Freight and Export Strategies

Economic Development for the Global Economy

July 13, 2020
Acknowledgements

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WESTMARC

Notice

The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official policy of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.
Introduction

Success in exporting requires a diverse blend of expertise and partners, from the bravery of entrepreneurs to take risks, to the keen organizational skills of logistics partners, to the liaisons savvy in business and culture to open doors to international markets. No single industry drives the success or failure of these ventures. All play a significant role. The purpose of this document is to strengthen the connection between businesses that export their goods and the freight industry upon which they rely to move their goods to market. Export and freight strategies benefit these two industries that, together, drive the economic competitiveness of the global market.

The Sun Corridor in Arizona strives for success in these global markets. Regularly cited as friendly to business and entrepreneurs with close proximity to major markets, this megaregion delivers goods and services around the globe. Freight providers move more than $60 million of these goods destined for international markets every day. With significant expertise in business and transportation, the Sun Corridor is poised for accelerated growth and increasing success.

Despite these assets, challenges remain. The Sun Corridor Economic Development for the Global Economy (EDGE) Program launched in 2016 with the support of partners throughout Greater Phoenix, Greater Tucson, and Pinal County. Experts from economic development and transportation organizations joined together to confront the realities of the challenges impeding international trade, and to celebrate hard won successes.

In the first year of the program, 17 exporters were recognized with awards at an event attended by elected officials and business leaders. In the second year, EDGE continued to celebrate the success of 20 businesses exporting goods and services, as well as provide technical assistance and funds to help them enter new markets. In its third year, EDGE has evolved into providing more in-depth support by offering training to businesses and connecting them with talented students from Arizona State University’s Thunderbird School for International Business.

EDGE has progressed from promoting exporters to empowering them. This focus is facilitated through training for the businesses, as well as strategies to help freight interests better respond to their needs. This document will detail the technical assistance given to exporters, reflect the concerns of businesses and freight providers, and provide an update on strategies to enhance exporting through freight solutions.

The concerns raised and the solutions offered in this document are not unique to Arizona’s Sun Corridor. Often, both will be relevant to communities throughout the country. This document is offered to all as a catalyst to begin critical conversations with
exporters and freight providers. Not only will these two groups benefit from these conversations, but the economy will thrive as well.

Outreach to and Insights from Exporters
The EDGE Program reached businesses that export goods and services through three training programs. Each program was tailored to a specific geography, as well as a specific stage of development for the business. Businesses applied to participate in each of the three programs and were accepted based on an evaluation of their commitment and capacity. Throughout the training sessions, the businesses received customized technical assistance and access to resources. Feedback from the businesses was also collected during these sessions. This information forms the basis for the corresponding strategies intended to accelerate successful exporting.

- The first training was facilitated by the Metro Phoenix Alliance (MPEXA) through their Export Explore Program. Implemented in 2017, Export Explore is a tool that is intended to entice more companies to learn about and grow their export potential. Made possible through a grant provided by JPMorgan Chase & Co. and in partnership with Sun Corridor EDGE and the Arizona District Export Council, small to mid-sized companies in Greater Phoenix applied to participate in a workshop series to learn from experts about multiple export-related topics. The program concludes with a “pitch competition” in which participating companies can receive additional resources by elaborating their export goals. Export Explore fellows from the Thunderbird School of Global Management participated in workshops and were matched with Export Explore award recipients to work on research-based projects (within the realm of exportation) for six months. The target audience for this training was beginning exporters in Maricopa and Pinal Counties.

- The second training was facilitated by the Arizona Commerce Authority (ACA) through its ExporTech Program. This is part of the ACA Arizona Manufacturing Extension Partnership program in conjunction with the U.S. Commercial Service. The program consists of three workshops that are combined with individualized coaching, resulting in a complete export plan within approximately 60 days. This accelerated program is execution driven, with a dedicated team of partners, who make it easier to go to market and implement the plan. ExporTech offers a peer group model, typically limited to leaders from four to eight companies per cohort. The target audience for this program was Sun Corridor companies that were both new to export companies, as well as companies looking to expand into new export markets.

- The third training was facilitated by the Pima Association of Governments for beginning exporters in Pima and Pinal Counties. Workshops included industry
experts and business owners who exchanged information and identified the resources available to explain the process of exporting goods and clarify how exporting may work for their business. Tetakawi (The Offshore Group) and Chase Bank served as the established local experts and resources for the workshop. The speakers addressed the logistical and legal considerations of exporting, as well as the capital and credit aspects of working in markets external to the United States. Discussion included points on air and ocean shipments, compliance concerns and explained how the export control classifications number (ECCN) has a role in identifying goods in process. The dialogue also included information related to the financial aspects of exporting goods outside of the United States.

The feedback from the training programs revealed a number of shared challenges and exciting opportunities. A common theme was the thirst for more information and a deeper understanding of the nuances in exporting. Many did not understand the details for how the exporting process works. This compounds the fear many feel when faced with not understanding the impact of taxes, tariffs, and legal risks.

Businesses also struggle with explaining a new product in foreign markets. This affects marketing, but also how the products are categorized. Communication gaps or cultural insensitivity can exacerbate the issues. Financial issues can also plague early forays into exporting. International billing may pose challenges, heightening the fear of not being paid for goods and services.

Despite these impediments, the businesses in the training sessions proved savvy and innovative. They reported taking advantage of available resources, such as governmental databases with information. They are building relationships with service providers to leverage their knowledge. They are educating themselves on pricing to better understand the factors that affect pricing as well as how to reduce taxes on international trade.

As businesses learn more about exporting, by necessity they learn more about freight as well. According to one exporter, “We are currently shipping our product to international markets in multiple ways. We have made inroads with distributors and with some interested in private label services in a few countries. For these, the services we utilize are generally driven by the size of the order. In some cases, we have used small package courier services like UPS. We have also used international freight services for larger orders like DHL Global Forwarding or FedEx Freight. We also have direct-to-consumer orders available. For these, we use courier, USPS, and partnership services between the two.”

It is common for businesses to bring their goods to market through a variety of methods. Other methods include international carrier via ground and ocean, and air freight when
necessary due to time constraints. For some, the customers set up the shipping or the broker expeditors and DHL.

Thanks to these methods, these exporters are showing success in markets like Mexico, Canada, the European Union, Saudi Arabia, Argentina, Brazil, Columbia, Hong Kong, Indonesia, Israel, Nigeria, and Turkey. Their exports cover a wide array of products, from paper to ballistic body armor, from skin care to solar hydro panels, and from alcoholic kombucha to high pressure fog systems.

During the training opportunities, the businesses developed and executed exporting plans to help them overcome the challenges and build even greater success in international markets. In this process, the businesses identified strategies to help them better leverage freight in their exporting endeavors. These strategies include the following:

- Secure a distribution partner in the importing country and use a carrier to support the customs process.
- Share information about the shipping and exporting processes so that the customer/distributor knows what to expect.
- Standardize the documentation process to help alleviate delays in clearance.
- Pursue relationships with shipping providers to react better to service challenges.
- Price out shipments via multiple carriers and send smaller test shipments first.

The next section will offer insights gleaned from freight providers resulting from extensive outreach.

Outreach to and Insights from the Freight Industry

Freight is a critical driver of the economy. Insights from leaders in the freight industry can help to deepen the understanding of the main opportunities and challenges that affect the ability of businesses to move their products to markets. While there are a number of factors that affect the freight industry, regulations are a lever that can accelerate or impede success. The advent of the Electronic Logging Device (ELD) regulations has increased compliance with safety as the main goal. While increased compliance is a positive outcome, the regulations also present unintended challenges that impact the freight industry, with corresponding consequences for the economy if unaddressed.

With support from the Federal Highway Administration with a Technology in Innovation Deployment grant, the EDGE partners commissioned WSP and Freight Insights, LLC, to conduct a supply chain impact and assessment. This was done within the context of the
new Electronic Logging Device (ELD) regulations on the freight industry. This assessment included a literature review, key stakeholder interviews, and data analysis. The highlights of the findings are below. The full report is available in the attachments section.

Supply chains are formed with a linked set of processes for sourcing materials and transporting them to manufacturing, then distribution and finally to the point of sale. Supply chains power the economy from start to finish.

Transportation is the linking mechanism of the supply chain, both globally and locally. The figure below shows simplified supply chain processes, the main factors affecting transportation capacity across the supply chain. It also shows how ELD and hours-of-service (HOS) regulations are key to determining transportation capacity and thus overall supply chain performance.

A system often has a bottleneck that limits its throughput. In supply chains, transportation is often such a constraint. The ELD mandate and HOS regulations limit available transportation capacity in two ways: by capping the daily output of drivers and by raising barriers for new entrants to the market.

HOS regulations help keep roadways safe by setting the maximum work hours and minimum rest hours for commercial drivers, principally because a tired driver is at risk of making slower decisions or falling asleep. There is an inherent conflict between truck-driver pay and safety. Driver pay is typically activity-based (per mile driven, per stop made). The more hours worked each day and the more activities a driver completes, the more money they earn. This can lead to risky and unsafe driving practices.
HOS regulations and the accompanying enforcement policies are intended to balance the safety of everyone on American roads—including the truck drivers themselves as well as the public—with the productivity and income of commercial drivers. HOS regulations are in place to make the balance decision straightforward and consistent across the millions of drivers at work in the United States each day.

The ELD mandate to improve compliance with HOS regulations across the commercial trucking landscape can have a major impact on the speed, efficiency, and output of the U.S. supply chains and the health and well-being of the country. Logs are a record of truck driver activity and are required by the U.S. Department of Transportation (U.S. DOT) for all drivers engaged in interstate carriage. The previously existing method of logging a driver’s duty hours on paper allowed drivers room to complete the documentation with some leeway in accuracy. The ELD regulation enforces the regulations with limited flexibility. Regulators believed that better compliance with the HOS regulations would reduce the potential for drivers operating vehicles while tired and therefore improve highway safety.

The ELD mandate took effect in January 2017 and accentuated the problem of adequate truck parking on the nation’s highways and in metropolitan areas. While addressing one safety issue, the mandate increased awareness of parking infrastructure as another significant factor in highway safety. The ADOT and MAG truck parking studies are intended to address the truck parking need, which will help improve safety overall.

Freight stakeholders ranked their concerns about parking and other factors that impact the industry as follows:
The enforcement of the ELD mandate, the inflexibility of the current HOS regulations, and inadequate space for truck parking have together had a serious impact on supply chain productivity. Prior to the HOS regulations revisions, drivers could use time at customer locations as break time. Without this provision, they must search for an acceptable parking location for a 30-minute off-duty break. Lost productivity results from drivers looking for parking for three purposes: the 10-hour break, the 30-minute break, or waiting for a scheduled pickup or delivery, referred to as logistical parking. Logistical parking is not particularly affected by ELDs because it is not mandated (although trucks parked for logistical reasons can affect the space available for the required rest that ELDs monitor).

The 10-hour and 30-minute requirements are both mandated and are very much affected. The ELD mandate has implications for supply chain efficiency and cost. There are three areas of pressure on commercial drivers. The precise measurement of the ELD mandate, the increased stringency of the HOS regulations, and increasing common truck parking restraints. These combine to magnify the challenges commercial drivers face in planning their work and successfully executing their trip itinerary.

This challenge extends to planning agencies as they seek to relieve the pressure points to improve supply chain efficiency. Certainly, this need is represented by the freight challenges identified by EDGE and the strategy development defined by the MAG and ADOT parking studies, as well as this ELD impact paper.

In summary, the impact of the ELD mandate has had a positive effect on HOS regulations compliance across the trucking industry. However, the ELD mandate, combined with HOS regulations, puts pressure on drivers and increases the need for truck parking. The parking infrastructure needs will only increase over time as the demand for freight and the numbers of trucks on the highways reach new volumes. Arizona and the MAG region are affected by the growth in regional and local needs, as well as supporting the national supply chain with services for through traffic.

For additional information, please refer to the full ELD study included as an attachment.

The following section offers an update on progress made in the strategies to accelerate the economy and support exporting through freight.
## Strategies to Enhance Exporting through Freight Solutions

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<th>Freight Challenges</th>
<th>Strategies</th>
<th>Lead</th>
<th>Progress</th>
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<tr>
<td><strong>Infrastructure capacity:</strong> Limited or misaligned infrastructure capacity inhibits economic growth (i.e. West-East connectivity in Tucson, two-lane state highways, incompatible land use, shortage of passing and climbing lanes on Key Commerce Corridors, winter weather-related disruptions along I-40, and dust storms along I-10).</td>
<td>Complete the Sonoran Corridor Project, a proposed new transportation facility that would connect Interstate 10 and Interstate 19 south of the Tucson International Airport.</td>
<td>PAG and ADOT</td>
<td>ADOT, in partnership with FHWA, is currently conducting a multi-year environmental study to identify and analyze corridor alternatives, including a no-build option. The Tier 1 draft Environmental Impact Study (EIS) is anticipated in the summer 2020 for public and agency review. The Final Tier 1 EIS and Record of Decision are anticipated in late 2020. Subsequent Tier 2 environmental studies would evaluate design concepts for specific alignments within the corridor. In addition, a number of infrastructure improvements and planning studies have been made or are underway, such as the I-10 Loop 202 to SR 387 (Wild Horse Pass Corridor), the Interstate 10 Broadway Curve Improvement Project (I-10/I-17 split to Loop 202), I-10, State Route 85 to Verrado Way project, and the opening of the South Mountain freeway.</td>
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<td>Conduct the North-South Corridor Study, a</td>
<td>ADOT</td>
<td>In fall 2019, ADOT published the Tier 1 draft Environmental Impact Statement with a</td>
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<td>Proposed Transportation Facility</td>
<td>Preferred Corridor for Public and Agency Review. The Final Tier 1 EIS is anticipated in late 2020 with a selected alternative. Subsequent Tier 2 environmental studies would evaluate design concepts for specific alignments within the corridor.</td>
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<tr>
<td>Proposed</td>
<td>Preferred corridor for public and agency review. The Final Tier 1 EIS is anticipated in late 2020 with a selected alternative. Subsequent Tier 2 environmental studies would evaluate design concepts for specific alignments within the corridor.</td>
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<tr>
<td>Eloy to Apache Junction</td>
<td>Tier 1 final EIS is anticipated in early 2021 with a preferred corridor alternative. Subsequent Tier 2 environmental studies would evaluate design concepts for specific alignments within the corridor.</td>
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<tr>
<td>Nogales to Wickenburg Tier 1 Environmental Impact Statement for I-11</td>
<td>The Tier 1 draft EIS was published in spring 2019 with a recommended alternative for public and agency review. The Tier 1 final EIS is anticipated in early 2021 with a preferred corridor alternative. Subsequent Tier 2 environmental studies would evaluate design concepts for specific alignments within the corridor.</td>
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<tr>
<td>Regional Sales Tax to Fund Transportation Improvements</td>
<td>PAG established a Citizens Advisory Committee in 2018 to help guide the process for developing a new RTA plan. With input from the public, PAG member agencies, and stakeholders during the process, the CAC, RTA Technical Management Committee, and RTA Board will work together on various elements of plan development (e.g., plan elements, projects and categories, funding amounts, policies, etc.). No target date for an election has been set.</td>
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MAG conducted a values-mapping exercise to inform the development of the next Regional Transportation Plan (RTP), *Momentum*, to better understand what residents most value about transportation. Technical analysis is underway to better understand regional multimodal transportation needs. Results of MAG’s system-wide analyses will help to inform development of a new RTP and identify the highest performing transportation investments that will be proposed to be funded, in part, by an extension of Maricopa County’s transportation sales tax.

Convene business and government leader forums to discuss issues and alignment.

JPAC and ADOT Freight Advisory Committee

The MAG Freight Subarea Project Assessments and the MAG Truck Parking Study public outreach efforts include stakeholder meetings with industry and government representatives. The MAG Truck Parking Study launched in early October 2019 and the three remaining SPAs are underway in 2020.

Incorporate additional freight design standards (i.e. wider turn radii, wider Right of Way, more robust pavement)

ADOT and MPOs

MAG is scheduled to conduct four Freight Subarea Project Assessments (SPAs) in the industrial clusters of the MAG region that will develop an inventory of corridor needs to reduce commercial vehicle congestion and
sections, and road geometrics affecting maneuvering large trucks).

improve safety. Recommend phased solutions to reduce commercial vehicle congestion and improve safety for all modes (vehicles, trucks, bicycles, pedestrians, transit) through innovative and traditional methods. Recommendations could include access management treatments and strategies, new sidewalks and bicycle facilities in congested corridors where there are freight-pedestrian/bicycle conflicts, and transit improvements, such as bus pullouts, transit stop pads, and shelters. MAG finalized the first freight subarea project assessment in October 2019 and the last three assessments are underway in early 2020.

**Border delays:** Delays at border caused by high congestion and security processes costs money. Infrastructure at the border needs to be added, such as

<table>
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<th>Travel during off peak hours.</th>
<th>Shippers</th>
<th>Shippers are responding to the market by adjusting their hours of travel as needed.</th>
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<tr>
<td>Leverage Skybridge to increase commercial flights to Mexico.</td>
<td>Businesses and shippers</td>
<td>Commercial flights from Skybridge to Mexico are expected to increase to 2,000 a year and then to 10,000 a year by 2036. ¹</td>
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improvements at the Douglas port of Entry and others.

- Add a bridge for commercial traffic at the proposed new Traffic Interchange at Mariposa Road and I-19 near the Mariposa Port of Entry.

**ADOT**

- Improvements to SR 189 are underway. The interchange between SR 189 (Mariposa Road) and I-19 will be a bidirectional flyover. While not specifically set aside for commercial traffic, the flyover accomplishes the same goals: taking through-traffic off the city street and removing most heavy truck traffic from the city street and at-grade intersection.

**Truck parking:** Limited truck parking makes it more difficult for drivers to take mandatory rests and increases safety concerns. Electronic logging device regulations impact this issue and the logistics market.

- Evaluate future technologies such as automated trucks and platooning.

**Industry**

- The MAG Truck Parking study includes a task to evaluate the impact of autonomous trucking. This task will consider the various ways that autonomous trucking could play out in the future and assess how this could impact the demand and supply for truck parking. The MAG Truck Parking Study launched in early October 2019.

- Conduct Truck Parking Studies.

**ADOT and MAG**

- The ADOT Truck Parking Study has been completed. ADOT is in the process of addressing the following projects and initiatives: design and expansion of truck parking at the Haviland, Bouse Wash, and Meteor Crater Rest Areas. Other initiatives include developing Truck Parking Information Management System (TPIMS) proof of concept and leverage this to inform additional
investments; integrate truck parking into Arizona’s 511 system, develop design standards and identify additional truck parking locations, determine the feasibility of truck turnouts and monitor the impact of implemented truck parking solutions. In addition, ADOT has received a $6.8 million Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant to implement a Truck Parking Availability System along I-10 from California to Texas.

MAG launched a complementary truck parking study in the fall of 2019. The MAG Truck Parking Study builds upon the recommendations of the ADOT truck parking initiative and focus primarily on the truck parking trends in the industrial clusters of the MAG region.

<p>| Conduct Electronic Logging Device Study. | MAG | The MAG Truck Parking Study includes a task to evaluate the electronic logging device impacts on the regional logistics market. The consultant team will provide an evaluation of the impact of hours-of-service and ELD requirements to carrier operations overall, and |</p>
<table>
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<tr>
<th><strong>Truck and driver shortages:</strong> Shortages of truck drivers and trucks decrease productivity.</th>
<th>Evaluate future technologies such as automated trucks and platooning.</th>
<th>Industry</th>
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<tr>
<td>The MAG Truck Parking Study includes a task to evaluate the impact autonomous trucks will have on truck parking. This task considers the various ways that autonomous trucking could play out in the future and assess how this could impact the demand and supply for parking.</td>
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<tr>
<td>Shift to just in time delivery with strategically located distribution centers.</td>
<td>MAG is conducting four Freight Subarea Project Assessments (SPAs) in the industrial clusters of the MAG Region that focus on moving goods more efficiently, reducing congestion and improving safety. The transportation improvements that are recommended from these studies will provide a more reliable transportation network for the distribution of goods to/from the region.</td>
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<tr>
<th><strong>Maintenance:</strong> Infrastructure maintenance increase costs. (i.e. overgrown trees, potholes).</th>
<th>Improve and update existing roadway infrastructure in industrial clusters of the Sun Corridor to support the movement of goods and industrial growth.</th>
<th>ADOT and MPOs</th>
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<td>MAG is conducting four Freight Subarea Project Assessments (SPAs) in the industrial clusters of the MAG Region that focus on moving goods more efficiently, reducing congestion and improving safety. The recommendations from these studies will include infrastructure improvements.</td>
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**Policy:** Policies at state and local level do not always support freight. Examples:

- Noise ordinances cited as a problem by retail companies
- Better coordination is needed to provide more consistency regarding overweight and over-dimensional loads
- Low axle weights cited as a top issue by natural resources sector
- Freight needs and projects are not fully integrated into the statewide planning process and this results in freight focused

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<tr>
<th>Address through Regional Transportation and State Transportation Plans.</th>
<th>ADOT and MPOs</th>
<th>A number of different funding sources and projects are addressing this need. For example, partners throughout the megaregion and state coordinated with ADOT on the state freight plan that identified a prioritized list of freight projects that received the states distribution of FAST Act freight funding. This level of coordination will continue through future surface transportation bills. The extension of regional sales tax efforts will likely include freight projects. Future studies could include an analysis of the need for freeway maintenance to accommodate the impact of oversized and overweight vehicles.</th>
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<tbody>
<tr>
<td>Convene business and government leader forums to discuss issues and alignment.</td>
<td>JPAC and ADOT Freight Advisory Committee</td>
<td>Business and government leaders regularly attend Joint Planning Advisory Council meetings. A future meeting can include discussion and possible next steps on this topic.</td>
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- Projects not being funded
- Need to better coordinate risks that affect freight.
Conclusion

As the Sun Corridor positions itself for success in the global marketplace, a range of diverse stakeholders and solutions will be needed. This success will not be defined or delivered by any one sector. Entrepreneurs, freight leaders, regional planning agencies, local governments, and departments of transportation all contribute unique perspectives, skill sets, and realms of influence. What sets the Sun Corridor apart from competitors in this global competition for prosperity is not our sunshine or desert climate, but our commitment to working together and our close coordination on complex issues. This cooperation will support the Sun Corridor in mitigating issues as they arise to claim an increasingly bigger share of the world’s market.

For more information about megaregion coordination in the Sun Corridor, please visit the website for the Joint Planning Advisory Council at jpacaz.org/.
Electronic Logging Devices
Supply Chain Impact and Assessment

Maricopa County
June 5, 2020

Prepared for: MARICOPA ASSOCIATION of GOVERNMENTS
Prepared by: WSP Freight Insights, LLC
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Acronyms and Definitions of Terms

**AOBRD – Automatic Onboard Recording Device** – With the arrival of new technology for recording a driver’s duty status, the Automatic Onboard Recording rule was published in 1988 to set standards for use of digital methods of recording driver duty status.

**ATRI – American Trucking Research Institute** – research arm of the American Trucking Association.

**CDL – Commercial Driver’s License** – license required to operate large, heavy, or placarded hazardous material vehicles in commerce

**CMV – Commercial Motor Vehicles** – any vehicle used to transport goods or passengers for the profit of an individual or business. Examples of CMVs include pickup trucks, box trucks, semi-trucks, vans, coaches, buses, taxicabs, trailers and travel trailers

**CVSA – Commercial Vehicle Safety Alliance** – a nonprofit association of local, state, provincial, territorial and federal commercial motor vehicle safety officials and industry representatives

**ECM – Engine Control Module** – a computer embedded into the vehicle to control and monitor things such as fuel injection, maximum speed, lighting, and many other electronic systems. These devices may also manage engine operations.

**EDGE – Economic Development for the Global Economy** – an initiative formed in 2009 with the shared vision to jointly coordinate planning efforts for the greater good of the participating regions and the State of Arizona between the Maricopa Association of Governments (MAG), the Pima Association of Governments, the Central Arizona Governments, the Central Yavapai Metropolitan Planning Organization, and the Sun Corridor Metropolitan Planning Organization

**ELD – Electronic Logging Device** – synchronizes with a vehicle engine to automatically record driving time, for easier, more accurate hours of service (recording as defined in the 2015 final ELD rule)

**FHWA – Federal Highway Administration** – a division of the U.S. Department of Transportation that specializes in highway transportation

**FMCSA – Federal Motor Carrier Safety Administration** – an agency in the U.S. Department of Transportation that regulates the trucking industry whose primary mission is to reduce crashes, injuries and fatalities involving large trucks and buses

**HOS – Hours of Service regulations** – issued by the Federal Motor Carrier Safety Administration to govern the working hours of anyone operating a commercial motor vehicle in the United States

**LTL – Less than Truckload** – transportation of comingle pallet-sized quantities of freight serving the shipping needs between parcel carriers and full truckload carriers
MAG - **Maricopa Association of Governments** - a Council of Governments that serves as the regional planning agency for the metropolitan Phoenix area

MAP-21 - **Moving Ahead for Progress in the 21st Century Act** - a funding and authorization bill to govern United States federal surface transportation spending passed by Congress on June 29, 2012, and signed by President Obama

MCSAP - **Motor Carrier Safety Assistance Program** - a federal grant program that provides financial assistance to states to reduce the number and severity of crashes and hazardous materials incidents involving CMVs

NHS - **National Highway System** - a network of strategic highways within the United States, including the Interstate Highway System and other roads serving major airports, ports, rail or truck terminals, railway stations, pipeline terminals and other strategic transport facilities

OO - **Owner-Operator** - individuals who both own and operate a trucking business. There are approximately 350,000 owner-operators registered in the United States. Most lease on to larger carriers and operate under that carrier's U.S. DOT number.

RODS - **Record of Duty Status** - required documentation maintained and kept current by commercial drivers showing each change in duty status. For each change in duty status, the name of the city/town/village with the state abbreviations must be recorded. Upon request, motor carriers may be asked to submit documents supporting the driver's record of duty. Such documents can include any of the following: toll receipts/records, fuel receipts/records, bills of lading, trip reports or another type of document for verification.

SMS - **Safety Measurement System** - an FMCSA database and information system to assess compliance with various safety regulations and prioritize carriers for interventions based on their on-road performance and investigation results. On-road performance includes data collected from roadside inspections and crash reports; investigation results include violations discovered within the previous 12 months.

U.S. DOT - **United States Department of Transportation** - federal department of the U.S. government concerned with transportation
Introduction and Orientation

The Arizona Sun Corridor is a mega region comprising of cities across multiple counties in Arizona, the largest of which are Phoenix and Tucson. The work of the Sun Corridor is undertaken by the Joint Planning Advisory Council, which is a partnership of planning agencies. This advisory group includes Maricopa, Pima, and Pinal Counties. The Central Arizona Governments, Central Yavapai Metropolitan Planning Organization, Maricopa Association of Governments (MAG), Pima Associations of Governments and Sun Corridor Metropolitan Planning Organization are included in this coalition.

In 2016 the Joint Planning Advisory Council developed the Economic Development for the Global Economy (EDGE) program. EDGE was formed to promote business within the Sun Corridor, particularly in developing regional businesses and export capabilities. The range of exports includes not only goods but services as well. An outgrowth of the early years of EDGE was the recognition that enhancing freight mobility in the region was a specific need that warranted further exploration. Freight studies conducted by Arizona Department of Transportation (ADOT), MAG, and others have focused on issues surrounding supply chain effectiveness and what factors shippers and freight transportation companies consider critical.

In the most recent EDGE work, a series of “freight challenges” were developed with corresponding strategies for specific initiatives to follow. These projects were assigned to various members of the partnership. MAG and ADOT were tasked with developing truck parking studies. MAG was also given the responsibility of evaluating the impact that electronic logging devices (ELD) regulations have had on the regional logistics market. This document will evaluate this issue as part of the EDGE program and has been prepared as part of a larger analysis for the MAG Truck Parking Study.

Supply chains are formed with a linked set of processes for sourcing materials and transporting them to manufacturing, then distribution and finally to the point of sale. Supply chains power the economy from start to finish.

Transportation is the linking mechanism of the supply chain, both globally and locally. Figure 1 shows simplified supply chain processes, the main factors affecting transportation capacity across the supply chain, and how ELD and hours-of-service (HOS) regulations are key to determining transportation capacity and thus overall supply chain performance.
A system always has a bottleneck limiting its throughput. In supply chains, transportation is often such a constraint. The ELD mandate and HOS regulations limit available transportation capacity in two ways: by capping the daily output of drivers and by raising barriers to entry for new entrants to the market.

HOS regulations help keep roadways safe by setting the maximum work hours and minimum rest hours for commercial drivers, principally because a tired driver is at risk of making slower decisions or falling asleep. There is an inherent conflict between truck-driver pay and safety. Driver pay is typically activity-based (per mile driven, per stop made). The more hours worked each day and the more activities a driver completes, the more money they earn. This can lead to risky and unsafe driving practices.

HOS regulations and the accompanying enforcement policies are intended to balance the safety of everyone on American roads—including the truck drivers themselves as well as the public—with the productivity and income of commercial drivers. HOS regulations are in place to make the balance decision straightforward and consistent across the millions of drivers at work in the United States each day.
The ELD mandate to improve compliance with HOS regulations across the commercial trucking landscape can have a major impact on the speed, efficiency, and output of the U.S. supply chains and the health and well-being of the country. Logs are a record of truck driver activity and are required by the U.S. Department of Transportation (U.S. DOT) for all drivers engaged in interstate commerce. The previously existing method of logging a driver’s duty hours on paper allowed drivers room to complete the documentation with some leeway in accuracy. The ELD regulation enforces the regulations with limited flexibility. Regulators believed that better compliance with the HOS regulations would reduce drivers’ operating vehicles while fatigued and therefore improve highway safety.

The ELD mandate took effect in January 2017 and accentuated the problem of adequate truck parking on the nation’s highways and in metropolitan areas. While addressing one safety issue, the mandate highlighted that parking infrastructure is a significant factor in highway safety. The ADOT and MAG truck parking studies are intended to address the truck parking need, which will help improve safety overall.

**Electronic Logging Device Regulation and Technology**

The recording of a daily work history for commercial motor vehicles (CMV) was put in place to ensure that drivers followed regulations governing their HOS. The ELD is a technology tool to improve the monitoring of and compliance with these rules, which have been in place in various forms since the late 1930s. Figure 2 shows a sample paper log, or Record of Duty Status (RODS) showing a sample driver’s day logged into one of four categories of duty.

![Figure 2: Daily Record of Duty Status](https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/docs/HOS_Logbook_Examples_2015MAY_508.PDF)

The Federal Motor Carrier Safety Administration (FMCSA) requires that drivers log their work and non-work schedules in compliance with the current regulations. This record of work is subject to U.S. DOT inspection and can lead to disciplinary action for both drivers and motor carriers, including the removal of a commercial driver’s license (CDL). All of a driver’s time must be logged to one of these four categories:

- **Off Duty** – time that the driver is relieved of all duty and responsibility for performing work
- **Sleeper Berth** - time in the back of the truck (the sleeper berth), which can contain a bed and other amenities, (similar to the Off Duty category)

- **Driving** - time spent operating the commercial motor vehicle

- **On Duty (not driving)** - all time spent working while not driving (e.g., fueling, loading/unloading)

Time parked to rest is logged as Off Duty or Sleeper Berth. Time driving is always logged as Driving, and when the driver is working but not driving is logged as On Duty time.

Both drivers and the companies they work for are tasked with completing, checking, and storing these logs. This task represents a cumbersome administrative for everyone involved. To streamline these tasks, Automatic Onboard Recording Devices (AOBRDs), Figure 3, were developed in the later 1980s and the FMCSA issued its 1988 AOBRD rule.


These devices replaced the driver’s record with an automated duty log captured electronically from the operating information of the vehicle. Like much of modern-day technology, the AOBRD converted the paper-based logging process to an automated paperless process linking the engine and GPS data to an electronic recording device for the driver to record duty status. Use of an AOBRD was discretionary: a driver or fleet could adopt them, or they could continue to use paper logs.

In December 2017, the U.S. DOT implemented regulation requiring truck drivers to use ELD (Figure 4). The ELD was newer technology that replaced the AOBDRD. This requirement was included in the Moving Ahead for Progress (MAP-21) legislation adopted in 2012. The ELD tracks the driver’s work
history and replaces the paper RODS, which were the traditional method of recording work hours. Use of the ELD is not discretionary; all drivers must have them.

**FIGURE 4: ELECTRONIC LOGGING DEVICE INSTALLED FOR USE**

![Electronic Logging Device](https://www.overdriveonline.com)

The ELD is essentially an improved version of the first paperless logging devices, the AOBRD. The ELD-generated record does not rely on the driver’s accuracy and are less susceptible to manipulation.

Because the paper RODS process allowed more driver flexibility in reporting HOS, the belief was that capturing the data electronically would result in better compliance with HOS requirements and a reduced number of truck-involved accidents. There was also a secondary benefit that the electronic logging would reduce paperwork and be more efficient for the truckers. The ELD increased the monitoring capabilities of existing AOBRDs, making AOBRDs obsolete except in certain grandfathered cases.

The new ELD regulations were implemented gradually in phases over a three-year period with increasing degrees of enforcement. Full enforcement began on April 1, 2018. The original exemptions from the ELD mandate follow: ²

- Drivers who operate under the short-haul exceptions (less than 100 air miles from base) may continue using timecards; they are not required to keep RODS and will not be required to use ELDs.
- Drivers who use paper RODS for not more than 8 days out of every 30-day period.
- Drivers who conduct drive-away/tow-away operations, in which the vehicle being driven is the commodity being delivered.
- Drivers of vehicles manufactured before 2000.

Exemptions are also allowed for certain agricultural operations.

Other exemptions are covered in the footnoted guidance from FMCSA. The agricultural exemption is meaningful in Arizona because it extends the allowed 100-mile distance to 150 miles, giving Arizona producers more flexibility in their range of operation from the agricultural facility to destination.

The installation of the ELD system and compliance with the new regulations was relatively straightforward for the large fleets that were already using some form of AORBDs to capture log information electronically. For small fleets and individual owner-operators (OO, also referred to as independent contractors) the process has been more difficult.

ELD systems require that a truck be equipped with an engine control module (ECM). There are units that can work without the ECM but the process is more cumbersome. The truck owner must select a device and its related software system, make sure that the system is approved and registered with the FMCSA, then do any installation and training that might be necessary. Various fee structures—initial fees and monthly service fees—are associated with the equipment and software.
The driver must have access to a user’s manual, instructions for data transfer mechanisms, instructions for recording and reporting malfunctions and a minimum 8-day supply of paper RODS for backup. The data transfer is used to move information from the unit to an authorized safety official during an inspection. In the event of a failure, the owner has 7 days to complete a repair or apply for an extension. The systems can operate via satellite or cellular technology. The owner must select the system that will work best in their areas of operation, understanding that there may be gaps in service. The number and complexity of these requirements have caused some independent contractors to leave the market.

Drivers from Canada and Mexico are also required to follow the same ELD and HOS regulations while in the United States, even to the extent that they must report in miles (vs. kilometers). One implication is that carriers will focus on their home markets, reducing cross-border trucking capacity in the U.S. markets.

Industry Issues
The ELD mandate received mixed support within the trucking industry. Larger firms that were already using some form of electronic logging were in favor of the change. Smaller firms and independent contractors campaigned heavily against it. Appeals were filed to FMCSA for small company exemptions and bills were introduced in Congress to delay the implementation. These initiatives were not successful in stopping the implementation of the ELD regulations.

Beginning in 2005, the American Trucking Research Institute (ATRI) began publication of results from an annual survey of the primary concerns of the trucking industry. Participants include motor carrier operators of various sizes and types. The report from the annual survey is published as Critical Issues in the Trucking Industry. The survey results are presented as a rank ordering of the responses. These are shown for 2019 in Figure 6.

Driver Shortage has been the top concern over recent years. Other issues have moved up and down the list. The ELD mandate was near the top at the time of the initial legislation in 2017 but dropped back to No. 7 in the 2019 survey. This reflects the ongoing evolution of the process and to some extent the departure of some carriers and independent contractors from the market. This reduction contributed to Driver Shortage becoming the No. 1 issue.

Nos. 2 and 5 issues, HOS and Truck Parking, have been consistently near the top of the Industry Issues chart. Changes were made to the HOS regulations in the early 2010s during the same time frame as when the ELD mandate was being developed. These changes removed some flexibility that drivers had regarding the reporting of duty time, required breaks, and their ability to pause work during their day.

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3 [https://www.fmcsa.dot.gov/international-programs/cross-border-transportation-elds](https://www.fmcsa.dot.gov/international-programs/cross-border-transportation-elds)
Focused on allowing enough uninterrupted rest time for the driver, the rule change established a work-rest cycle that would create a more consistent circadian cycle for drivers. The major duty categories total 24 hours: 10 Off Duty resting, 14 On Duty working. Of the 14-hour On Duty time, 11 hours could be spent driving. A 30-minute rest break was required during the On Duty time for the driver to drive all 11 hours allowed. Specifically, 8 hours or less must have passed since the end of their last Off Duty or Sleeper Berth period of at least 30 minutes.

For example, a driver who drove for 8 hours straight after completing a 10-hour Off Duty period would be required to stop at the eighth hour for a 30-minute rest break in order to drive the remaining three hours allowed. In another change, the rest break must be logged as Off Duty or Sleeper Berth. In general, to be Off Duty, the driver must be free of all obligations and responsibilities and free to leave the premises. The Off Duty break-time rule change put added emphasis on No. 4, Detention and Delay at Customer Facilities (Figure 6). Now, a driver is always considered On Duty and is losing productive hours while at a customer facility. The On Duty clock can no longer be paused as allowed in the old HOS rules, and time spent waiting at a customer’s loading dock does not count toward a rest break period because the driver is not free to leave and still have responsibilities. The new log rules further reduce flexibility by changing the ways in
which Off Duty time can be taken. Because each break period requires a driver to find available parking—where the driver is free to leave the premises and is relieved of all duties and responsibilities—the demand for parking in public locations has increased.

While the HOS and ELD regulatory changes were moving ahead, the demand for truck transportation service and the sheer numbers of trucks operating on the highway increased significantly. The convergence of the ELD mandate, changes to HOS regulations and increasing numbers of trucks exacerbated another top ten issue—the need for truck parking. It is extremely difficult to separate these three concerns—HOS, ELD, truck parking—when looking at the impact of any single item with respect to trucking efficiency and supply chain performance. The HOS regulations created a more rigid structure to a driver’s day, making it more difficult for them to preserve work and drive hours than under the prior rules.

The ELD by itself helps create efficiency in the process of tracking duty time and it improves compliance by eliminating the manipulation of paper logbooks. But it also takes away a bit of flexibility that the paper logs allowed for a driver to adjust when it made sense operationally. As with paperlogs, drivers using electronic logs are in control of most duty status inputs. The exception is the “drive” status line, which functions automatically as specified by the HOS regulations. Once the tractor has reached 5 mph, the status is automatically recorded as “driving.” The driver has no control over when this starts or stops as the ELD is monitoring and recording that information. So, using a paperlog, a driver could have used all available hours to make an afternoon delivery appointment with a plan to move a few blocks to a truck stop for the night. The five minutes of driving to do that with an ELD would cause an HOS regulation violation to be recorded.

Together, the HOS regulations and the ELD mandate require drivers to find a certain, specific type of place to park: one where the driver is free to leave and is not performing work duties. This Off Duty status is required for over 10.5 hours of any driver’s day. That means over 40 percent of the time trucks are not on the road or at customer locations; they are parked at locations satisfying the specific HOS requirements for Off Duty time.

The ELD has become an accepted part of operations over the past couple of years and industry concerns about the implementation have been reduced. It is the combination of the ELD, the HOS concerns, and truck parking that have created problems in realizing the original goals of the MAP-21 legislation - improved highway safety through better monitoring of, and compliance with, HOS regulations.

Jason’s Law
Truck parking is not a new issue in transportation. Economic growth and trucking’s market share growth in transportation are magnifying truck parking shortages. HOS regulations allow for no more than 11 hours of driving in a single driver’s 24-hour day. For most trucks with one driver, that means for over half of the day, the truck must be parked safely and securely.
In 2009, a young truck driver, Jason Rivenburg, was robbed and killed while resting in his truck in an undesignated parking lot. In 2012, “Jason’s Law” was established to provide a “national priority on addressing the shortage of long-term parking for commercial motor vehicles on the National Highway System (NHS) to improve the safety of motorized and non-motorized users and for commercial motor vehicle operators.” A survey was conducted in 2015 to collect information about truck parking. An update was announced at the January 2020 meeting of the Transportation Research Board but it is not yet available.

Key issues and considerations identified from the 2015 survey include the following:

- **Parking at Night** - shortages in the availability of truck parking beginning in the evening hours and extending through the late morning hours the next day
- **Weather Impacts** - significant issues with winter weather and parking availability
- **Lack of Resources** - no funding for truck parking projects or for enforcement
- **Supply Chains and Changes in the Economy** - dynamic and elastic freight movement trends
- **Planning** - Truck parking planning must be part of economic development and land use planning for both commercial and residential developments.
- **Short- and Long-Term Parking Needs** - While much focus is usually on long-haul, overnight truck parking needs, there is a significant amount of short-term rest or queuing parking shortages.
- **Safety in Design and Operation** - facility design impacts the safety and usability of parking
- **Communication** - helps drivers know where parking is available
- **Location of Problems** - mostly metropolitan areas and corridors linking urban areas. Additionally, freight intensive areas such as intermodal facilities, ports or major industrial areas were also cited as places where problems with parking are concentrated
- **Regulations and Restrictions** - regulations and restrictions on trucks in terms of where trucks can park or travel create parking issues and challenges
- **Consistency of Information** - methods and metrics to assess parking, data, and other planning and project development are needed to bring a consistent level of understanding of the issue to a national level.

**Safety Effects**

The intention of the ELD regulation was improved highway safety. The policy judgment was that less leeway in recording HOS would deliver better compliance with the regulations. The expectation was that reducing the number of fatigued drivers would decrease the number of truck-involved accidents and improve highway safety.

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4 United States Public Law 112-141 Section 1401.
5 [ops.fhwa.dot.gov/freight/infrastructure/truck_parking/jasons_law/truckparkingsurvey](ops.fhwa.dot.gov/freight/infrastructure/truck_parking/jasons_law/truckparkingsurvey)
In January of 2019, research checking that hypothesis was published by a team from Northeastern University, the University of Arkansas, and Michigan State. The study, titled Did the Electronic Logging Device Mandate Reduce Accidents?\(^6\) combined detailed data from millions of driver inspections and all federally recordable crashes from January 1, 2017, through September 1, 2018, to assess the effectiveness of the mandate. A search of publications indicated that this was the most recent peer-reviewed research available at the time of this report. The results of the work done by Scott, et al. confirmed that the ELD mandate did improve compliance with HOS regulations.

**Fleet Composition**

Larger fleets had already implemented the AOBRD, which had the effect of bringing these trucks into compliance ahead of the ELD mandate. The mandate's effects were predominately in the category of the small fleet. This segment accounts for the largest portion of the trucking capacity in the United States, where the industry is highly fragmented (Figure 7). While most people recognize large, national carriers like UPS, FedEx and Swift, the reality is that the large firms represent only 3 percent of all trucks in operation; 97 percent of trucking companies are small businesses with fewer than 20 trucks. In raw numbers, there are over 1,700,000 of these small companies compared to less than 50,000 for the larger firms.

![Figure 7: Market Share by Fleet Size](source: ATA, www.trucking.org/economics-and-industry-data)

\(^6\) Scott, Alex & Balthrop, Andrew & Miller, Jason. (2019). *Did the Electronic Logging Device Mandate Reduce Accidents?*. 
Improvements to compliance in the smaller fleet categories created a greater overall effect because they represent the largest portion of the market. The ELD mandate brings a much larger proportion of commercial drivers into compliance with HOS.

**Inspection Data Collection**

In the referenced study, Scott et al. collected U.S. DOT inspection data from January 1, 2017 through September 1, 2018. During this time period, inspectors recorded whether the driver was compliant with HOS regulations. Specific violations were recorded for those who were not in compliance. The inspection count numbered in the millions.

A key component of improving highway safety, roadside inspections of CMVs are examinations of the vehicles and/or drivers by certified Motor Carrier Safety Assistance Program (MCSAP) inspectors. MCSAP inspectors include federal and state DOT inspectors, state patrol/police officers, sheriff’s officers, and municipality officers.

The Commercial Vehicle Safety Alliance (CVSA) is a nonprofit association comprising these and other safety officials and industry representatives. Their goal is to achieve uniformity, compatibility and reciprocity of commercial motor vehicle inspections and enforcement by certified inspectors dedicated to driver and vehicle safety.

The CVSA coordinates certification and inspection activities across North America and provides a unified approach to the disparate entities responsible for performing them. Following guidelines and protocols established by the CVSA, eight levels of inspection are defined. Of those, the following three levels are the most common roadside inspections:

- **Level I** – a comprehensive examination of compliance with the critical elements of both driver and vehicle regulations. A Level I inspection takes 45 to 60 minutes to complete.
- **Level II** – similar to the Level I inspection, except the inspector will not check items that require the inspector to physically get under the vehicle. The Level II inspection takes roughly 30 minutes to complete.
- **Level III** – an examination of only those documents pertaining to the driver and hazardous materials (if applicable). A driver’s CDL, medical certificate, hours of service records, and documentation of the annual vehicle inspection are examined.

Inspection results are a key input to the FMCSA’s Safety Measurement System (SMS), holding both drivers and the firms they represent accountable for complying with highway safety regulations. This data was used in the research by Scott et al.

**Crash Data**

Crash data from this same time included the carrier identification, the location, and the timing of truck-involved accidents. The research generated several findings. HOS regulations compliance increased as the ELD mandate was enforced. The percentage of inspections with a violation dropped from 6 percent to 3.8 percent during the light enforcement period. When the mandate was strictly enforced, there was an additional drop to 2.9 percent of inspections identifying a violation. During 2017, the ELD mandate was in place and companies were moving forward with installing compliant devices.

During the first quarter of 2018, there was a light enforcement period during which violations were recorded but no penalties were assigned to the company. Points were not charged against the driver’s CDL. April 2018 onward, the regulations were strictly enforced with a 10-hour out-of-service order, forcing the driver to shut down.

The results of the data analysis showed that changes in violation rates were consistent based on the number of trucks associated with the company (Figure 8). Three groupings are identified: large carriers, those with two to six trucks, and independent owner-operators. The large carriers with established electronic logging showed minimal change while the smaller carrier compliance improved markedly based on the level of enforcement.
Unsafe Driving Behavior

The research discussed above shows a clear drop in HOS regulation violations as the ELD mandate implementation increased. However, it also determined that increased compliance had no effect on the number of accidents and that, in fact, the number of accidents among the smaller fleets and individual operators increased after the implementation of the ELD mandate. It is important to note that accident statistics are not identified as resulting from driver fatigue when collected. Therefore, it is impossible to determine a causal link. The increase in accidents could be attributed to other factors at play. Unsafe driving violations did increase. Speeding was among the highest (Figure 9). This was attributed to drivers rushing to travel farther and/or accomplish assigned tasks within the HOS regulations restrictions.
The WSP study team completed interviews in order to evaluate truck parking conditions within the MAG region. These interviews included safety and operations personnel from multiple common carriers and private fleets. The information gained supported the conclusions of the research by Scott et al. Several interviewees indicated that drivers report increased driver stress associated with HOS regulation changes as tracked by the ELD. Fleets utilizing small carriers and independent contractors suggested that the concerns were increased in that category of carrier size. The large company-owned fleets also observed this tension and aggressive driving in their interactions with outside drivers.

Damage caused by parking-related accidents has increased according to carrier reports. While not collected in the U.S. DOT accident data that affects carrier and driver status, these “fender benders” add repair delays and additional expense in operations. These accidents are linked to parking in congested lots, which is a common challenge in truck stops and rest areas during peak periods.

The WSP study team has experience with freight planning and private-sector engagement for state and metropolitan agencies. Interviews conducted with the private sector for MAG, for Oregon DOT, Texas DOT, and others support the idea that the interaction of the ELD mandate and the HOS regulations have created stress in the drivers, which can lead to unsafe driving conditions not necessarily associated with driver fatigue.
Productivity Effects

The ELD mandate enforcement, the inflexibility of the current HOS regulations, and inadequate space for truck parking have together had a serious impact on supply chain productivity. Prior to the HOS regulations revisions, drivers could utilize time at customer locations as break time. Without this provision, they must search for an acceptable parking location for a 30-minute off-duty break. Lost productivity results from drivers looking for parking for three purposes: the 10-hour break, the 30-minute break, or waiting for a scheduled pickup or delivery, referred to as logistical parking. Logistical parking is not particularly affected by ELDs because it is not mandated (although trucks parked for logistical reasons can affect the space available for the required rest that ELDs monitor). The 10-hour and 30-minute requirements are both mandated and are very much affected.

Nearly all the largest carriers operating in the United States have terminal facilities in the area surrounding Phoenix. Locally based truck lines and private fleets (such as those owned by some retailers and food distributors) have similar driver domiciles. The overnight parking needs of most of these drivers (including owner-operators who contract with these companies) are met by these locations. However, drivers sometimes run out of hours within a short drive time from the terminal, requiring they secure parking despite the proximity of their terminal.

The overnight parking needs among the carriers interviewed were met at their local terminals. However, these carriers are subject to the need for break-time parking as they complete their regional work. This was the most significant operational concern within the area encompassed by MAG. Less-than-Truckload (LTL) carriers schedule their trucks between terminals so that the overnight parking is planned at company facilities, but they also encounter break-time parking needs as they complete their regional pickup and delivery routes. When working outside the MAG area, carriers are subject to the need for overnight parking. The carriers working in the MAG region without terminal locations require both overnight and break-time parking.

Range Anxiety

Carriers and individual drivers report stress associated with lost utilization in their day-to-day work caused by the ELD mandate and HOS regulations. Proper trip planning depends on availability of
parking, whether it is for long-haul routes or regional deliveries. Determining when and where to park for required breaks and rest creates anxiety and stress for the driver.

“Range Anxiety”—most commonly associated with electric vehicles and the ability to find a charging station before the battery is depleted—is encountered by all types of drivers. With the additional demand of maintaining HOS regulations compliance within their assigned work plan, commercial drivers experience a similar stress when searching for a place to safely and legally park and rest. The lack of information about and access to parking for required breaks magnifies the stress.

Commercial drivers experience this anxiety not just occasionally, but nearly every day; it is their new normal.

To cope with range anxiety, drivers often stop earlier than required, which results in diminished transportation productivity and throughput. The lost utilization causes transportation costs to rise and driver pay to fall. Shipment lead times increase, transit times become more variable, and supply chain costs increase as a result. And since most drivers are paid by the mile travelled, lost miles equate to lost pay. For an independent contractor or a small fleet, this can mean the difference between profit and loss and the ability to remain in business.

Arizona Department of Transportation Survey
Arizona is not immune to the productivity impacts caused by lack of knowledge of and access to parking availability. The survey conducted in conjunction with the ADOT parking study identified the percentage and frequency of the time spent searching for parking (shown Figure 10 on the next page).

Electronic Logging Devices: Supply Chain Impact and Assessment
The largest reported loss in utilization by a major fleet identified in the MAG interviews was estimated as 30 percent. Other fleets reported lower numbers, but lost productivity was a consistent theme. Carriers doing pickup and delivery routes within the MAG region have added additional equipment to complete the work required on a daily basis. This is an added operational cost to the company. More trucks moving during peak congestion hours contribute to air quality concerns. The loss of flexibility in trip planning pushed against the enforced HOS regulations increases the level of range anxiety for commercial drivers.

This effect has been supported in industry interviews across the board.

Figure 11 shows the Arizona productivity loss compared against the national results prepared by ATRI. The ADOT findings include 16 percent of drivers in the under-30-minutes category who have no time lost at all (perhaps due to local domiciles); the ATRI findings do not break out this component. Overall, ADOT finds less time lost than ATRI because of the size of the under-30-minutes group, but while the ADOT 60-plus-minute group was somewhat smaller than ATRI, it still represented two out of five drivers spending an hour or more searching for a place to rest.
The ELD mandate has implications for supply chain efficiency and cost. The combined pressures of the precise measurement of the ELD mandate, the increased stringency of the HOS regulations, and increasingly common truck parking constraints magnifies the challenges commercial drivers face both planning their work and successfully executing their trip itinerary.

This challenge extends to planning agencies as they seek to relieve the pressure points in their efforts to improve supply chain efficiency. Certainly, this need is represented by the freight challenges identified by EDGE and the strategy development defined by the MAG and ADOT parking studies as well as this ELD impact paper.
Hours of Service Regulations Change
On May 14, 2020, the FMCSA announced a final rule updating HOS regulations for commercial motor vehicle drivers. This rule change does not alter the ELD requirements, but it does revise some HOS regulations that the ELD mandate enforces.

The regulations changes provide more flexibility from the existing regulations. This change has been under review and comment since the summer 2019. The final rule change is expected to be published within 5 days of the announcement and made effective within 120 days of publication.

FMCSA’s final rule on hours of service makes four key revisions to the existing HOS rules:

1. The 30-minute break rule, which requires a break after no more than eight hours of consecutive driving, can now be satisfied by the on duty/not driving status, rather than off duty status. That means a driver’s “break” could be satisfied by stopping to fuel the truck, for instance. This change accounts for the majority of the $274 million the agency estimates the rule will save each year for the U.S. economy.

2. The sleeper berth rules will now allow drivers to split their required 10 hours off duty into two periods: an 8/2 split, or a 7/3 split — with neither period counting against the driver’s 14-hour driving window.

3. The new rule changes the adverse driving conditions exception by extending by two hours the maximum window during which driving is permitted. The current rule allows for an extra two hours of driving time, but it still had to be within the maximum 14-hour workday. The new rule allows the workday to be extended to as much as 16 hours in the case of adverse conditions such as extreme weather or congestion.

4. The agency will change the short-haul exception available to certain commercial drivers by lengthening the drivers’ maximum on-duty period from 12 to 14 hours and extending the distance limit within which the driver may operate from 100 air miles to 150 air miles.

Increased Flexibility in Operations
The trucking industry has lobbied heavily for these HOS regulation changes and anticipates they will alleviate some of the operational and safety concerns that have been described throughout this paper. The intermodal drayage market will see a significant change as the distance traveled and the allowable on-duty period have increased. The above referenced text suggests $274 million in savings to the U.S. economy.

The 30-minute break change is the most consequential for MAG because it affects the whole territory, and effectively obviates the rule: the time drivers spend waiting at customer locations or fueling their truck now qualifies as the break, and these are everyday occurrences for most drivers. Concern with the 30-minute break was the No. 1 thing most cited in the interviews.

The remaining regulatory changes affect the 10-hour parking demand. This type of parking is focused more on the outskirts of the region and also on the primary truck stops along I-10, Buckeye Road and elsewhere. The effects seem to be at the margin: for instance, they could reduce the amount of time drivers spend resting at truck stops, and somewhat the demand for resting in the region (instead of somewhere else). However, with the split of berth time added, drivers may be looking for parking twice in a day: once for 2 to 3 hours, once for 7 to 8 hours. This could lead to less peaking, and more demand at other times of day (e.g. between loads mid-day). The 2- to 3-hour demand then might turn up at different places, because a truck stop with all of its amenities may not be required as often for a 2- to 3-hour break.

**Truck Parking Needs**

While this rule change will increase flexibility and is critical to improving utilization and efficiency, the need for adequate truck parking remains. Drivers still face the uncertainty of finding truck parking to meet their needs.

Statewide freight planning and truck parking initiatives have proposed ways to help alleviate the problems with truck parking, particularly for overnight breaks. They have also identified elements of the truck parking challenge that extend beyond the physical infrastructure. These include jurisdictional regulations and public opinion that has a negative effect on parking initiatives even those offered on shipper and receiver property. During the MAG interviews the variance in jurisdictional regulations and enforcement was a consistent theme. Providing services for drivers such as food and restroom facilities is a universally identified need.

The ADOT Truck Parking Study identified the issue of the growth of through traffic to the state. The through traffic needs intersects with MAG requirements because of the I-10 corridor volumes.
Food service is one of the expressed industry-needs as it relates to publicly operated rest areas and regulations around privatization. On April 3, 2020, the Federal Highway Administration (FHWA) gave mobile restaurants temporary permission to use interstate rest areas to feed truckers who are transporting vital food, personal protective equipment, and medical devices during the COVID-19 pandemic. Some locations have allowed the change, but the implementation has been delayed others by jurisdictional issues. It is unclear whether this concept will "stick" but it offers some useful potential.

Adaptations
The Freight Challenge put forward by the EDGE initiative is that limited truck parking makes it more difficult for drivers to take mandatory rests and increases safety concerns. What this paper has identified is that the ELD mandate reduces the HOS regulations violations but increases "range anxiety" and associated unsafe operating violations.

Inadequate parking is a contributor to this stress. The new rule change that was recently announced removes the pressure on the 30-minute break window, which was the biggest concern for carriers operating within the MAG region. Apart from logistical parking needs (which, as noted above, are not much affected by ELDs and thus are not the focus of this report), the challenge now becomes how to better address the need for 7- to 10-hour parking for fleets that do not have a local terminal presence. Most of these trucks fall into the small fleet category or are individual owner-operators. Trending ideas such as paid parking and reservation technology are less accessible to them because of cost. It is important to seek a variety of strategies to meet this overall need. The volume of through traffic on I-40 and I-10 must also be considered by ADOT and by MAG.
Strategies for improving parking situations require participation from all stakeholders in the supply chain including the shippers, the transportation providers, the warehouse and 3PL community along with developers and public agencies across jurisdictional and responsibility boundaries. This is as true for the MAG region and the state of Arizona as it is for other states and metropolitan areas in the country.

One recommendation by a World Economic Forum report on the future of last mile ecosystems is the creation of city platforms or forums. In these, public-sector players of all sizes can exchange the most effective methods and interventions to address logistical issues by reporting on successful pilots, interacting with businesses, and discussing which evolutionary interventions—like retro-fitting parking infrastructure, implementing delivery parking zones, or allowing off-hour pickups and deliveries—can be implemented now and in the future. The EDGE coalition has a good start on this concept.

The ADOT Truck Parking Study identified this need for collaboration (Figure 12). The identified relationships include participating in MAG efforts on parking initiatives. ADOT also highlighted the need to foster public-private partnership (P3) relationships and develop P3 structures for parking-specific projects.


The partnership needs to extend to land development and zoning agencies as the search for available capacity continues. This was brought up repeatedly in the MAG interviews. The buildout of warehouse space in the region adds to the truck volume and parking needs. This aspect of

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8 [http://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf](http://www3.weforum.org/docs/WEF_Future_of_the_last_mile_ecosystem.pdf)
development may not have received enough attention in the effort to maximize taxable land use.

The Regulatory and Best Practices Review (March 2020) completed as a part of this study researched national, state and regional truck parking studies. Table 7 from that memo compiled solutions that had been recommended from those studies in the areas of data technology and deployment, public capacity expansion, expansion through public-private partnerships, policy and regulations, coalitions and Institutional oversight and public and private strategies. These recommended strategies will be further explored as the study progresses.

Summary
The impact of the ELD mandate has had a positive effect on HOS regulations compliance across the trucking industry. However, the ELD mandate combined with HOS regulations creates pressure on drivers and increases the need for truck parking. The parking infrastructure needs will only increase over time as the demand for freight and the number of trucks on the highways reach new volumes. Arizona and the MAG region are affected by the growth in regional and local needs as well as supporting the national supply chain with services for through traffic.

EDGE has taken a positive step forward by including truck parking in the strategies necessary for facilitating freight mobility and supply chain efficiency in the region. Continued P3 collaboration is essential for continued success in reaching these goals.