Generally, increased prevalence and use of alternative transportation modes (e.g., transit, vanpools, biking, etc.) makes freight clusters more competitive as they can draw on a larger labor pool.
- **Truck Routing.** The restriction of trucks on certain routes and their allowance on others impacts both motor carriers and the communities that are proximate to freight clusters. Restrictions on certain routes may result in operational inefficiencies for motor carriers and/or confusion for drivers. The allowance of trucks on other routes may expose surrounding communities to greater levels of noise, emissions, congestion, and other negative externalities. In addition, a lack of alternative routes capable of handling truck traffic limits the resilience of the freight network and hinders its ability to respond to incidents that limit network capacity, such as crashes at key access points. Steps that other freight clusters have taken to address truck routing challenges is therefore a focus of the review.
- **Land Use Conflicts.** Industrial areas are often surrounded by residential communities and under constant pressure to redevelop away from heavy industrial use. Growth in and around these areas of mixed-use developments increase conflict points with residents, bicyclists, pedestrians, personal vehicle drivers, and transit. Conflicts with non-industrial activities often arise from issues related to noise from truck movements, idling, and commercial vehicle loading/unloading. Conflicts can also arise from issues related to roadways not designed to carry modern commercial vehicles. In these environments, it is not uncommon for trucks to strike signs, damage sidewalks, and block bicycle lanes, causing tension with non-industrial stakeholders. The best practices review investigates how other areas have addressed land use conflicts.
- **Congestion.** Congestion on Interstate highways, major arterials, and on local streets due to growing volumes of commuter and freight traffic create a challenge for freight clusters. Commercial

vehicles must compete for limited space with pedestrians, bicyclists, transit, and other roadway users. Congestion is a negative externality for all roadway users, from the trucks and personal vehicles on the road caught in the congestion to the pedestrians walking alongside a backup of cars generating emissions. Congestion in dense commercial districts can also restrict the space for freight movement, limiting deliveries, pick-up times, turn radii, and access. These types of restricted or difficult environments can increase the potential for safety conflicts especially when the residential and commercial populations are increasing at the same time.

- **State of Good Repair.** Freight movements impact, and are impacted by, the state of repair of the highway system. A high volume of trucks operating on roadways accelerates pavement deterioration and causes other types of damage such as striking signs and street furniture or raising noise or vibration levels. However, trucks likewise suffer from poor roadway conditions as worn pavements cause increased fuel consumption, increased need for vehicle repair and maintenance costs, and can damage cargo. Deteriorating roadway conditions have a direct impact on transportation costs and economic vitality in a region and can lead to diminished ability to compete with other jurisdictions in business attraction and quality of life. Generally, federal and state funding levels have not kept up with the need for roadway and other asset repair and many jurisdictions are consistently behind in maintenance and preservation of their roadways.

# REVIEW OF STUDIES, PLANS, AND INITIATIVES REPRESENTING BEST PRACTICES FOR FREIGHT CLUSTER PLANNING

This high-level review of best practices for freight cluster planning focuses on studies, plans, and initiatives conducted at the sub-regional level. While several states and metropolitan regions have conducted statewide and region-wide goods movement studies, far fewer agencies have conducted freight studies aimed specifically at sub-regions or freight clusters. By focusing on sub-regional initiatives, the review aims to identify those best practices that are directly applicable to the Boulevard CID.

Despite the review's focus on sub-regional initiatives, it does include best practices from regional and statewide studies that are relevant to the Boulevard CID. Specifically, in regard to truck parking and staging, there are examples of strategies identified as part of regional and statewide truck parking plans that may be applicable to the Boulevard CID. Those plans and their relevant components are highlighted in the best practices review.

## Safety, Congestion, and General Transportation Planning

This set of examples focuses on safety, congestion, and other general transportation challenges experienced within freight clusters.

### Subregional Freight Movement Truck Access Study, 2004

In 2004, the Southern California Association of Governments (SCAG) and the San Bernardino Associated Governments (SANBAG) undertook the Subregional Freight Movement Truck Access Study[1]. The

[1] Southern California Association of Governments and San Bernardino Associated Governments, Subregional Freight Movement Truck Access Study, July 2004.

motivation for the study was the continued growth of the Inland Empire, particularly the western San Bernardino and Riverside County area, as a hub of warehouses, distribution centers, rail intermodal facilities, international airports with significant cargo operations, and other freight-intensive industries. The main goal of the study was to develop strategies and planning tools to improve the forecasting of goods movement and trucking trends and to better characterize truck access to intermodal facilities and truck activity centers in the Inland Empire. The Truck Access Study developed by SCAG and SANBAG can be described as consisting of three major technical tasks: (1) network usage and performance, (2) truck trip generation, and (3) stakeholder outreach. Those tasks are described in greater detail in the paragraphs that follow.

One of the primary components of the network usage and performance technical task was the compilation of existing truck volume data and the collection of new data where existing data sources were missing or out of date. The collection of volume data provided SCAG and SANBAG with a better understanding of network usage and how the highway system facilitates goods movement in the study region. Related to performance, SCAG and SANBAG concentrated on the number, rate, and severity of truck-involved crashes. Observing that incidents involving trucks typically result in larger highway closures and longer recovery times, the Truck Access Study treated the safety analysis as a key component for the mitigation of non-recurring congestion.

At the time of their study, the accuracy of methods for forecasting truck trip demand was a significant concern for SCAG and SANBAG. As a result, they conducted a review of local and national efforts for developing truck trip generation rates. These included methods previously developed by SCAG as well as national efforts such as the National Cooperative Highway Research Program Synthesis 298, which provided truck trip generation data from numerous cities across the nation.

The final major component of the Truck Access Study, stakeholder outreach, was used to support the truck trip generation rate task. Recognizing that the region was lacking in truck trip generation data and tools, SCAG and SANBAG conducted a shipper and motor carrier survey on truck travel patterns. The survey asked questions about the types of trucks being operated, their origins, destinations, type of cargo transported, and the frequency of trips. The results of the survey were used to develop detailed, local truck trip generation rates to support future modeling and forecasting efforts.

## State Highway 146 Subregional Study, 2018

In September 2018, the Houston-Galveston Area Council (H-GAC) in partnership with the Texas Department of Transportation (TxDOT) released the State Highway 146 Subregional Study. The Study focused on the areas surrounding State Highway (SH) 146, an important regional corridor for freight and hurricane evacuation, in the Houston-Galveston metropolitan area. The study was motivated by the observation that these areas, namely the cities of Mont Belvieu and Baytown, have been experiencing rapid growth in terms of population, employment, traffic, and freight movements.

Though the SH 146 Subregional Study was not exclusively a freight study, the route is heavily traveled by trucks and the study contains many of the components important to effectively plan for freight at the subregional level. These include the collection of arterial and turning movement counts, an analysis of crash data, and intersection level-of-service analyses, among others. Furthermore, the large amount of industrial land uses within the study area along with the high percentage of truck traffic on area roadways made

freight a key consideration in the study's goals, objectives, and ultimately the recommendations. Both cities in the study area have large clusters of petrochemical facilities and other freight-intensive industries along SH 146 generating significant levels of truck traffic.

## City of Opa-locka Freight Implementation Plan

District 6 of the Florida Department of Transportation (FDOT) encompasses Miami-Dade and Monroe Counties in South Florida, which is home to over 2.5 million people.[2] District 6 is also home to transportation assets that are critical to freight mobility at the regional, statewide, and in some cases the national level. These include gateways for international trade such as the Port of Miami ("PortMiami") and the Miami International Airport. With significant investments made to these facilities in order to compete globally for new cargo opportunities stemming from growing trade with South America and increased Asian trade through the Panama and Suez Canals, FDOT District 6 initiated a subarea freight plan program to support growth at these gateways. This program has resulted in seven separate sub-area freight plans that resulted in short- and long-term improvements designed to mitigate freight bottlenecks (e.g., access, capacity, operations, safety). Truck parking also was a key factor in all seven plans. The seven subareas consisted of industrial freight clusters home to manufacturing operations, warehouses, distribution centers, and freight terminals. FDOT determined that it was essential for each of these communities to identify and invest in infrastructure improvements to position themselves for economic development and growth in cargo. To meet this need, FDOT District 6 conducted subarea freight plans for the Town of Medley, City of Opa-locka, City of Doral, City of Miami Gardens, City of Hialeah, City of Homestead (ongoing), and the Miami River area. This case study focuses on the plan developed for the City of Opa-locka, with briefer treatments of the Miami River and Town of Medley plans following.

The goal of the Opa-locka Freight Implementation Plan was to investigate freight corridors within the Opa-locka area and develop a plan of viable improvements to enhance freight connectivity and minimize conflicts. The Opa-locka Freight Implementation Plan consisted of seven major tasks, all of which are generally applicable to conducting subregional freight planning. These include: (1) stakeholder outreach; (2) assessment of existing conditions; (3) programming, which included identifying performance measures and applying environmental screening; (4) mapping the condition of the subregion's freight infrastructure as well as identified needs; (5) performing an analysis of alternatives for improving the subregion's freight network; (6) developing project improvements and planning level cost estimates; and (7) developing a set of final recommendations.

Two notable practices employed as part of the Opa-locka Freight Implementation Plan were: (1) the use of alternative growth scenarios to evaluate freight movement on the subregion's highway system and the impact on performance; and (2) the division of the subregion into smaller subareas based on commonalities among the specific types of freight generating economic activities, such as warehousing, manufacturing, and transportation. The alternative scenarios represented the potential location of new warehousing or logistics space, and redevelopment opportunities. The scenarios developed as part of the Freight Implementation Plan were:

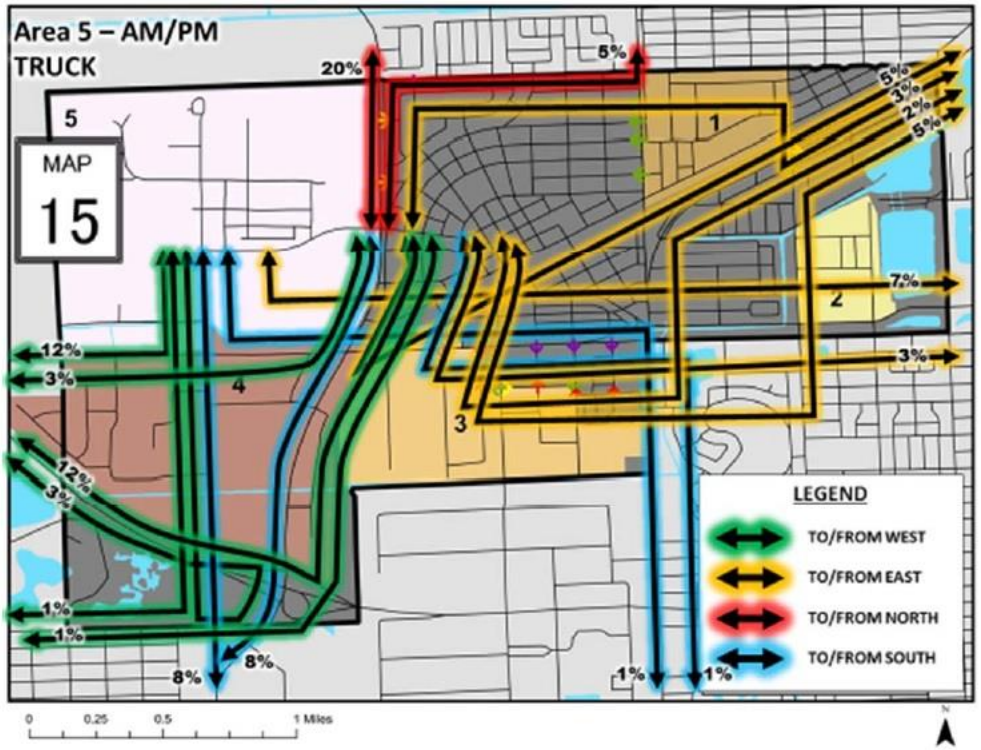
- Trend – Conditions continue as is, with new businesses building on the little remaining vacant land;

[2] https://www.fdot.gov/agencyresources/districts/index.shtm

- Moderate Growth – Additional freight traffic occurs beyond historic trends, potentially driven by increased freight demand at PortMiami;
- High Growth – Significant growth occurs in Opa-locka, particularly around the airport; and
- Most Likely – In this scenario, a potential development at the airport by Amazon comes to fruition.

The division of the subregion into a smaller set of subareas tied into the Freight Implementation Plan's scenario analysis. For each of the identified scenarios, traffic analyses were prepared to determine the number of new trips that would be produced. The rate and magnitude at which new trips would be generated were specifically tied to the subregion's subareas and their predominant land uses. In this manner, the Opa-locka Freight Implementation Plan was able to produce traffic forecasts tailored to each subarea and ultimately identify recommendations that considered the unique conditions and potential outcomes for each subarea. Figure 1 illustrates the truck trip assignment by direction.

**Figure 1: Opa-locka Freight Implementation Truck Assignment**



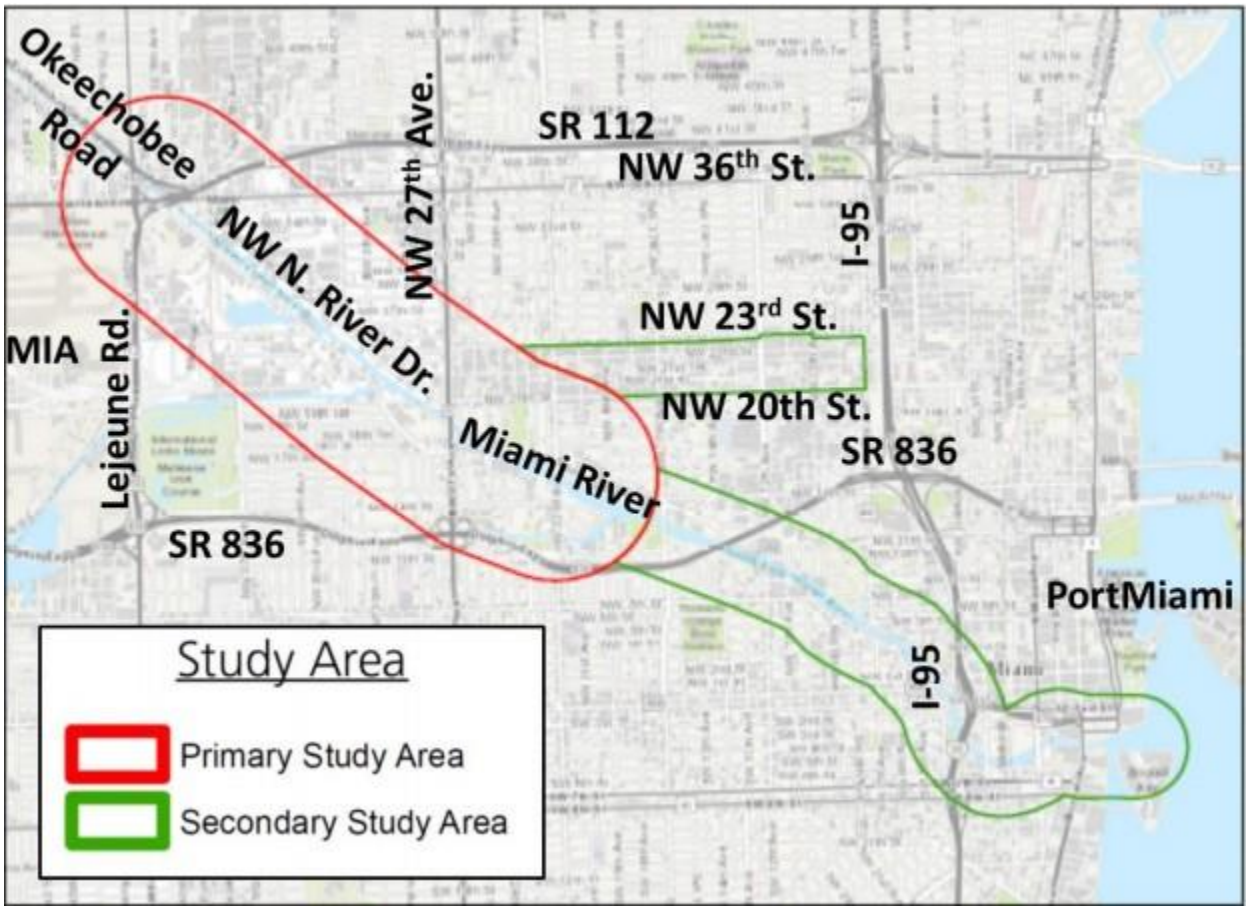

**Source: Florida Department of Transportation, City of Opa-locka Freight Implementation Plan, 2017.**

## Miami River Freight Implementation Plan

The Miami River Freight Implementation Plan, produced by FDOT District 6, encompasses 5.5 miles of the Miami River, which falls within portions of the City of Miami and unincorporated Miami-Dade County in Florida. This marine corridor is essential to the marine shipping industry in the area. Surrounded land uses include shipping terminals, logistics hubs and existing railroad and street network access. The Plan provides a framework to preserve marine industrial land uses while enhancing connectivity between existing infrastructure and the regional network. Key objectives for the study included inventorying existing and future mobility issues, evaluating capacity, assessing the potential for short sea shipping, mitigating traffic congestion and safety issues, and identifying a prioritized list of improvement projects for marine logistics. The Plan provided short-, medium- and longer-term project improvements and a set of policy recommendations to enhance freight movement along the Miami River.[3] Figure 2 illustrates the study area.

[3] https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/rail/publications/d6/miami-river-freight-study-final-fact-sheet_march2018.pdf?sfvrsn=d0fee5fe_2

Figure 2: Miami River Freight Improvement Plan Study Area




Source: Florida Department of Transportation, Miami River Freight Improvement Plan, Presentation to the Miami-Dade TPO Freight Advisory Committee, November 8, 2017.

## The Town of Medley Freight Mobility Improvement Plan

The purpose of the Town of Medley Freight Mobility Improvement Plan was to identify specific needs to support FDOT's vision of becoming a global hub. The study objective was to investigate the freight corridors and industrial land uses within the study area, develop a plan of alternatives to enhance freight connectivity and minimize conflicts, and analyze alternatives through existing conditions findings, and collected stakeholder input. Stakeholder comments reflected common themes of freight mobility related to safety and connectivity. At the conclusion of the report, the locally preferred project recommendations identified a potential funding source and were screened under the Department's efficient transportation decision making (EDTM) process, which is used to review environmental impacts of proposed transportation projects.[4]

[4] https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/rail/publications/d6/medley-freight-study-final-report_june2017.pdf?sfvrsn=2ae36de5_2

## South Fulton Community Improvement District Multimodal Study

Over the November 2016 to March 2018 time period, the South Fulton Community Improvement District (CID) conducted a Multimodal Transportation Study to understand how the CID's transportation infrastructure is being used to handle freight and to support local resident and commuter mobility. The South Fulton CID, located primarily along the I-85 and Oakley Industrial Boulevard corridors, is experiencing substantial growth as a result of significant warehousing and distribution center development and resulting increases in freight movements to, from, and within the area. Much of this new development can be traced to the construction of the Fairburn CSX Intermodal Center, completed in 1999, which created a high-volume rail corridor connection for intermodal service between southern California ports, Atlanta, and the rest of the southeast region. While ancillary logistics, warehousing, and transportation jobs and investment have flourished, congestion and access issues for both freight and passenger movements in the area have also increased.

The purpose of the Multimodal Transportation Study was to develop and prioritize a strategic set of transportation solutions within the study area to address both short and long-term investment needs. Though the Multimodal Transportation Study was not exclusively a freight study, the South Fulton CID is characterized by the large cluster of freight-intensive land uses contained within its boundaries and also by large volumes of heavy truck traffic generated by area industries. In addition, the ARC designated the broader area that encompasses the South Fulton CID a regional freight cluster. Thus, the Multimodal Study can be viewed as a subregional freight plan.

To address the complex mobility challenges in the study area, the Multimodal Transportation Study was guided by a technical approach that considered multimodal system performance (both current and projected), system conditions, and evolving land use and development trends. The analysis included a detailed assessment of the following:

- An assessment of existing and projected roadway congestion;
- A detailed crash analysis based on geo-located crash data from the last five years;
- A network and asset-level pavement and bridge conditions assessment;
- An evaluation of roadway operations and design;
- A multimodal gap analysis for bicycle, pedestrian, and transit infrastructure; and
- A detailed analysis of existing and projected land use and development trends to identify potential areas of opportunity or conflict between proposed transportation investment and planned land use.

In addition to the technical analysis, targeted stakeholder input was gathered throughout the study to calibrate technical findings against local realities and ensure a comprehensive perspective on investment needs. This integrated process directly informed the identification and prioritization of projects and policies for the study area, as reflected in final study recommendations.

A notable component of the Multimodal Transportation Study was the land use analysis which included a stakeholder workshop and build-out analysis. The purpose of the workshop was to bring awareness of existing and projected transportation and land use conditions to a broader set of project stakeholders and provide an understanding of the impacts that land use decisions have on transportation system performance. The South Fulton CID viewed dialogue around the transportation/land use dynamic as important for stakeholders to make informed positions on the challenges, opportunities, and desired

investment strategies to enable the CID's future growth and development. The stakeholder land use workshop was informed by the results of the build-out analysis, which painted a picture of what the study area would look like if all developable land was consumed according to plans and policies for future development as articulated through approved Developments of Regional Impact (DRIs), ARC's Unified Growth Policy Map and local comprehensive plans.

## Improving Truck Travel in the Everett-Chelsea Industrial Area

The cities of Everett and Chelsea, MA have a large number of industrial areas along the northern portion of Boston's inner harbor. Industrial infrastructure is balanced between the western boundary of the city of Everett and the eastern boundary of the city of Chelsea, with significant truck access routes along the adjacent rivers. This area is transforming to include new and modernized industrial and nonindustrial development. The goal of the study was to identify modifications to the existing roadway network that would support investment in both types of land use. The study characterized eight distinct truck types and evaluated improvements to the roadway network suggested by stakeholders based on their ability to impact truck traffic, truck uses and corridor freight volumes. Detailed observations of transportation services supporting commerce within the study area led to the proposal of network improvements designed to help industrial and nonindustrial businesses, pedestrian mobility, and nearby residential areas to create a successful development plan for the future. [5] Figure 3 illustrates the study area, its key roadway network, and the location of proposed improvements.

[5] https://www.ctps.org/data/calendar/pdfs/2016/MPO_0121_Freight_Memo.pdf

**Figure 3: Everett-Chelsea Industrial Area**


**Source: Boston Region Metropolitan Planning Organization, Improving Truck Travel in the Everett-Chelsea Industrial Area, Technical Memorandum, January 21, 2016.**

## Truck Parking and Staging

Trucks parking in and near industrial, warehousing, and commercial facilities pose a challenge throughout the U.S. The truck parking challenges experienced by freight clusters speak to the need to develop zoning or site development standards to help local municipalities plan for the increase in truck parking brought on by specific types of development. This portion of the best practices review highlights a few efforts to increase the supply and improve the utilization of truck parking.

### Township of Upper Macungie Zoning Requirement for Truck Parking

In 2017, the Township of Upper Macungie in the Lehigh Valley region of Pennsylvania passed a new zoning requirement which requires one off-street truck parking space for every loading dock at a new warehouse or distribution facility.[6] Lehigh Valley is the freight distribution hub of the Northeast and growth in warehousing and associated truck traffic has been substantial. The new zoning regulation also mandated one truck staging space (with 10-feet x 80-feet dimensions) for every two loading spaces at a distribution center or warehouse facility.[7] The new zoning requirements specify that "*the applicant shall present credible*

[6] Township of Upper Macungie Municipal Code § 27-605. https://ecode360.com/14517379.

[7] Township of Upper Macungie Municipal Code § 27-601. https://ecode360.com/14517379.

*evidence that the number of "oversized" off-street parking spaces provided for trucks will be adequate to accommodate the expected demand generated by the warehouse activities."*

The ordinance does not define truck staging or specify the length of time a truck may stage or park. The ordinance requires staging spaces be provided in proportion to the number of loading spaces; this implies access to the staging spaces is limited to drivers currently waiting to engage in loading/unloading activities. However, the ordinance does not explicitly state these spaces cannot be used for longer-term parking.

These zoning requirements came after a culmination of events. Documented in the 2007 Upper Macungie Township Comprehensive Plan, community members expressed concern for truck traffic and the implications of growing clusters of warehouse/distribution uses.[8] As a result, the Township established a Good Neighbor Coalition (GNC) in 2015 to address growing truck traffic issues and enhance the safety of traveling vehicles through collaborative action between freight providers, community members and law enforcement.[9] In the same year, residents pushed back against development plans to build an Old Dominion Freight Line distribution warehouse facility on light industrial zoned land, stating that existing roadways did not have the capacity to accommodate the influx of truck volumes from the planned development. Furthermore, the Township conducted a traffic engineering study used to ban large vehicles from driving or parking on a series of roadways, to reduce traffic and protect traveling residents from traffic incidents caused by large trucks.

## National Coalition on Truck Parking

The National Coalition on Truck Parking is a collection of stakeholders from the public sector, transportation organizations, the freight industry, and other groups to advance safe truck parking.[10] An important initiative conducted by the Coalition was the development of Truck Parking Working Groups. The purpose of the working groups was to share best practices and create products to disseminate information on truck parking issues related to priorities identified by the Coalition. The working groups covered the following topics: parking capacity; technology and data; funding, finance, and regulations; and state, regional, and local government coordination. A summary of best practices identified by those working groups that are relevant to freight clusters are summarized below.

### *State, Regional, and Local Government Coordination*

The State, Regional, and Local Government Coordination working group identified several examples of local governments including provisions for truck parking and staging in their local planning and zoning.[11] These plans and ordinances address staging, long-term parking, deliveries, and parking at home. These

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[8] Upper Macungie Township 2019 Comprehensive Plan: http://www.uppermac.org/wp-content/uploads/2017/10/UMT-Appendices-Combined-4-26-19_LowRes.pdf

[9] https://www.uppermac.org/police/trucksafety/#:~:text=In%20a%20continuing%20effort%20to,positive%20changes%20through%20collaborative%20action.

[10] https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/workinggroups/index.htm

[11] https://ops.fhwa.dot.gov/freight/infrastructure/truck_parking/workinggroups/state_reg_lgov_coord/product/requirements.pdf

examples could be considered as a model for freight clusters to address truck parking and staging challenges in coordination with their municipal partners.

- **Carson, California.** The City of Carson's Traffic Engineering Section noted that trucks and commercial vehicles are essential to the region, providing goods and services to the residents and businesses every day.[12] Furthermore, the City's diverse mixture of land uses, urban environment and vast transportation infrastructure requires a distinct set of rules and regulations to govern the operation of trucks and commercial vehicles on city streets. To this end, the City of Carson developed and codified citywide truck routes and truck parking areas. Trucks may park in designated areas for up to 72 hours and also use those areas to load/unload goods. The City also designated truck routes providing access to the truck parking areas from Interstate highways, state highways, and commercial zones in the city. The excerpt from the zoning code is as follows:

  > *The parking of any commercial vehicle with a gross weight of over six thousand (6,000) pounds, length of over twenty-five (25) feet, or width of over ninety-six (96) inches (total outside width of vehicle or load or combined) is prohibited at all times on any street in the City of Carson except:*
  >
  > *(a) At locations and for the time period authorized by the City Council and posted by the Public Works Director;*
  >
  > *(b) For such time as is reasonably necessary to deliver or collect goods from or provide a service to a property in the block in which the vehicle is parked. At locations where parking of commercial vehicles with a gross weight of over six thousand (6,000) pounds is permitted overnight, illuminated clearance lights or safety reflectors must be provided and utilized.*

- **Elmira, NY.** The City of Elmira created a municipal truck parking area from an existing industrial-zoned lot adjacent to a carpool parking lot near Interstate 86. The municipal lot provides capacity for about 25 trucks. The City charges $5 per day and trucks can stay for up to thirty days. There appear to be no on-site amenities. However, the lot is adjacent to greenspace (including a park and multi-use trail) and proximate to a hotel (about ¼ mile). The working group noted that once the lot was created, complaints from residents in a nearby residential area about unauthorized truck parking decreased. Figure 4 illustrates the parking area.

[12] http://ci.carson.ca.us/PublicWorks/truckroutes.aspx

Figure 4: Public Truck Parking in Elmira, NY


Source: Google Earth.

- **Weed, California.** The town of Weed, CA, located on Interstate 5 at the base of Mount Shasta, created a municipal truck parking lot with a capacity of 30 trucks using two pieces of city owned land zoned for industrial use. There are no amenities and trucks are permitted to park for no more than 72 hours. Despite the lack of amenities, the municipal lot is adjacent to commercial developments including restaurants, a motel, and a Pilot Travel Center commercial truck stop. The lot is limited to trucks as passenger vehicles, recreational vehicles, and other vehicles are not allowed to park in the lot.

  The town of Weed, CA was motivated to provide truck parking based on complaints from drivers that were ticketed for parking in unauthorized areas proximate to the truck stop when it had reached its maximum capacity.[13] Upon further investigation, the town concluded its location at the confluence of multiple freight corridors (i.e., U.S. 30, U.S. 97, and I-5) resulted in the town lacking sufficient truck parking capacity to meet demand. Furthermore, the town estimated that approximately 84 percent of its sales tax revenue was generated by truck drivers.

[13] https://www.fleetowner.com/resource-center/driver-management/article/21693795/truckers-love-weed-weed-loves-truckers

## *Parking Capacity*

The Parking Capacity working group explored alternative methods to increase truck parking capacity that may be a part of broader truck parking solutions for freight clusters. These alternative methods include involving shippers and receivers in providing capacity and creative uses of right-of-way (ROW) and adjacent areas.

**Involving Shippers/Receivers to Address Truck Parking Capacity.** The Parking Capacity working group noted that it is necessary for truck parking and staging to be considered at every stage of the supply chain. Furthermore, they observed that most truck parking capacity is provided by private businesses, namely travel centers, and is located proximate to Interstate highways. To increase the supply of truck parking in the U.S., other entities need to play a role – namely businesses that are the shippers and receivers of freight. Meijer Grocery Stores and Unilever were provided as examples of shippers/receivers contributing to the supply of truck parking.

- **Meijer Grocery Stores.** Meijer Grocery Stores incorporated truck parking into their distribution centers by allowing drivers that recently completed, or will soon make a delivery, to park in a designated "bullpen" area outside the distribution center. A bullpen is a fenced area located on the property of a business but not inside the gated area of the distribution facility. Being outside the actual distribution center limits liability for the company by separating parked trucks from trucks in the delivery area. Local police rather than Meijer respond to crashes that occur in the bullpen. Meijer usually provides Wi-Fi, a Port-o-John, and trash collection in the parking area.
- **Unilever.** Unilever partnered with Kriska Transportation Group to create the Safe Haven Program, which allows drivers to park onsite or immediately adjacent to their distribution centers both for staging purposes and overnight. Kriska's dispatch assigns drivers to parking spots at the distribution centers. Drivers on site must follow specific safety measures, such as wearing safety vests at all times and carrying a flashlight at night. Due to the success of the pilot study, the Safe Haven Program was expanded to all of Unilever's North American distribution centers and manufacturing plants.

**Creative Uses of Right-of-Way and Adjacent Areas.** One approach that some states have taken to increase the supply of truck parking is to use existing facilities in the ROW or adjacent to the ROW. Facility types where this has been implemented include rest areas, weigh stations, and tourism centers. Kentucky, Florida, Maryland, Missouri, and South Dakota are all states that have undertaken initiatives to expand truck parking capacity at rest areas and weigh stations. In some cases, such as Missouri and South Dakota, rest areas and weigh stations were converted to truck parking facilities. Though there are no rest areas or weigh stations within the Boulevard CID, there is a weigh station near the study area along I-20 between Mt. Vernon Rd. and Thornton Rd. in Lithia Springs where such an approach to expand truck parking capacity could be applied.

## *Funding, Finance, and Regulations*

One topic explored by the Funding, Finance, and Regulations working group was the use of public-private partnerships (P3) to develop truck parking capacity. The working group recognized that there are opportunities to create P3 arrangements with travel center operators handling operations and maintenance of the publicly owned facility. However, travel center operators are usually concerned with liability and

maintenance costs should an agreement be entered into which creates a potential impediment to the development of truck parking P3s. To address this, the working group identified examples of truck parking P3s that may serve as models for non-traditional funding agreements to increase the supply of truck parking.

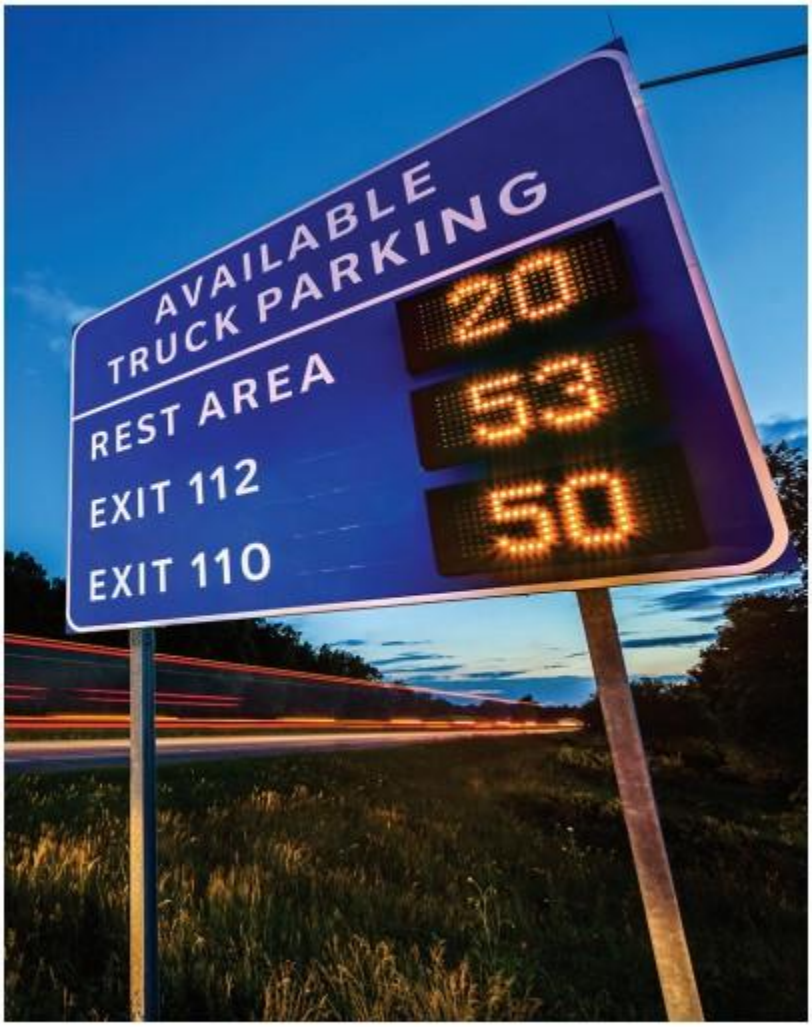
- **Wamsutter, Wyoming.** Using a Truck Parking Facilities (TPF) Program grant, Wyoming Department of Transportation (WYDOT) constructed 43 dedicated long-term truck parking spaces in a secure, lighted area right off Interstate 80 in Wamsutter, Wyoming. These spots were created adjacent to a truck stop with existing food and shelter. This project will alleviate negative economic impacts resulting from makeshift parking within the community of Wamsutter, as well as assist with previous issues that arose during weather-related highway closures.
- **Brainerd Lakes Area Welcome Center.** The Brainerd Lakes Area Welcome Center in Minnesota was funded through a P3 and is sited in the middle of the highway right of way. The center required special State legislation to create a unique P3 with the Brainerd Chamber, Crow Wing County, Minnesota DOT, Minnesota Department of Natural Resources, and Minnesota State Patrol. A gift shop featuring local products helps financially support the operating costs of the facility. The site provides separated, short-term truck parking, bathrooms, and vending machines. The site is operated as a rest area and has 30 truck parking spaces that are easily accessible from either direction of travel on the highway. Private gas station facilities are located approximately 15 miles from the site that offer additional services such as gas, food, and some commercial truck services.

## *Technology and Data*

The Technology and Data working group led an initiative that investigated best practices related to Truck Parking Information Management Systems (TPIMS). These systems provide real-time information to truck drivers about available parking with the goal of maximizing the utilization of existing truck parking capacity. In general, these systems collect real-time parking information using various technologies for sensing and counting vehicles including closed circuit television, in-ground sensors, above-ground radar, and side laser scanners. This data is then sent to an information processing center to be converted into parking availability information, which is then disseminated to motor carriers – via in-cab systems, mobile applications or websites, and dynamic message signs to name a few – to inform them of parking availability.

**Mid-America Association of State Transportation Officials (MAASTO) TPIMS Project.** MAASTO is a coalition of Midwestern state DOTs with the goal of fostering the development, operation, and maintenance of an integrated and balanced transportation system that adequately serves the transportation needs of the ten member states. MAASTO received a $25 million 2015 Transportation Investment Generating Economic Recovery (TIGER) grant from the Federal Highway Administration (FHWA) to develop and implement a regional TPIMS. The TPIMS involves the development of a coordinated truck parking management solution in the Midwest region. Means of detection and notification are uniquely defined within each MAASTO member state, but the information from each state is collected through standard extensible markup language (XML) feeds and shared through a common application programming interface (API) via dynamic message signs (DMS), traveler information websites, and a smart phone app. Figure 5 illustrates use of DMS to communicate available truck parking spaces.

Figure 5: Dynamic Message Sign with Available Truck Parking




Source: MAASTO, Regional Truck Parking Information and Management System, 2015 TIGER Proposal, http://www.maasto.net/documents/TPIMS-Grant.pdf.

**Colorado DOT TPIMS.** The Colorado DOT (CDOT) plans to implement TPIMS to communicate real-time parking availability to drivers. CDOT was awarded a 2016 Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies (FASTLANE) grant to partially fund the project with the remainder coming from other CDOT and federal sources. Using a combination of static cameras and sensors to monitor parking availability, CDOT collects information from public rest areas, private truck stops, and new parking facilities along I-25, I-70, and I-76. This information is incorporated into CDOT's advanced traffic management system (ATMS) and used to communicate real-time parking information to drivers via dynamic message signs (DMS), the CDOT website, smartphone apps, and the 511-travel information system. CDOT also developed a Truck Parking Guide to assist drivers in locating long-term, emergency, and chain-up parking. In addition, CDOT planned to align the project to be a compatible and complimentary extension of the MAASTO TPIMS approach.

**Florida DOT TPAS.** The Florida DOT's Truck Parking Availability System (TPAS) uses CCTV, microwave vehicle detection, and in-ground sensors in the truck spaces at interstate rest areas, welcome centers, and weigh stations to monitor the number of available truck parking spaces. That information is used to inform drivers of truck parking availability using the State's FL511 website and mobile application, third-party mobile applications, and roadside DMS. FDOT hopes to eventually expand to predictive analyses from the real-time data. FDOT has installed or begun installing TPAS along I-4, I-10, I-75, and I-95 with a total of 68 locations statewide.

## Regional and Statewide Truck Parking Studies with Implications for Local Planning

Several regional and statewide truck parking studies have been conducted in recent years that have implications for the truck parking challenges experienced by freight clusters. Most relevant to the Boulevard CID is the Atlanta Regional Commission's 2018 Truck Parking Study. The Truck Parking Study was motivated by the recognition that Metro Atlanta lacks truck parking facilities, and that the region should better understand freight mobility issues centered on the lack of truck parking capacity. It also was motivated by then-impending federal regulation for electronic logging devices to digitally monitor truck driver hours of service. This meant hours for truck drivers would be more closely monitored, and the need for truck parking would increase to give drivers improved opportunities to meet the regulations.

Some key findings from the 2018 ARC Truck Parking Study with implications for the Boulevard CID include:

- A general lack of truck parking supply that will worsen as truck volumes increase;
- A localized lack of truck parking around the region's perimeter (i.e., I-285);
- The federal requirement for electronic logging devices further increases demand for truck parking in the region; and
- Industries that require transportation of freight by truck will continue to grow in Atlanta, which will increase the demand for truck parking facilities even more.

Recommendations from the ARC Truck Parking study that impact the Boulevard CID include:

- An assessment of truck parking needs and challenges should be required as part of comprehensive transportation plans and freight cluster plans;
- The need for increased truck parking supply should be assessed with member jurisdictions through options including:
    - Expansion of existing truck stops and private lots;
    - Use of vacant industrial spaces and/or brownfield sites;
    - Coordination with shippers/receivers to allow on-site parking;
    - Expansion of existing public facilities; and
    - Use of closed public facilities.
- Parking costs/benefits should be shared with new warehousing/distribution developments and other new freight-intensive land uses that generate demand for truck parking;
- Zoning should be used to develop truck parking facility design standards which, among other benefits, could lessen negative community impacts through the use of buffer landscaping, lighting requirements, and safety/security requirements; and

- Local governments should be encouraged to review/update local zoning ordinances to address truck parking, including expansions of existing facilities and the construction of new facilities.

Beyond Georgia, truck parking studies from other states with notable practices are also informative to the development of the Boulevard CID FCP. These notable practices primarily relate to land use and zoning initiatives as that is a category of truck parking solutions that could be led by a CID, given their strong ties to county and municipal partners. Some of those studies are highlighted in the following subsections.

**Arizona Truck Parking Study (2019).** A key conclusion of the 2019 Arizona Truck Parking Study was that there was an insufficient supply of truck parking available to meet freight demand. A notable practice from that study was the use of Trucker Path data, a truck parking application used to crowdsource information about truck parking availability from over 800,000 users, to identify the utilization of public and private truck parking locations. The app data provided an opportunity to identify truck parking utilization in line with what a truck driver would see when they searched for parking along the road network. As a result, the Arizona Truck Parking Study was able to identify the density of truck parking availability throughout different intervals within a day. This data helped provide policy recommendations to enhance truck parking including integrating truck parking information into Arizona's 511 system and promoting truck parking partnerships to assist public and private stakeholders with construction and expansion of truck stops and advance opportunities for P3s.

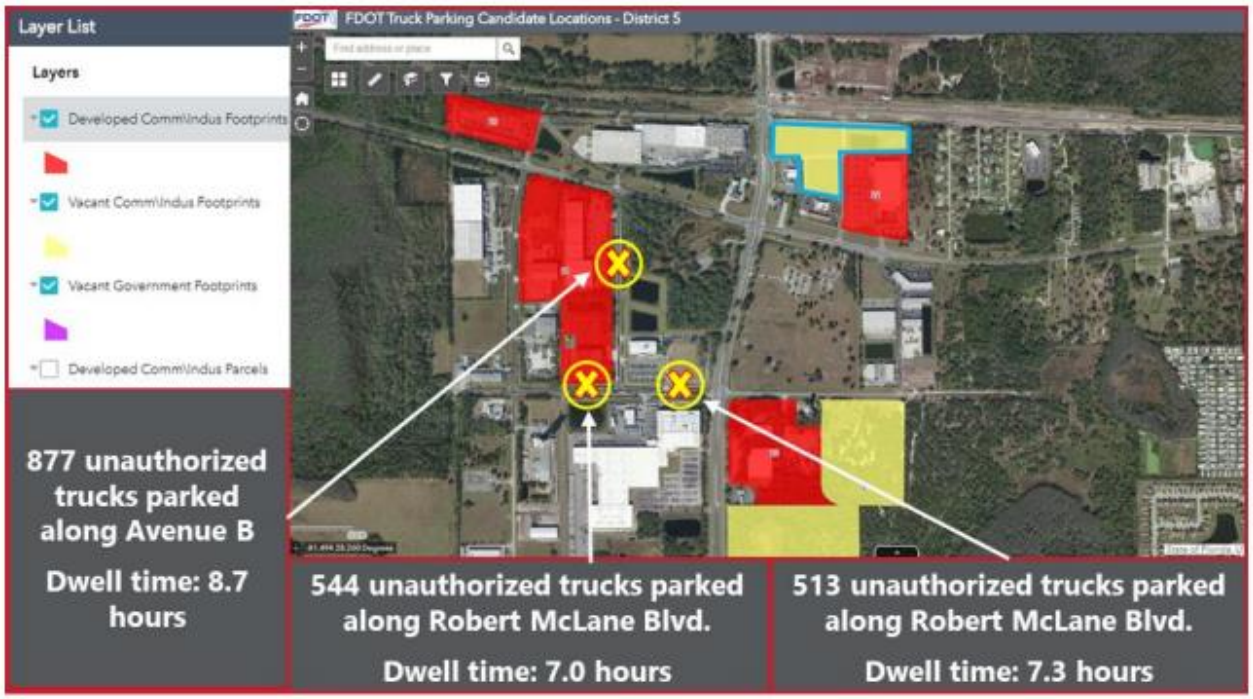
**North Carolina Truck Parking Study (2020).** The purpose of the North Carolina Truck Parking Study was to analyze the adequacy of off-road truck parking in the State of North Carolina, provide truck parking solutions that better serve freight transportation providers, and create a safer environment for the traveling public in and through North Carolina.[14] One potential solution was a policy recommendation to require the inclusion of truck parking in site design for new industrial or commercial developments. North Carolina DOT recognized that local zoning ordinances often contain use-specific development standards (like for manufacturing operations or car dealerships or drive-through windows) that could be amended to better accommodate truck parking needs. The potential use of local zoning regulations to enhance the ability of states and regions to add truck parking capacity is a notable practice observed in several state truck parking studies.

**Florida Statewide Truck Parking Study (2020).** The Florida Department of Transportation (FDOT) developed the Statewide Truck Parking Study to identify, prioritize, and recommend solutions to address the areas in Florida with the greatest truck parking needs.[15] The Statewide Truck Parking Study observed that the State of Florida had an insufficient supply of truck parking capacity to meet demand, which had implications for safety and overall freight system performance. Like several other states, Florida recognized the need to develop policies that incorporate truck parking into planning and land use. Florida's approach to incorporating truck parking into planning and land use is notable as FDOT created a land suitability analysis tool created to identify and screen parcels suitable for developing truck parking facilities. Such a tool, or a simpler process using the key methodological components, could be deployed at the freight cluster level to identify specific parcels to consider for truck parking. Figure 6 provides an illustration of the tool.

[14] https://connect.ncdot.gov/projects/planning/Statewide-Freight-Plan/Documents/Truck_Parking_Study_Final.pdf

[15] https://www.fdot.gov/rail/studies/truck-parking

Figure 6: Trucks Parked on Roads Near an Industrial Area




Source: https://www.fdot.gov/rail/studies/truck-parking

**Minnesota Statewide Truck Parking Study (2019).** The Minnesota Truck Parking Study was designed to build a better understanding of how truck parking issues impact Minnesota and what potential solutions could be undertaken by the Minnesota Department of Transportation (MnDOT) and its private sector partners.[16] Among other solutions, the study identified two initiatives related to land use and zoning that could be used to address truck parking challenges near industrial, warehousing, and commercial areas. One is to develop minimum parking requirements, which the study noted are commonly included in zoning ordinances to develop large commercial parcels and could serve as a template for freight-related land use developments. The second is to change zoning near existing public and private truck parking facilities to allow truck parking "by-right". Essentially, zones that allow certain uses "by-right" allow projects that conform to the zoning standards to receive project approvals without a discretionary review process.

**Texas Statewide Truck Parking Study (2020).** The purpose of the Texas Statewide Truck Parking Study was to conduct a statewide assessment of the current supply and demand for truck parking in Texas, identify needs, and develop solutions to address existing and future truck parking gaps and needs. The study also developed actionable strategies to meet truck parking needs across the state, promote partnerships with local governments and the private sector, enhance safety, reduce congestion, and improve efficiency on the Texas Highway Freight Network.

16 https://www.dot.state.mn.us/ofrw/freight/PDF/truckparking/final-report.pdf

One notable policy recommendation from the Texas Statewide Truck Parking Study was to coordinate with private property owners to allow truck parking at large parking facilities when not in use. The study noted that fairgrounds, stadiums, racetracks, and other event venues with large amounts of parking close to the highway in areas with high truck parking needs could potentially provide truck parking. These types of locations have schedules that are known far in advance, often have significant downtime, and are used to accommodate large numbers of vehicles and people in a condensed period. Near the Boulevard CID study area, the Six Flags Over Georgia amusement park is a large event venue with relatively predictable, seasonal demand. Extensive outreach and research on utilization patterns would be needed to confirm the feasibility of this site for such a use.

Another notable practice from the Texas Statewide Truck Parking Study was the development of high-level conceptual design drawings for an urban staging lot. The drawings included planning level cost estimates and rough timelines for engineering work (e.g., site survey design, environmental clearance, utilities, etc.). Technology solutions could be incorporated in these concepts as TPIMS technologies could be deployed at these lots. As noted in the ARC Truck Parking Study, regional truck parking needs are driven by both long-term (mandated 10 hour) parking and short-term staging needs. Thus, the inclusion of a high-level concept for an urban staging lot could be a part of broader solutions for meeting local and regional truck parking needs.

The Texas study also made recommendations that can be considered as notable practices for deploying technology for addressing truck parking challenges. The study noted that technology programs provide ways for the existing truck parking to be used more effectively and provide drivers with necessary information related to truck parking. The upfront capital costs and on-going maintenance costs are often lower than traditional infrastructure and the time needed for planning and implementation are a fraction of what is needed for construction. For these reasons, technology solutions are often more cost effective and timely in meeting immediate needs. A recommendation that is appropriate to consider at the freight cluster level is the identification of locations within the CID study area that might be good candidates to include in a TPIMS program should the state deploy such a system in the mid- to long-term. As a freight cluster, the CID is part of the first-/last-mile for numerous long-haul freight trips. Because of this, it could be a critical location for deploying information to motor carriers (potentially in the form of DMS) on available truck parking.

## Land Use – Managing Conflicts

Maintaining industrial land uses in areas that are mixed use, or adjacent to incompatible land uses can be a challenge. With careful planning, industrial lands can be protected. Tools include buffer zones and modifications to established ordinances and zoning codes. Buffer zones refer to land uses that are put in place in order to create a transition between two other land uses that are incompatible; an example is a commercial development between a residential zone and an industrial zone. Buffer zones can be an important tool for preserving freight-intensive land uses as they help to mediate some of the negative externalities experienced by neighboring communities. In addition to buffer zones, efforts to modify local ordinances and zoning codes are also an important tool for preserving and protecting industrial land uses. These studies highlight best practices from Maryland, Illinois, and Oregon to preserve freight-intensive land uses.

## Maritime Industrial Zone Overlay District (MIZOD), Baltimore, MD

The City of Baltimore's Maritime Industrial Zoning Overlay District (MIZOD) is an example of an effective zoning tool that preserves current freight-intensive land uses.[17] This overlay district preserves waterfront land adjacent to the Port of Baltimore for industrial uses in the face of speculative commercial real-estate development activity that has applied considerable pressure to convert waterfront industrial properties to mixed-use. The City enacted the MIZOD in 2004 to preserve maritime properties with deep water, rail, and highway access in order to protect maritime-dependent uses and intermodal freight movement. The goal was to balance the needs of both mixed-use and maritime shipping. The City categorized its waterfront into two general districts: Mixed-Use and Maritime Industrial. In the first, mixed-use would be allowed, while in the second the MIZOD would protect maritime uses by prohibiting conversion of land to non-industrial uses. In addition, the Maritime Industrial district preserved these areas for industrial use by:

- Disallowing planned unit developments;
- Prohibiting hotels, motels, and taverns;
- Allowing offices and restaurants only as accessory uses; and
- Creating a 20-year moratorium on rezoning.[18]

The MIZOD is credited with protecting the integrity of the maritime area by preventing the encroachment of mixed use into maritime areas and with retaining major industrial employers dependent on port access, such as Domino Sugar. The City of Baltimore conducted evaluations of the MIZOD for the first three years and found that a) MIZOD firms had made significant capital investments after the MIZOD was enacted; and b) that businesses at the port grew - even when accounting for declines experienced during the Great Recession. Originally set to expire in 2014 to provide an opt-out period for participating landowners, no properties opted-out and the MIZOD was renewed in 2009, extending its expiration date to 2024. In 2017, the City of Baltimore enacted a new zoning code, making the Maritime Industrial Zone a permanent zoning district with the same protections as the MIZOD and no sunset provision.

## City of Chicago Industrial Corridor Program

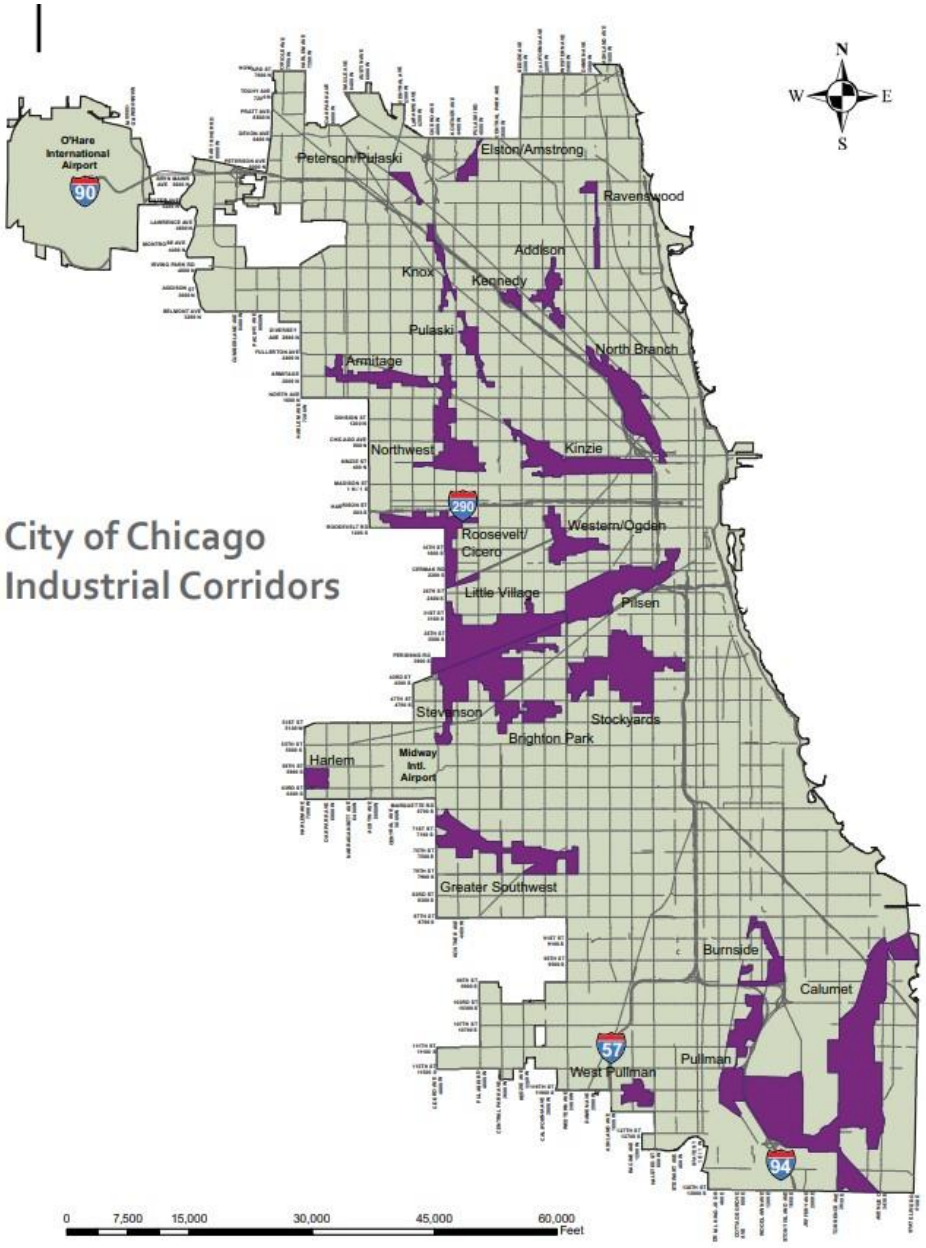
Chicago has been a hub of freight activity since its founding; it is the meeting point of eastern, western, and Canadian railroads, and is home to a port on the Great Lakes, a national air cargo hub, and a network of Interstate highways that handle thousands of truck trips every day. Despite the continued importance of freight-intensive industries to the Chicago economy, the demand for housing, particularly in the downtown area, put pressure on the industrial land uses as many sites have been or are being converted into residential developments. To combat the encroachment of non-industrial land uses, the City of Chicago created the Industrial Corridor Program in the 1990's to protect industrial land use and to guide further development along identified corridors. A feature of the Industrial Corridor Program is the identification of Planned Manufacturing Districts (PMD), which limits the type of developments within the PMD and

[17] Department of Planning, City of Baltimore, Maritime Industrial Zoning Overlay District (MIZOD): Summary & Evaluation, 2009-2010, https://planning.baltimorecity.gov/sites/default/files/MIZODREPORT2010_1.pdf.

[18] Maryland Port Administration, Partnerships to Address Urban Freight Challenges at the Port of Baltimore, Presentation to the 2019 METRANS International Urban Freight Conference, October 16, 2019.

establishes buffer zones near the edges of the PMD to allow a transition between industrial and non-industrial land uses. Figure 7 illustrates the industrial corridors in Chicago.

**Figure 7: City of Chicago Industrial Corridors**




**Source: City of Chicago, Department of Planning and Development, Chicago Sustainable Industries.**

Each established PMD also specifies the level of noise, vibration, smoke and particulate matter, toxic matter, noxious odorous matter, fire and explosive hazards, and glare or heat that can be emitted from properties

within the zone. The corridors with PMDs are identified by set characteristics including the existence of compatible land uses within the corridor, and accessibility to goods dependent industries and transit. There were 24 corridors identified in 2004 and 35 in 2011. These corridors and the PMDs have helped to legitimize the industrial clusters in the City of Chicago and have served as mechanisms for appropriate redevelopment.

## Guild's Lake Industrial Sanctuary Plan

Adopted by the Portland (Oregon) Planning Commission and the Portland City Council in 2001, the Guild's Lake Industrial Sanctuary Plan provided a policy framework to preserve industrial land in the Guild's Lake Industrial Sanctuary (GLIS) and protect and promote its long-term economic viability as an industrial district.[19] The GLIS is located along U.S. 30 and the Willamette River in the northwest portion of the City of Portland. It is one of the premier heavy industrial districts in the Pacific Northwest. The purpose of the Guild's Lake Industrial Sanctuary Plan was to protect and maintain this area as a unique place for a broad variety of industrial land uses and businesses.

The Plan was motivated by a desire to protect the GLIS from being encroached upon by non-industrial land uses. While the GLIS was still a functioning, viable industrial area, it had come under increasing pressure for changes to land use and development patterns that could diminish its role and stature. The Plan was implemented to promote the study area's economic viability as an industrial district and protect it from future redevelopment efforts.

Three policy action statements – supported with detailed objectives, action items, and timelines for completion – were developed as part of the Plan:

- **Jobs and Economic Development Policy Statement:** Maintain and expand industrial business and employment opportunities in the Guild's Lake Industrial Sanctuary. Stimulate investment in the area's public and private infrastructure and industrial facilities.
- **Transportation Policy Statement:** Maintain, preserve, and improve the intermodal and multimodal transportation system to provide for the smooth movement of goods and employees into and through the Guild's Lake Industrial Sanctuary.
- **Land Use Policy Statement:** Preserve and protect land primarily for industrial uses and minimize land use conflicts in the Guild's Lake Industrial Sanctuary. Allow compatible non-industrial uses within the GLIS that provide retail and business services primarily to support industrial employees and businesses.

In addition to the City Council adopting the Plan, amendments to the City's zoning code were also adopted in order to implement its policies and to ensure that new development and redevelopment will help realize the objectives of the Plan. The adopted zoning regulations included additional limitations and prohibitions on commercial, residential, and accessory office uses to ensure new developments will not interfere with industrial activities. The following is a summary of the zoning regulations:

- Retail sales and service and office uses in the heavy industrial zone larger than 10,000 square feet per use are prohibited. Such uses larger than 3,000 square feet are subject to conditional use approval;

[19] https://www.portlandoregon.gov/bps/article/59602

- Accessory offices and headquarters offices in the heavy industrial zone are limited to 25 percent of a site's net building and work/storage area, or 25,000 square feet, whichever is less, with such uses exceeding these limits subject to conditional use approval;
- In the heavy industrial zone, household living, self-service storage, commercial outdoor recreation, and major event entertainment uses are prohibited; and
- In the General Industrial zones, household living, self-service storage, commercial outdoor recreation, and major event entertainment uses are prohibited.

## Land Use – Electronic Commerce and Urban Infill

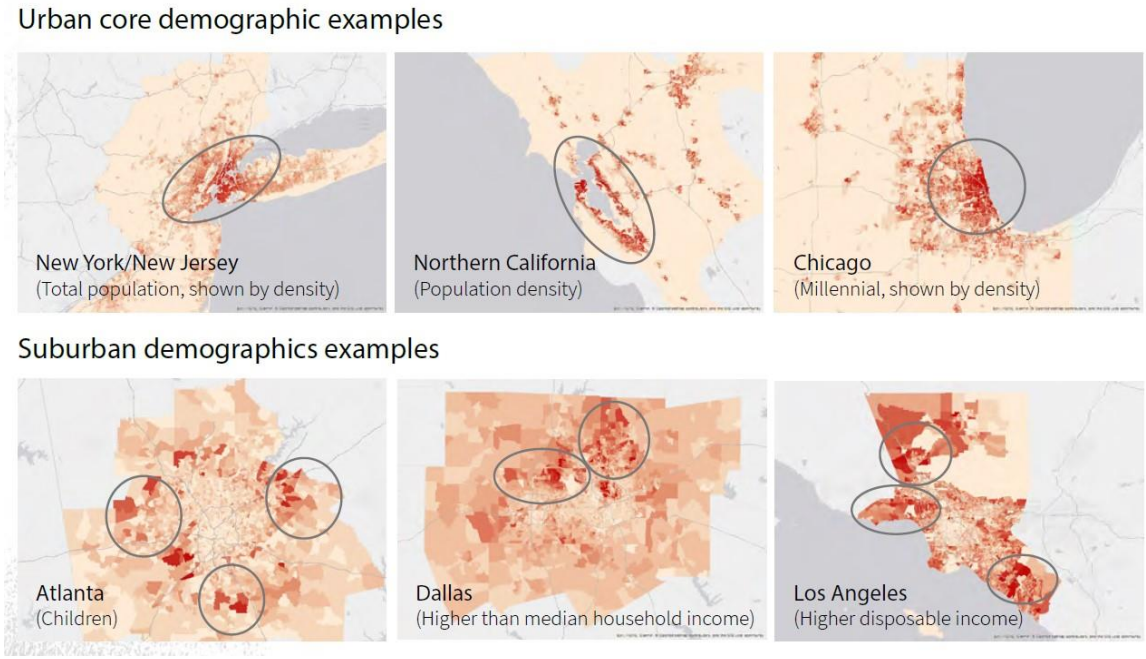
Electronic commerce (i.e., e-commerce) is the use of electronic devices and technologies to conduct commerce and trade, including purchasing goods and services on the internet and electronic banking. E-commerce increased from about 4 percent of total retail activity in 2010 to approximately 16 percent in 2020.[20] Some of the demographic factors driving this growth include total population, population density, a relatively high population of millennials, families with young children, higher than median household incomes, and higher disposable incomes (see Figure 8).[21] The steady growth of e-commerce as a preferred method for purchasing consumer goods and its acceleration during the COVID-19 pandemic have impacted freight traffic and land use patterns in metropolitan regions including Metro Atlanta. As same-day and next-day delivery is commonplace for e-commerce transactions, retailers are sensitive to the impacts of distance, congestion, and poor travel time reliability for meeting customer demands. As a result, a common practice is to position fulfilment centers close to population centers with good access to major highways.[22] This contrasts with previously observed trends of industrial land uses generally sprawling away from city centers. The development of urban infill logistics facilities to support e-commerce is an innovative supply chain practice that the Boulevard CID is a locus of today as it develops its Freight Cluster Plan.

[20] U.S. Census Bureau News. Quarterly Retail E-commerce Sales. https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

[21] https://www.us.jll.com/content/dam/jll-com/documents/pdf/research/americas/us/am-research-Urban-infill-the-route-to-delivery-solutions.pdf

[22] Ibid.

**Figure 8: Examples of Demographic Factors Driving E-Commerce Growth**




**Source: Jones Lang LaSalle, Urban infill: the route to delivery solutions, 2020.**

Re-purposing or rehabilitating existing urban infill industrial facilities to meet modern e-commerce logistics needs is currently and will continue to impact the Boulevard CID. For example, companies have been able to raise the roofs of older properties and make other improvements so that they may serve e-commerce demand. The CID is well-positioned for this type of development as it is less than 1 hour from the core of the Metro Atlanta region, is proximate to other regional centers, such as Perimeter Center and Cumberland, and is adjacent to I-20 and the I-285 Perimeter itself. As the population density and economic activity of Metro Atlanta grows, so too will the demand for goods consumed via e-commerce and the land needed to facilitate consumer demand.

## Truck Routing

Truck routing is an important operational issue to consider in freight cluster planning. In particular, at the freight cluster level one aspect of truck routing that becomes more important is minimizing impacts to communities that are adjacent to freight-intensive land uses and are thus a part of the first/last mile. It is not uncommon for communities that are adjacent to freight clusters to complain about large trucks operating or parking on residential streets. Burgeoning growth in internet home delivery makes this issue especially challenging. Effective truck routing – in the form of signage, wayfinding, and pavement markings – can minimize community impacts and promote safe and efficient movement of goods in and around a community.

## O'Hare Subregion Truck Route Plan

The Chicago O'Hare International Airport Subregion is a significant economic engine for the Chicago region, the State of Illinois, and the nation as a whole. The region is home to numerous manufacturing, logistics, and other freight-intensive industries. While O'Hare International Airport is the hub of the subregion, the regional highways and streets that connect suppliers, customers, warehouses, and other businesses are critical, facilitating the travel of thousands of trucks on a daily basis. The O'Hare Subregion Truck Route Plan was developed by the Chicago Metropolitan Agency for Planning (CMAP) for the purpose of helping the municipalities surrounding Chicago O'Hare International Airport coordinate policy and investment decisions to facilitate the flow of trucks in the region, while mitigating the negative impacts of such high levels of freight activity.

The primary outcome of the O'Hare Subregion Truck Route Plan was the development of a subregional truck route network that provided connectivity to the National Highway Freight Network as well as local destinations. The Truck Route Plan first identified several overarching needs for the O'Hare subregion including: (1) closing gaps in the existing truck route network; (2) designating existing and developing new arterial routes to facilitate through truck traffic; (3) improving direct interstate connectivity for major facilities; (4) providing relief to truck bottlenecks; and (5) planning for increased levels of truck traffic as the O'Hare Subregion continues to add new freight-intensive developments and renovate aging facilities.

To meet the region's identified needs, CMAP developed a truck route categorization framework that features a four-tier system for describing the use and need of the subregion's roadways as related to trucks.

- Level A Truck Routes – These are high-mobility roads critical to through truck movements and for providing access to high-volume intermodal facilities. Truck-related investments should be prioritized on Level A Truck Routes even if passenger improvements are not necessary.
- Level B Truck Routes – These roads facilitate both through movements and local access for large trucks, including first-/last-mile connections. Truck-related investments should be balanced with passenger improvements on Level B Truck Routes.
- Level C Truck Routes – These roads provide local access for small trucks. Truck-related investments on these routes may be considered but not necessarily prioritized.
- Level D Roads – Trucks are strongly discouraged or restricted on these roads and truck access should not be a consideration in investment decisions.

The CMAP O'Hare Subregion Truck Route Plan concluded with a proposed truck route network and a set of recommendations related to identifying capital improvement projects, coordinating across agencies, and improving regional truck data. Other technical tasks conducted as part of the Truck Route Plan that are relevant to subregional freight planning in general include examining barriers to multi-jurisdictional truck routes (such as changing land use patterns, lack of local support, different weight limits across jurisdictions, etc.) and identifying opportunities for freight funding at the federal and state levels.

### Truck Route Plan for the City of Sharon

The primary goal of the study was to develop a truck route plan for the City of Sharon that could be implemented to move trucks safely and efficiently in Mercer County, Pennsylvania.[23] The City of Sharon experiences a significant volume of truck traffic (both tractor trailers and smaller distribution trucks) transporting goods to and from nearby rail lines, I-80, I-79, SR 60 and thirteen major industrial and distribution facilities located in or immediately adjacent to the study area. The study aimed to improve truck access to numerous facilities while also improving pedestrian and automobile safety and mobility in the area.

The study evaluated existing conditions such as daily truck volumes, hourly truck volumes, truck origins-destinations and deficiencies along current truck routes. The plan identified general improvements to truck movements such as truck route signage, pavement markings and traffic signal operations, in addition to short-term and long-term improvement alternatives such as minor route shifts and street connections. All alternatives aimed to improve access and reduce highlighted deficiencies. Furthermore, each improvement alternative was qualitatively evaluated with respect to seven key objectives that addressed the most notable project deficiencies and were then presented to stakeholders who selected, prioritized, and advanced locally preferred alternatives to consider for funding, programming and implementation needs.

## Technology and Data

The intersection of technology innovation and transportation continues to influence freight movement. Technology advancements can be used to address freight transportation needs and issues; support future growth in freight volume and flow; improve freight mobility across all modes in terms of safety, efficiency, and reliability; and foster increased economic growth through reduced transportation cost and enhanced productivity. Table 1 provides a high-level review of freight technology areas that should be considered when addressing the future of freight movement within the Boulevard CID.

**Table 1: Freight Technology Areas**

| Technology Area | Definition | Example |
|---|---|---|
| **Dynamic Route Guidance** | Dynamic Route Guidance includes technologies that incorporate real-time traffic and roadway conditions, allowing drivers to make re-routing decisions to a more optimal route. | The INRIX Artificial Intelligence (AI) Traffic tool is an example of dynamic route guidance. It detects changes in road conditions and alerts drivers instantaneously via a mobile application. This application can be used to inform drivers about slowdowns, incidents, and weather conditions allowing them to make dynamic routing decisions. |
| **Data Integration and Analytics** | The cumulation of large datasets accompanied by analysis to better understand | Denver's Enterprise Data Management System is a platform that compiles a wide |

[23] https://mcrpc.com/wp-content/uploads/2017/05/Sharon-Truck-Route-Report-FINAL.pdf

| Technology Area | Definition | Example |
|---|---|---|
| | travel patterns, and to help manage traffic and operate transportation systems. | range of real-time information, including freight, and uses artificial intelligence (AI) to help improve traffic management in the city. |
| **Automated and Connected Freight Vehicles** | Technologies used to support connected and automated freight vehicles that include a combination of smart infrastructure, the linkage of two or more trucks, and automated vehicle control systems. | Local initiatives such as the Atlanta Regional Commission's Connected Vehicle Project and the Gwinnett County Connected Vehicle Technology Master Plan are examples that demonstrate the testing and implementation of connected vehicle technology to improve traffic congestion and reduce crashes. These initiatives involve installing 1,700 roadside units (RSU) that communicate with dedicated short-range communications (DSRC) and cellular technology along and near smart corridors. |
| **Traffic Management** | Traffic management technologies are deployed to implement strategies to improve mobility and safety operations for all users. | SR 6 in Douglas and Cobb Counties is an example of a traffic management initiative that deployed freight technology. The project integrated roadway geometric and capacity improvements with freight intelligent transportation systems (ITS) elements to create a truck friendly corridor. The technology elements included dilemma zone protection for trucks and traffic responsive signal timing based on sensing mix of vehicles and adjusting for heavy truck volumes. |
| **Intermodal Terminal Operations** | The interchange between modes is crucial for freight mobility. Intermodal terminal operations include truck queuing, truck staging/parking and truck appointment systems. | An example of an intermodal terminal operations application is the Siemens Integrated Truck Guidance tool. It combines logistics scheduling data with real-time regional traffic data to provide an accurate status of the flow of goods and traffic conditions around a terminal. This information is shared with truck drivers, terminal operations, and logistics providers to provide a communication platform that helps eliminate bottlenecks and increase efficiency at terminals. |

As highlighted above, technology innovation across many freight-related areas is being implemented to improve freight operations and to support integrated transportation ecosystems that revolve around big data analytics, logistics as a service (Laas), Internet of Things (IOT), robotics, and automation[24]. Current and future trends (which will be explored in greater detail in Task 4) such as the switch to renewable energy sources, the integration of Artificial Intelligence (AI), and rising demand for e-commerce and same day-delivery expectations will require innovative solutions to accommodate freight needs. As noted in the 2020 State of Georgia's Supply Chain/Logistics Technology Ecosystem report, AI trends are shaping almost every industry, but especially the supply chain and logistics field. AI predictive capabilities in network planning are allowing markets to become more proactive by estimating how many freight vehicles are needed at specific locations based on demand, for example. Furthermore, mobile technology is being implemented to manage distribution operations while robotics is being used to create fully automated smart warehouses. As a freight hub, the Boulevard CID has an opportunity to leverage technology advancements to support enhanced mobility, greater safety, and improved reliability for passengers and freight.

## Summary of Best Practices

The review of notable practices has shown that there is a variety of analyses, technologies, policies, and operational and design approaches to help address freight planning challenges experienced within freight clusters. Many of the best practices cited were identified and called out in the scope of work for this Freight Cluster Plan. They were incorporated either as components of the technical approach, or as potential solutions as part of recommended projects, policies, and programs, and thus are intrinsically under consideration for the Plan. Nevertheless, for the sake of completeness, these practices are included in the comprehensive summary provided below, along with other best practices uncovered through research and not explicitly included in the scope of work. The best practices to be incorporated into the Boulevard CID Freight Cluster Plan are summarized below:

- Transportation Condition and Performance
    - **Freight-Focused Safety Analyses.** Many of the studies and plans included in the best practices review featured safety analyses that focused on freight vehicles. Primarily, these included analyses of crashes involving trucks and those occurring at highway-rail crossings. Studies that focused on truck parking also included analyses of crashes involving parked trucks as an indicator of where truck parking needs are a driving factor of safety challenges. Incorporating freight-focused safety analyses is considered a best practice for freight cluster planning and has already been identified as such in the Freight Cluster Plan's scope of work.
    - **Freight-Focused Travel Time and Congestion Analyses.** The studies and plans included as part of the best practices review also featured analyses of highway performance that focused on heavy trucks. Examples include intersection level of service

[24] TAG Supply Chain and Logistics, 2020 State of Georgia's Supply Chain/Logistics Technology Ecosystem. https://www.tagonline.org/wp-content/uploads/2020/01/2019-Supply-Chain-Report_compressed.pdf

analyses along freight corridors (a scope-identified best practice) and travel time analyses using truck probe data. These types of analyses are a best practice because they allow stakeholders to focus in on corridors that are important for freight mobility but may not receive the same attention as corridors that carry large volumes of both freight and commuter traffic.

- **Freight Asset Condition Analyses.** In addition to safety and performance analyses, notable studies and plans also devoted significant attention to the condition of freight assets. In particular, pavement and bridge conditions on freight corridors were a primary interest. This scope identified best practice highlights both the impact that goods movement has on the state of good repair of the transportation system and the impact that the condition of the transportation system has on freight mobility. Freight vehicles often disproportionately cause damage to transportation assets. However, freight vehicles are significantly impacted by poor infrastructure conditions as they can damage valuable goods and make freight trips less efficient, for instance when vehicles must take circuitous routes to avoid bridges or other facilities with conditions that are insufficient for carrying heavy trucks.
- **Scenario Planning for Freight.** A notable practice observed in some plans and studies was the use of scenario planning within a freight context. Generally, these plans developed scenarios for growth in freight activity (i.e., in terms of freight traffic volumes) and/or changes to external factors impacting freight at the cluster level (e.g., changes to trade policy, funding levels, etc.) and assessed the implications of these scenarios for the freight cluster. This is a best practice because it allowed those stakeholders to understand the implications of alternative futures for investment needs and policy and programmatic strategies.

- Land Use
  - **Utilizing Zoning to Mitigate Freight Impacts.** A strategy employed in some of the plans and initiatives that represents a best practice is the use of zoning to mitigate freight impacts. An example is zoning ordinances to require the provision of space for truck parking and staging as part of warehousing and industrial developments, mitigating the impact of truck parking needs on neighboring communities. Another example is zoning ordinances that alter how new warehousing and industrial developments interact with the public right-of-way, placing a greater focus on limiting driveways, encouraging inter-parcel access, preserving space for alternative transportation modes, and creating buffers between industrial and non-industrial land uses.
  - **Utilizing Zoning to Preserve Freight-Intensive Land Uses.** Another land use strategy that represents a best practice is the use of zoning to preserve freight-intensive land uses. These practices include the development of overlay districts and performance-based zoning codes that encourage or make it easier to develop land for freight-intensive uses. This is a best practice that is most relevant for freight clusters experiencing pressure for the redevelopment of industrial land to residential, commercial, and mixed-use.
- Truck Parking and Staging
  - **Truck Parking Technologies.** A notable practice observed in some plans was the identification (and in some plans the conceptual development) of ITS technologies to

improve the utilization and efficiency of truck parking. These technologies were conceived as part of state and/or regional ATMS and aimed to deliver to motor carriers information on the location and quantity of available truck parking. The exploration of these types of truck parking solutions is a best practice for freight clusters because there may be opportunities for local applications of truck parking ITS concepts that could eventually be folded into a broader regional and/or statewide system.

- **Public-Private Partnerships for Truck Parking.** The development of public-private partnerships (P3s) to increase the supply of truck parking is a notable practice that was observed in some plans and initiatives. There were examples of plans and initiatives that highlighted some of the impediments to developing truck parking P3s and how those impediments might be overcome. The exploration of truck parking P3 opportunities represents a best practice for freight clusters because they may offer solutions to existing truck parking and staging needs. Furthermore, as truck parking P3s are an emerging focus area for addressing truck parking needs, it also represents an opportunity for freight clusters to contribute to the development of successful template agreements that may be replicated elsewhere.
- **Public Truck Parking.** Another notable best practice for truck parking is the provision of public truck parking beyond traditional locations, such as through public rest areas and welcome centers. There are examples of local governments providing truck parking in the form of municipal lots dedicated to truck parking and the development of ordinances codifying the allowance of overnight truck parking on specific city streets. This represents a best practice for freight cluster planning as it demonstrates how other areas have taken steps to address truck parking challenges. These practices also provide examples of how community concerns about truck parking near residential and commercial areas have been mitigated.

- Stakeholder Engagement
  - A common theme of nearly all the studies, plans, and initiatives included in this review is the importance of stakeholder engagement. Most of the plans and initiatives reviewed had significant outreach to identify and prioritize investments. This provided the dual benefit of improving the quality of the finished products and making them actionable and implementable so that real-world improvements could be gained. This best practice has already been integrated into the Freight Cluster Plan as part of the project scope of work.

In addition to the lessons learned from the studies, plans, and initiatives included in this review, it is important to note that a number of freight cluster plans have been completed, or are nearing completion, as part of ARC's freight cluster planning program. These include plans for the Gateway85 CID, the Tucker-Summit CID, Aerotropolis Atlanta CIDs, and Spalding County. Though we are just at the beginning stages of being able to review and assess these studies for best practices, one key lesson learned that has already emerged is the importance of creative and multiple avenues for engaging stakeholders. All of these studies featured multiple outreach efforts including electronic surveys, online maps for commenting, and interviews, among others. These types of efforts for engaging stakeholders will be critical for the Boulevard CID moving forward.