Current and Forecasted Truck Parking Needs Assessment Memo

WA 3 Tasks 2.8 and 2.10

Final: March 23, 2020
# Contents

1.0 Introduction ........................................................................................................... 1
  1.1 Study Purpose and Tasks .................................................................................... 1
  1.2 Definitions ....................................................................................................... 4
  1.3 Organization of the Document ......................................................................... 5

2.0 Summary of Truck Parking Issues .................................................................... 6
  2.1 Summary of On-going Demand ..................................................................... 6
  2.2 Summary of Intermittent, Emergency Demand ............................................. 9
  2.3 Summary of Safety Issues ............................................................................ 11

3.0 Categories of Truck Parking ........................................................................... 13
  3.1 Short-Term Parking ....................................................................................... 13
  3.2 Staging at Logistics/Commercial Areas ......................................................... 13
  3.3 Staging: Ports/Border Crossings .................................................................... 14
  3.4 Long-Term Parking ........................................................................................ 15
  3.5 Storage Parking ............................................................................................. 15
  3.6 Emergency Truck Parking During Closures ................................................. 16

4.0 Prioritized Current Truck Parking Needs ....................................................... 17
  4.1 Capacity Need ................................................................................................ 18
  4.2 Safety Need .................................................................................................... 20
  4.3 Freight Network Significance ....................................................................... 22
  4.4 Combined Needs ........................................................................................... 25
  4.5 Needs Comparison ........................................................................................ 27
    4.5.1 Truck Parking Capacity and Safety Needs .......................................... 28
    4.5.2 Unauthorized Truck Parking and Truck Parking Safety Needs .......... 30
    4.5.3 Unauthorized Truck Parking and Pavement Condition ....................... 32
    4.5.4 Unauthorized Truck Parking and Congestion ....................................... 32

5.0 Forecasted Truck Parking Needs .................................................................... 35
  5.1 Baseline Forecast ........................................................................................... 35
  5.2 Forecast Scenarios ........................................................................................ 39
    5.2.1 Technology ............................................................................................. 39
    5.2.2 Policy .................................................................................................... 41
    5.2.3 Economies ............................................................................................. 42
    5.2.4 Environment and Extreme Weather Events .......................................... 43
    5.2.5 Summary of Scenarios ......................................................................... 43
  5.3 Prioritized Future Truck Parking Needs ......................................................... 46
    5.3.1 Future Capacity Need ............................................................................. 46
    5.3.2 Future Combined Needs ......................................................................... 49

6.0 Potential Strategies for Addressing Truck Parking Needs ................................ 52
  6.1 Add Amenities ............................................................................................... 55
  6.2 Infrastructure/Capacity Solutions .................................................................. 59
### Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ATRI</td>
<td>American Transportation Research Institute</td>
</tr>
<tr>
<td>AV</td>
<td>Autonomous Vehicle</td>
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<tr>
<td>DPS</td>
<td>Department of Public Safety</td>
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<tr>
<td>FSD</td>
<td>Freight System Designation</td>
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<tr>
<td>HOS</td>
<td>Hours of Service</td>
</tr>
<tr>
<td>NDOT</td>
<td>Nevada Department of Transportation</td>
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<tr>
<td>OOIDA</td>
<td>Owner-Operator Independent Driver Association</td>
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<tr>
<td>OS/OW</td>
<td>Oversize/overweight</td>
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<tr>
<td>SAM</td>
<td>Statewide Analysis Model</td>
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<tr>
<td>SRA</td>
<td>Safety Rest Area</td>
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<tr>
<td>TFMP</td>
<td>Texas Freight Mobility Plan</td>
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<tr>
<td>THFN</td>
<td>Texas Highway Freight Network</td>
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<tr>
<td>TxDOT</td>
<td>Texas Department of Transportation</td>
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<tr>
<td>TIC</td>
<td>Travel Information Center</td>
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<tr>
<td>TPAS</td>
<td>Truck Parking Availability Systems</td>
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</table>
1.0 Introduction
The safe and efficient movement of freight depends on adequate and strategically located truck parking. Hours-of-service (HOS) regulations require drivers to rest at defined intervals, causing them to search for parking before their allowable drive time expires or while staging for their pick-up and delivery slots. The scarcer truck parking is, the sooner drivers must begin searching for parking, resulting in lost productivity and higher shipping costs. Parking shortages can also lead to parking in unauthorized locations and result in a safety hazard for both the driver and the motoring public. Assessing the current condition of truck parking was identified in the Texas Freight Mobility Plan 2018 (TFMP) as an immediate need and a comprehensive examination and plan for truck parking was one of the short-term policy recommendations.

1.1 Study Purpose and Tasks
The purpose of this study is to conduct a statewide truck parking study that will assess 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 will also develop 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 (shown in Exhibit 1).

The various tasks within this study are shown in Exhibit 2. This memo contains information for Tasks 2.8 (Freight Forecast and Impact on Demand), Task 2.10 (Truck Parking Needs), and portions of Task 2.10 (Range of Solutions).
Exhibit 1: Texas Highway Freight Network

Source: TxDOT
To frame where this document fits in the broader study, the technical assessments included in this effort are summarized below with topics addressed in this memo noted with an asterisk (*).

- **Truck Parking Inventory and Utilization of Authorized Locations (Tasks 2.3 and 2.4)—** An inventory and the attributes of all known and authorized truck parking locations across the State will be collected from a variety of sources. The utilization of authorized sites by time of day, day of week, and for what purpose also will be shown.

- **Truck Parking Demand in Dedicated and Unauthorized Locations: the Impacts of Parking Deficiencies (Task 2.5)—** Building on the utilization analysis in the prior step, a more in-depth assessment of demand for parking will be conducted to identify common areas, patterns, and reasons for unauthorized parking. This section also includes information for Task 2.7 regarding an examination of unpredictable incidents and events and their impact on truck parking demand.

- **Crash Data Analysis Related to Trucks on Highways and Ramps (Task 2.6)—** Truck involved crash statistics for the latest five-year history will be analyzed to document
and map the highest crash locations and overlay those crash statistics with the truck parking inventory and demand analysis.

- **Truck Parking Demand (Task 2.7)**—Expanding the truck parking demand analysis in Task 2.5, this task estimates the demand for truck parking in key corridors and regions in Texas, identifies areas or locations where parking is not sufficient to meet current demand, and examines the impacts of weather closures on truck parking.

- **Freight Forecast and Impact on Truck Parking (Task 2.8)**—Future freight volumes will be forecasted to estimate future truck parking demand.

- **Truck Parking Impacts on Safety (Task 2.9)**—Building on the Crash Data Analysis (Task 2.6) an assessment will be conducted of how strategic truck parking improvements—such as increased capacity, improved technology, or physical changes to existing truck parking facilities—can provide safer operations for truck drivers, passenger vehicles, and communities.

- **Summarize Truck Parking Needs (Task 2.10, subject of this memo)**—Utilizing the information gathered in previous tasks, truck parking shortages and issues will be summarized by category, and truck parking needs identified.

- **Recommendations (Task 2.12)**—A range of policies, programs, and projects to address Texas’ current and future truck parking needs will be presented, along with an assessment of estimated costs, potential funding sources, and an analysis of key factors influencing, and affected by completing the recommendation.

- **Actionable Steps for Recommended Solutions (Task 2.13)**—A set of actionable steps for each recommended solution will be developed, describing the sequence of activities which must occur for the concept to be fully realized.

### 1.2 Definitions

There are a number of terms used when discussing truck parking, often describing very similar concepts and sometimes used interchangeably. For purposes of this study, the following terms and definitions apply:

- **Authorized Location**—Specific site where truck parking is explicitly allowed.

- **Inventory**—Number of truck parking spaces at a location.

- **Capacity**—Number of truck parking spaces in a given geographic area (district, statewide, corridor, etc.).

- **Demand**—How many trucks would park at a location or geographic area if there was sufficient space.

- **Utilization**—How many trucks are parked at a location or in a geographic area at a given time.
▪ **Raw Utilization**—The number of trucks in the American Transportation Research Institute (ATRI)’s database parked at a location or within a defined geographic area at a given time compared to the inventory or capacity available within the same defined area.

▪ **Expanded Utilization**—An estimate of the full number of trucks at a location or within a defined geographic area derived by “expanding” the number of trucks in ATRI’s database. Not every truck on the road is included in ATRI’s GPS database; therefore, the number of parked trucks captured in the database and recorded at any given location is only a portion of the total number of parked trucks. The ratio of ATRI truck volumes to TxDOT truck volumes at locations around the State is needed to “expand” the ATRI count and thereby approximate the actual number of parked trucks.

▪ **Percent Capacity**—The number of trucks parked at a location or in a geographic area at a given time compared to the inventory or capacity. This number, expressed as a ratio or percent shows if a location or area has a shortage or surplus of truck parking spaces.

▪ **Shortage (or surplus) in Truck Parking**—The inventory or capacity of truck parking at a location or in a geographic area, less the number of trucks parked there at a given time.

▪ **Urban**—Located within a U.S. Census designated urbanized area.

1.3 **Organization of the Document**
The remainder of this memo is organized into the following sections:

▪ Section 2 provides a summary of truck parking issues that were introduced in prior technical memoranda.
▪ Section 3 describes categories of truck parking.
▪ Section 4 prioritizes the current truck parking needs by small corridor segments.
▪ Section 5 prioritizes the future truck parking needs by small corridor segments.
▪ Section 6 presents a toolbox of strategies for addressing the needs.
▪ Section 7 provides the next steps in the study process.
2.0 Summary of Truck Parking Issues

2.1 Summary of On-going Demand
A detailed analysis of the demand for truck parking in authorized and unauthorized locations is presented in the *Truck Parking Demand in Dedicated and Unauthorized Locations* memorandum, which identifies and quantifies areas where truck parking demand exceeds inventory or capacity based on an “expanded” dataset using the ATRI raw GPS data as a base. Some key findings and observations are summarized in Exhibit 3 below. Exhibit 4 shows truck parking shortage by district as well as the capacity need at each truck parking location based on percent utilization during the peak hour (1-2 a.m.).

Exhibit 3: Texas Truck Parking Summary Statistics

<table>
<thead>
<tr>
<th>TOTAL UTILIZATION</th>
<th>AT PEAK HOUR AT:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>105 percent</td>
</tr>
<tr>
<td></td>
<td>Major national truck stops</td>
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<tr>
<td></td>
<td>67 percent</td>
</tr>
<tr>
<td></td>
<td>All other privately owned truck stops</td>
</tr>
<tr>
<td>92 percent</td>
<td>Total of all privately owned truck stops</td>
</tr>
<tr>
<td>86 percent</td>
<td>Publicly owned safety rest areas/travel information centers</td>
</tr>
<tr>
<td>60 percent</td>
<td>Publicly owned picnic areas/pull-offs</td>
</tr>
<tr>
<td>78 percent</td>
<td>Total of all publicly owned locations</td>
</tr>
</tbody>
</table>


- The peak hour for truck parking based on demand at authorized parking locations is 1-2 a.m. Meaning that in a 24-hour period, the period of highest demand at the greatest number of authorized sites was between the hours of 1:00 a.m. and 2:00 a.m.
- There are 150 locations from the “Big 3” (Love’s, Pilot/FlyingJ, TA-Petro) with approximately 16,200 truck parking spaces in the utilization data. Total peak hour utilization across all locations is 105 percent. At the peak hour, the remaining 312 privately owned locations with approximately 8,600 truck parking spaces have a total
utilization rate of 67 percent. The State’s 89 rest areas or travel information centers (approximately 1,600 truck parking spaces) have a peak hour utilization rate of 86 percent, and the 88 picnic areas or pull-offs (approximately 725 truck parking spaces) have an utilization rate of 60 percent.

- I-20, I-30, I-35, and I-45 have peak hour utilization rates above 100 percent. The eight Interstate corridors examined in this study have a peak hour average utilization rate of 99 percent for all locations within 1 mile of the corridor.

- Based on the peak hour demand for truck parking at authorized locations, within TxDOT right of way, and street parking off the TxDOT network (estimated at 4 percent of all other parked trucks), 15 of the 25 TxDOT districts are overcapacity with five more districts with a surplus of less than 100 spaces. In total, there is a net shortage of approximately 5,475 spaces at the peak hour in Texas. a net shortage of approximately 3,685 spaces.¹

¹ Note that this calculation is at the District level so specific locations, corridors, or sub-areas may be overcapacity even if the District as a whole is not.
Exhibit 4: Truck Parking Locations Capacity Need Categories

All Authorized Truck Parking Locations - Capacity Need Category

2.2 Summary of Intermittent, Emergency Demand

Incidents or uncommon events including road closures, weather conditions, and roadway incidents, can create an intermittent or emergency demand for truck parking which can be a common contributor to unauthorized truck parking. This is especially true for trucks if there are limited authorized locations to park near the incident and the truck parking inventory is reaching capacity during normal conditions.

Road closure data were collected for the interstate highway, U.S. highway, and state highway network to evaluate the potential impact of any type of road closures on truck parking throughout the State. The data were used to identify corridors where there is a high frequency of long-term road closures, combined with high truck volumes, significant parking demand, little or no parking near the corridor, and limited or no alternate routes. This combination of factors creates a significant challenge for truck drivers during an unexpected road closure.

Below are some key findings and observations presented in detail in the Truck Parking Demand in Dedicated and Unauthorized Locations memorandum.

- There were more than 38,250 road closures in Texas between March 2017 and December 2018.
- The top 5 corridors with closures, shown in Exhibit 5, include I-27/U.S. 87 between Midland and Amarillo, I-35 between Laredo and San Antonio, SH 73/87 between Winnie and Orange, U.S. 281 between Brownsville to Rancho Alegre, and U.S. 59 between Victoria and Rosenberg. These 5 segments had 61 closures lasting a total of 395 days during the period analyzed.
- Flooding was the main contributing factor to road closures that lasted greater than 10 hours. These longer closures have the greatest disruption to travel patterns and potential demand for truck parking. Across Texas between March 2017 and December 2018, there were more than 2,000 closures due to flooding that lasted longer than 24 hours.
- All routes have nearby alternatives, limiting the impact of any single road closure on the system as a whole. However, large-scale events like hurricanes and associated flooding that close multiple routes in a region can have an outsized impact. For example, Tropical Depression Imelda in September, 2019 closed a large section of I-10 east of Houston as well as a number alternative routes such as Highway 73 (which is one of the top-5 corridors) and Highway 12 east of Vidor.² Although outside the data collection period for this project, these storms indicate a need to consider emergency truck parking, especially on highly trafficked freight corridors that are vulnerable to long-term closures such as I-10.

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² [https://www.nola.com/news/hurricane/article_d329e312-dbb4-41e9-b3b8-0be7625c8710.html](https://www.nola.com/news/hurricane/article_d329e312-dbb4-41e9-b3b8-0be7625c8710.html)
Exhibit 5: Top Five Corridors with the Most Frequent Road Closures (2017-2018)

2.3 Summary of Safety Issues

The Truck Parking Crash Analysis memorandum noted that truck parking infrastructure is important to both the trucking industry and the motoring public due to mobility and safety concerns when trucks must park in unsafe or vulnerable areas. It is difficult to draw conclusions on the precise causes of crashes at this scale of analysis, and human behavior is a complicating factor in any safety assessment. However, it is reasonable to assume, based on data analysis and stakeholder outreach indicating a shortage of authorized truck parking in Texas, that some truck drivers park in unauthorized truck parking locations due to lack of a safer option nearby. Half of drivers surveyed commented that they park in unauthorized locations due to HOS demands (i.e., running out of time to reach a safe location), and 23 percent cited lack of overnight facilities.

The majority of crashes involving a parked truck occurred in urban areas, but the majority of fatal crashes occurred in rural areas on high speed corridors, as shown in Exhibit 6. Speed and speed limit are assumed to be a significant factor in this finding, and other highway attributes could also play a factor (e.g., lack of frontage roads in rural areas). The Dallas-Fort Worth and Houston areas have the highest concentration of crashes involving a parked truck. These findings suggest that while there is need for parking and staging improvements in urban areas, improvements in rural areas have the greatest potential to mitigate loss of life on Texas highways.


Prepared by Cambridge Systematics.
Data for planning purposes only.
3.0 Categories of Truck Parking

The demand for truck parking and the type of truck parking needed is influenced by a number of factors. For example, some trucks may need a parking space for a short period of time while waiting for a receiver to open or to wait for rush hour traffic to subside. Others may need a place to park for a longer period of time in the event of an unexpected incident, while others may require long-term parking, such as for a scheduled rest break to meet HOS requirements.

3.1 Short-Term Parking

Short-term parking refers to stops of less than one hour. The most common reason for this type of stop is to fulfill the HOS-mandated 30-minute rest break within the first 8 hours of driving. Other reasons for a short stop could include stopping for food/restrooms, waiting for traffic conditions to subside, or stopping for a brief safety check and to ensure the load is secure.

Depending on route, traffic, weather conditions, and personal preferences, drivers often need to park for a short period of time in a rural area along their route. The parking demand analysis showed that approximately 67 percent of trucks that stopped at authorized parking locations in rural areas were parked for one hour or less. Short-term parking was also the top need in urban areas. The parking demand analysis showed that for all authorized lots in urban areas approximately 63 percent of trucks parked for one hour or less.

3.2 Staging at Logistics/Commercial Areas

Staging parking to serve business needs is a type of “medium-term” parking that typically last longer than one hour but less than four or five hours. It is commonly associated with trucks waiting to pick-up or drop off a load but that arrive in the vicinity before their scheduled time, thus it is most frequently needed in or near urban areas, especially where there are higher concentrations of industrial, warehousing, and commercial properties.

Many commercial businesses have specific windows of time during which trucks can be on site to load or unload their goods. Distribution and warehouse facilities want to maintain the most efficient truck delivery schedule possible to maximize onsite labor and resources, and therefore may add penalty fees to trucks arriving late for deliveries or pickups. Large retail shippers, such as Walmart, levy penalties on tardy drivers, a punishment which has become more common in the industry. These factors, along with HOS regulations and a desire to

Regular Safety and Operational Parking

- Short breaks – 65% of all stops
- Staging – 15% of all stops
  - Logistics/Commercial Areas
  - Ports/Border Crossings
- Long-Term – 20% of all stops

Functional or Infrequent Parking

- Storage parking for owner-operators
- Emergency Closure

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3 Approximately 3% of the total stops at authorized locations lasted between 4 and 8 hours.

arrive at their destination outside of peak commute times puts more incentive on drivers to arrive early to delivery sites.

Most shippers and receivers do not provide additional staging parking for trucks on site. Therefore, drivers typically try to park as close to the loading and delivery location as possible, sometimes in residential neighborhoods, shopping complexes, or abandoned facilities. This unauthorized parking leads to safety issues for drivers and the traveling public as well as maintenance issues for local municipalities or property owners if parking is occurring illegally on someone’s property.

Because of the shorter duration, staging parking has a higher turnover of trucks parking at both authorized and unauthorized locations. The demand analysis indicates that many urban lots are near or over capacity for longer periods throughout the day and night because they serve multiple needs for short-term parking, staging, and long-term parking.

Staging parking is typically less needed in rural areas where there are fewer businesses to serve and the possibility of missing a delivery window due to traffic or other factors is lower. One exception is staging in agricultural areas where drivers may need to wait hours, and in some cases days if the harvest is delayed, to pick up their load.

Areas just outside the urban core may also see some staging parking, consistent with a driver’s need to be as close to their destination point as possible, but possibly not finding available parking at facilities closer to their destination. In addition, as warehousing and industrial uses have migrated to the edges of urban areas to avoid higher land-use costs and zoning restrictions, trucks desiring to park close to these facilities may increasingly need parking in these areas. There is a slightly higher incidence of staging parking than occurs at rural lots, and slightly lower than urban center lots. Truck parking in these areas can also serve long-term stops as drivers stop in areas on the outskirts of the urban core due to HOS limits, routing needs, or personal preference.

Authorized truck parking to serve staging has been identified as a critical need in urban areas throughout the state through the data analysis, the case studies of urban parking (see the “Truck Parking Demand in Dedicated and Unauthorized Locations” Memo) and through extensive outreach to stakeholders.

3.3 **Staging: Ports/Border Crossings**

In many ways, truck parking for border and port areas is similar to staging needs found in and near urban areas. However, because of the more diverse set of land uses that are possible near these facilities (some border crossings are in very rural areas for example) and the unique issues involved, especially for border-crossings, this type of truck parking is discussed separately.

Truck movements in and around ports are of two general types: drayage and long-haul. Drayage carriers make multiple trips each day carrying goods between the port and warehouse facilities near the port. The warehouse facilities are usually affiliated with the
drayage companies and therefore their drivers have immediate access to them, negating the need for any staging or parking. However, drayage carriers need a place to queue while they wait to enter the ports. Long-haul carriers coming to pick-up or deliver goods that are warehoused in the port regions have the same need for parking and staging as carriers destined for logistics and commercial areas in urban centers.

Truck movements in and around the U.S. – Mexico border crossings are of the same two general types, drayage and long-haul, but with slightly different parking needs. Interviews with drivers and businesses heavily involved in cross-border trade indicate that drayage carriers (often Mexican companies) make multiple short runs across the border each day between warehouses or businesses on either side of the border. Unlike the automated process to enter the U.S., drivers wishing to re-enter Mexico must wait for paperwork to be processed, which can take several hours. This holding pattern requires drivers to find truck staging near the border. In some cases, a driver may need long-term truck parking if the required paperwork is not received before the port of entry closes, or if they arrive after it has closed.

Long-haul carriers coming to pick-up or deliver goods that are warehoused in the border regions have the same need for parking and staging as carriers destined for logistics and commercial areas in port regions and urban centers. Therefore, truck parking facilities near border crossings can serve short-term, staging, and long-term needs for both drayage and long-haul carriers.

3.4 Long-Term Parking
Long-term parking is defined in this study as a stop that lasts more than eight hours. This is driven in part by Federal Motor Carrier Safety Administration HOS rules that require drivers to have a 10-hour rest break every 24 hours, and a 34-hour break after 7/8 consecutive days on duty. Across all authorized locations, approximately 20 percent of stops were longer than eight hours with slightly lower rates in rural areas and slightly higher rates in and near urban areas. Maximizing distance covered before running out of hours is a key consideration for this type of parking. The lack of available spaces near that end point is a large driver of unauthorized parking, especially in rural areas and near highway ramps. Amenities also play a large role in driver choice for long-term stops. Many drivers prefer privately owned truck stops which may offer hot food, showers, laundry machines, wireless internet and other amenities in addition to loyalty rewards programs that cannot be found at publicly owned locations.

3.5 Storage Parking
Urban areas often serve as home base for drivers including more than 160,000 members of the Owner-Operator Independent Drivers Association (OOIDA) in the U.S. and Canada, a trade association that represents independent owner-operator truck drivers. Owner-operator independent drivers own their trucks instead of working for a company and typically do not have a company yard or other facility to park their vehicle when not in use, so they

5 https://www.ooida.com/WhoWeAre/.
often park near their home in residential areas between trips. This can become a source of conflict with neighboring residents and puts the owner-operator at risk of vehicle or cargo theft. As complaints mount, municipalities commonly post signs restricting truck parking in residential areas, which often leads to parking in other undesirable areas and does not solve the problem. The primary amenities needed at storage truck parking lots are security features, such as fencing, security gates, lighting, and staffing.

3.6 Emergency Truck Parking During Closures
As noted in Section 2.2 of this memo, extreme weather events or other unplanned emergencies that close roads create a need for emergency truck parking. Weather events such as flooding, sandstorms, and snow/ice can close roads on their own or contribute to crashes that close or severely delay travel in a corridor. These types of closures are a concern across the United States and impact all travelers. This is especially true for trucks as HOS restrictions. The lack of available authorized truck parking in many areas combined with the unknown time and duration of the closures can generate a large demand for truck parking in a short period of time and in a constrained area.

Emergency truck parking needs can take many forms ranging from short-term to long-term truck parking demand depending on the incident location and duration.
4.0 Prioritized Current Truck Parking Needs

Because the need for truck parking across the state is significant, a data-driven prioritization process was employed to identify highway segments with the greatest need for truck parking. The prioritized truck parking needs will be a direct input into the recommendations to be developed later in this study. The prioritization process was based on three factors:

- **Capacity Need**: measured by peak truck parking shortage, or how many additional spaces are needed during the statewide peak hour of demand for truck parking (1:00 a.m. – 2:00 a.m.) under current conditions, per mile.

- **Safety Need**: measured by the number and severity of crashes involving parked trucks from 2013-2017 per mile.

- **Freight Network Significance**: measured by the Freight System Designation (FSD) score developed during the 2018 TFMP.\(^6\) The FSD component was included to account for potential shortcomings in the ATRI data such as underreporting of truck parking in regions with a significant level of regional traffic. These locations are also often near major freight generators such as maritime ports, border crossings, or energy sector activity.

The prioritized needs analysis was conducted on the Texas Highway Freight Network (THFN) as well as state or U.S. highways not on the THFN. The resulting network included 3,471 control sections ranging from less than one mile to 35 miles in length. Each control section was classified as urban or rural based on whether it is located within the boundary of a metropolitan planning organization, consistent with the classification used in the 2018 TFMP.

Urban and rural segments were considered separately to identify the highest truck parking need in both types of regions. For each need type, the 80\(^{th}\) percentile of either urban or rural values was used as the cutoff for “high” need, the 50\(^{th}\) percentile was used as the cutoff for “medium” need, and the bottom 50 percent of values were considered “low” need. Segments with no data in that category were not assigned any need level. Exhibit 7 summarizes this framework. Each factor is described more detail in the following sections, and cutoff values used are documented in Appendix A.

\(^6\) FSD scoring ranked all segments of the Texas highway network based on goods movement criteria (such as average annual daily truck traffic), market access criteria (such as proximity to markets or ports), supply chain criteria (such as tonnage moved in target industries), and economic competitiveness criteria (such as workforce readiness).
4.1 Capacity Need
Capacity need was identified by determining the shortage of truck parking spaces during the statewide peak hour of 1-2 a.m. Demand for parking includes both authorized parking and unauthorized parking within TxDOT right-of-way. The inventory of available spaces is the sum of spaces at all facilities (public and private). The shortage (or surplus) of parking is the difference between the number of trucks parking along a segment and the number of available spaces. This value was then normalized by segment length to account for the varying lengths. The final capacity need value was calculated as:

\[
\frac{\text{Peak Authorized Parking} + \text{Peak Unauthorized Parking} - \text{Inventory}}{\text{Segment Length}} = \text{Shortage per Mile}
\]

The parking shortage per mile on each segment was then ranked against all other urban or rural segments to identify those with the highest capacity need. Exhibit 8 displays the location of high, medium, and low priority truck parking capacity needs. The highest priority capacity needs in the state are located on interstates, especially I-45, I-10, and I-35 connecting the Texas Triangle. Other priority capacity needs are also evident on I-20 through the Permian Basin, I-20 and I-30 east of Dallas, and in clusters in East and West Texas. Truck parking capacity needs around the Dallas-Fort Worth Metroplex can be seen in all directions, especially to the south and east of the most urbanized areas. Near Houston, the highest priority capacity needs are to the north and east. US 70 in the panhandle also
stands out as a high priority need corridor. Medium priority needs are distributed throughout the state, illuminating the prevalence of truck parking capacity issues.

**Exhibit 8: Prioritized Truck Parking Capacity Need**

4.2 Safety Need

The prioritization of safety need related to truck parking was based on the number of crashes from 2013-2017 involving a parked truck and the number of fatal crashes involving a parked truck during the same time period. Fatal crashes were weighted five times higher than non-fatal crashes to ensure areas with less frequent but more severe crashes were included. As with capacity need, this need category was then normalized by segment length. The final safety need was calculated as:

\[
\frac{\text{Non-fatal Crashes} + 5 \times \text{Fatal Crashes}}{\text{Segment Length}} = \text{Safety Score per Mile}
\]

The safety score per mile on each segment was then ranked against all other urban or rural segments to identify those with the highest safety need. Exhibit 9 displays the location of high, medium, and low truck parking safety needs. Approximately 70 percent of segments and mileage analyzed had no crashes involving a parked truck between 2013-2017. As a result, there are fewer segments identified as high and medium priority safety needs. Urban areas, I-35 south of San Antonio, the future I-69 corridor, and I-40 west of Amarillo had the most consistently high priority safety needs, and other small segments throughout the state are also visible in each region of the state. The next tier of medium priority safety need was identified predominantly along interstates throughout Texas, especially on I-10, I-35, and I-45 in the Texas Triangle.
Exhibit 9: Prioritized Truck Parking Safety Need

4.3 **Freight Network Significance**

The FSD score of segments was used to identify the highway segments that carry the most truck traffic and are most critical for freight movement in Texas. The FSD score was developed during the 2018 TFMP and includes the factors listed in Exhibit 10. Together, these criteria capture the many ways a roadway can contribute to and be influenced by freight movement. This score was included in the truck parking needs assessment to differentiate segments of highest importance for freight movement.

For example, if two highway segments exhibit a similar capacity need (e.g., 2 spaces per mile), the FSD score would assist in determining which of those segments should be a higher priority for truck parking investment. If one highway carried 1,000 trucks per day and another carried 3,000 trucks per day, the highway with more freight traffic would have more trucks competing for same spaces. Therefore, the relative need is higher.

Further, while the ATRI sample data were expanded to estimate the total number of trucks in a given location, this data source sometimes undercounts certain types of trucks such as regional haulers and drayage. The FSD score includes factors such as proximity to ports, border crossings, and intermodal facilities. Highways in these locations are likely to be used by the regional and drayage operators that are underrepresented in the data.

The FSD score of each segment was ranked against all other urban or rural segments to identify those with the greatest impact on the overall network. Exhibit 11 displays the location of high, medium, and low relative significance for freight movement. All of the corridors that were selected for the THFN are significant for the movement of freight in Texas. However, the segments which ranked highest were predominantly interstates which handle the largest volume of trucks, tonnage, and value of any roadway type, routes along the Texas-Mexico border and Gulf Coast that carry freight to and from freight gateways, and major regional connections in East, West, and Central Texas.
### Exhibit 10: Freight System Designation Criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economic Competitiveness</strong></td>
<td>▪ Workforce size</td>
</tr>
<tr>
<td></td>
<td>▪ Educational attainment (high school and above)</td>
</tr>
<tr>
<td></td>
<td>▪ Population growth</td>
</tr>
<tr>
<td></td>
<td>▪ Employment in freight intensive industries</td>
</tr>
<tr>
<td></td>
<td>▪ Average annual daily truck traffic (number of trucks)</td>
</tr>
<tr>
<td></td>
<td>▪ Truck percentage</td>
</tr>
<tr>
<td><strong>Goods Movement</strong></td>
<td>▪ Truck vehicle miles traveled</td>
</tr>
<tr>
<td></td>
<td>▪ Truck vehicle miles traveled by lane mile</td>
</tr>
<tr>
<td></td>
<td>▪ Total tonnage</td>
</tr>
<tr>
<td></td>
<td>▪ Total value of goods moved</td>
</tr>
<tr>
<td></td>
<td>▪ Growth in tonnage (2040)</td>
</tr>
<tr>
<td></td>
<td>▪ Growth in value (2040)</td>
</tr>
<tr>
<td><strong>Strategic Supply Chains</strong></td>
<td>▪ Number of strategic supply chains supported</td>
</tr>
<tr>
<td></td>
<td>▪ Number of businesses in strategic supply chains supported</td>
</tr>
<tr>
<td></td>
<td>▪ Level of employment in strategic supply chains</td>
</tr>
<tr>
<td></td>
<td>▪ Volume of commodities associated with strategic supply chains (tonnage)</td>
</tr>
<tr>
<td><strong>Market Access and Connectivity</strong></td>
<td>▪ Access to intermodal terminal</td>
</tr>
<tr>
<td></td>
<td>▪ Access to international gateway (port or commercial vehicle border crossing)</td>
</tr>
<tr>
<td></td>
<td>▪ Access to inland port</td>
</tr>
</tbody>
</table>

Source: Texas Freight Mobility Plan development, 2018.
Exhibit 11: Prioritized Freight Network Significance

Source: Texas Freight Mobility Plan development, 2018.
4.4 Combined Needs
The three needs described above were combined to create an overall prioritization of needs, and were weighted using the following scoring method:

- **Capacity Need:** 25 percent of the score
- **Safety Need:** 50 percent of the score
- **Freight Network Significance:** 25 percent of the score

This weighting is intended to focus on the top priority of TxDOT (safety) while also considering where capacity issues may cause safety or mobility issues currently or in the future. Within each category, a high priority ranking was given three points, medium two points, low one point, and zero points were awarded if no data were present. Using the weighting above, these scores were combined to result in a score ranging between zero and three.

For the purpose of combining these three prioritizations, a total score greater than two was considered high priority, and greater than one was considered a medium priority. It should be noted that segments identified as a medium priority still have pressing truck parking issues that need to be solved. The purpose of this exercise was to prioritize needs and determine locations where investment of finite sources of funding will be most effective. The locations of corridors by priority are shown in Exhibit 12.

The combined score resulted in high priority interstate locations along I-45, the future I-69 corridor, segments of I-35 throughout the state, I-40 west of Amarillo, and a mixture of high and medium segments on I-20 and I-10 in the Permian Basin. The Permian Basin region also contains a concentration of medium priority needs, which together reveal the persistence of truck parking issues in the region. The Gulf Coast and northeastern parts of the state also exhibit consistent need.
Exhibit 12: Prioritized Truck Parking Need — Combined Score

4.5 **Needs Comparison**

Different types of needs were compared to inform the best locations for various strategies. The major need areas described in the previous section were combined to identify where capacity and safety needs overlap. In addition, this analysis also separates unauthorized truck parking demand from the overall truck parking capacity component and examines it as a separate need area. Thus, needs areas examined include:

- Truck parking capacity and safety needs,
- Unauthorized truck parking and truck parking safety needs,
- Unauthorized truck parking and roadway pavement condition, and
- Unauthorized truck parking and congestion.

Exhibit 13 summarizes the outcomes of this needs comparison. More detailed analysis of needs and proposed strategies will be discussed in the Recommendations and Actionable Steps memorandum (Tasks 2.9, 2.12, and 2.13).

**Exhibit 13: Summary of Needs Comparisons**

<table>
<thead>
<tr>
<th>Needs</th>
<th>Possible Strategies</th>
<th>Common Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Capacity Need / High Safety Need</td>
<td>Urgent priority for expansion</td>
<td>Dallas-Fort Worth, Houston, East Texas, I-35 near San Antonio and Waco, US 59, I-30</td>
</tr>
<tr>
<td>High Capacity Need / Low Safety Need</td>
<td>Secondary priority for expansion</td>
<td>Interstates and major US Highways</td>
</tr>
<tr>
<td>Low Capacity Need / High Safety Need</td>
<td>Urgent need for enforcement, capacity, or information</td>
<td>I-40 west of Amarillo, US 281 and I-37 south of San Antonio, US 59, border regions</td>
</tr>
<tr>
<td>High Unauthorized Parking / High Safety</td>
<td>Urgent need for enforcement, capacity, or information</td>
<td>Urban areas, I-35, and segments of I-20</td>
</tr>
<tr>
<td>Low Unauthorized Parking / High Safety</td>
<td>Regular pull-offs, street lighting, or other cost-effective solutions may be appropriate</td>
<td>Southeast Texas, SH 90, SH 30, US 290, US 281, I-37, the Panhandle</td>
</tr>
<tr>
<td>High Unauthorized Parking / Low Safety</td>
<td>Possible capacity or enforcement need</td>
<td>Permian Basin</td>
</tr>
</tbody>
</table>

Strategies to address the pavement and congestion observations in Sections 4.5.3 and 4.5.4 depend on the causes of unauthorized truck parking. Capacity, enforcement, or information may be appropriate depending on other factors at each location.
4.5.1 Truck Parking Capacity and Safety Needs

Exhibit 14 displays a comparison between high and low truck parking capacity and safety needs. The combined needs score displayed in Section 4.4 includes both of these factors, and their comparison can inform how that need can best be met.

Locations with high capacity and high safety needs compared to other locations around the state are identified as priority locations for capacity expansion. These locations may also be well-suited for public-private partnerships as demand may be high enough to attract private investment or interest. Highways surrounding the densest areas of Dallas-Fort Worth and extending east and north of central Houston have high capacity and safety needs, shown in purple on Exhibit 14. Several segments of I-35 also have this combination of need, including north and south of San Antonio and near Waco. Segments of US 59, I-30, and other segments in East Texas meet this criteria as well.

Locations with comparatively high capacity need and low safety need, shown in blue below, also call for capacity-expanding strategies, but may be a lower priority for direct investment from TxDOT. These locations may have sufficient demand for private sector investment now or in the future and do not exhibit the highest priority safety concerns. Many of these locations are along interstates or major US highways.

The combination of comparatively low capacity need and high safety need may be the highest priority for direct investment in capacity, enforcement, and information from TxDOT. These locations will not be attractive to private investment in truck parking but have the highest rates of crashes involving parked trucks. Capacity-building in these locations may not require large safety rest areas due to the relatively low capacity need. Instead, regular pull-offs or smaller picnic areas may be cost-effective and appropriate solutions to address a safety concern. I-40 west of Amarillo, segments of US 281 and I-37 south of San Antonio, US 59 near Nacogdoches and Lufkin, and communities near the Texas-Mexico border all fall in this category. Public-private partnerships should still be considered, especially near the border and near urban areas.
Exhibit 14: Truck Parking Capacity and Safety Needs

Truck Parking Capacity and Safety Needs

4.5.2 Unauthorized Truck Parking and Truck Parking Safety Needs

Truck parking safety needs were compared to locations with comparatively high rates of unauthorized parking per mile to identify locations where enforcement or capacity could be most effective at improving safety.

Locations shown below in purple on Exhibit 16 have the highest comparative level of unauthorized truck parking per mile (determined through the 80th percentile of values, consistent with analysis throughout this task) and the highest priority safety needs. These locations have an immediate need and opportunity to improve safety through enforcement, capacity or information because of the concentration of trucks in a given location. Urban areas, I-35, and segments of I-20 all fall into this category.

Segments with relatively low levels of unauthorized parking per mile but high safety need may be more difficult to address through capacity-building at a single location because trucks are more dispersed. However, data indicate that crashes involving parked trucks are still occurring at a relatively high rate. This could be interpreted to mean that a variety of factors such as visibility, shoulder width, frontage road availability, or driver behavior lead to a higher likelihood of a crash when a truck is parked in an unauthorized location. Regular pull-offs, street lighting, or other cost-effective solutions may be appropriate. A cluster of these segments is visible in Southeast Texas between Bryan/College Station and Houston, including SH 6, SH 90, and SH 30. US 290 west and south of Austin, US 281 and I-37 south of San Antonio, and several segments in the Panhandle fall into this category, shown below in orange on Exhibit 16.

Locations shown in blue on Exhibit 16 have a relatively low safety need compared to other segments but a high level of unauthorized parking. These conditions are visible throughout the Permian Basin and in the 100-200 mile radii outside of urban areas. This pattern of parking behavior can result in safety concerns such as limited visibility for all drivers, but data indicate that crashes involving parked trucks occur less frequently in these locations than others in state. Lower crash rates involving parked trucks could be due to lower overall traffic volumes, availability of space within right-of-way, vacant land outside the right-of-way where parking is safe, or other factors that contribute to lower crash risk. For example, Exhibit 15 displays unauthorized truck parking observed in Midland-Odessa during 2019 visits to the region. Trucks are parked in a predictable manner clear of the main roadway, despite being in unauthorized locations.
Exhibit 16: Truck Parking Safety and Unauthorized Truck Parking Needs

4.5.3 Unauthorized Truck Parking and Pavement Condition
In addition to examining needs specific to truck parking, general transportation needs were also compared to identify overlapping and interconnected need areas. Pavement condition of the roadway is impacted by many factors unrelated to truck parking such as initial design, traffic volume and weight, soil conditions, and weather conditions. However, unauthorized truck parking on shoulders can also negatively impact pavement quality by causing deterioration of shoulders. Shoulder quality data were not available at the time of this study, and overall pavement quality measured by International Roughness Index was used instead. The pavement analysis was taken directly from the 2018 TFMP.

Exhibit 17 displays the overlap between unauthorized truck parking and pavement conditions as identified in the 2018 TFMP. While there are some locations, especially in urban areas, where high levels of unauthorized truck parking coincide with poor pavement, most other locations do not. Better data on asset condition is needed in order to better understand the relationship between unauthorized parking and pavement quality.

4.5.4 Unauthorized Truck Parking and Congestion
Exhibit 18 compares prioritized truck parking needs with congestion. Congestion is measured by level of service taken directly from the 2018 TFMP. These two factors can contribute to each other, though both have numerous contributing factors. Drivers may choose parking locations to avoid congestion, such as stopping outside of urban areas despite having hours of service remaining. Unexpected congestion or delay can also cause drivers to park somewhere other than their intended location (either near the congestion or beyond it) if the delay results in significant use of their limited hours of service. Inversely, trucks parked in unauthorized locations may further contribute to congestion by creating a bottleneck as drivers slow or change lanes in response to a vehicle on the shoulder.

In urban areas and on interstates in the Texas Triangle, congestion and high priority truck parking needs coincide. These findings illuminate the challenges drivers face in planning trips around anticipated congestion as well as reacting to unexpected delays. The exact location of the parking impact is difficult to determine, as a delay in one city may influence a driver’s parking several hundred miles away. However, systematic capacity increases and information about congestion and travel times can help drivers make informed decisions to avoid unauthorized truck parking.
Exhibit 17: Unauthorized Truck Parking and Pavement Condition

Exhibit 18: Prioritized Truck Parking Needs and Congestion

5.0 **Forecasted Truck Parking Needs**

After current truck parking needs were assessed, future truck parking capacity needs were also estimated. The purpose of this truck parking forecast is to identify segments that will continue to be the most critical for truck parking investments in the future. A baseline forecast was developed, then modified to assess performance under different scenarios. Finally, a future needs assessment was conducted and the results were compared to the current needs assessment. The methodology for determining the quantity and locations of future truck parking is documented in Appendix B.

5.1 **Baseline Forecast**

Throughout Texas, truck drivers parked an estimated 140,000 times per day in 2018. By 2050, this number is forecasted to increase by more than 70 percent to over 240,000 truck parking events per day. The share of this parking that occurs during peak hours may change over the next 30 years due to changes in regulations, business practices and operating hours, or technology and automation. However, time-of-day changes in truck parking are extremely difficult to predict or model with available tools. As a result, the following forecast, scenario, and future needs analysis assume that the time-of-day patterns of truck parking remain the same in the future as they are today, including the same peak hour period and the same percentage of all trucks parking during the peak hour.

Exhibit 19 displays the current peak hour (1 a.m. to 2 a.m.) truck parking activity assigned to corridor segments during the current truck parking needs assessment. Exhibit 20 displays the forecasted future truck parking activity in 2050. Throughout the state, demand for truck parking is forecasted to increase as the Texas population as well as production and transportation of goods in the state increase.

Exhibit 21 combines these two maps to display the change in the number of parked trucks during peak hour between 2018 and 2050. Urban areas and interstates are expected to continue to absorb a significant amount of truck parking activity in the future as they do today. New corridors are also expected to emerge in truck parking activity, such as the future I-69 corridor, US 287, parts of the Permian Basin, and both interstate and non-interstate highways near the U.S.-Mexico border. Growth along I-27 Ports-to-Plains Corridor is forecasted to be greatest on US 83 northwest of Laredo and on US 87 between San Angelo and Lubbock. Section 5.2 discusses factors that could change this forecast, and Section 5.3 compares the forecast to current truck parking inventory to determine the priorities of future truck parking needs.
Exhibit 19:  Peak Truck Parking Activity per Mile, 2018

Peak Truck Parking Activity per Mile, 2018

Exhibit 20: Peak Truck Parking Activity per Mile, 2050

Exhibit 21: Change in Peak Truck Parking Activity per Mile, 2018-2050

5.2  Forecast Scenarios
Uncertainties surrounding future technologies, policies, global changes, and other factors make it difficult to accurately predict the type, amount, and location of truck parking that Texas will need in the future. Several possible future scenarios related to technology, policy, economies, and climate change are described below. These are not predictions but an assessment of possible future outcomes accompanied by an analysis of implications for truck parking should the futures described evolve. If multiple possible futures are shown to have similar implications for forecasted truck parking needs, then adjusting the forecasts may be in order. This approach allows for consideration of a wide range of plausible futures and estimated impacts, so that the recommended truck parking strategies will perform as well as possible regardless of how the future unfolds.

5.2.1  Technology
The adoption of fully connected and autonomous vehicles (AV) has the potential to change the truck parking requirements of the industry. Autonomous trucking is expected to be operationalized in rural areas first due to the relative simplicity of the operating environment compared to complex, urban areas. However, several AV truck firms are piloting autonomous trucking technology on public roads in Texas, and each AV firm follows a slightly different operational approach that could have differing impacts on truck parking, depending on which approach is adopted by the production market.

Predictions about the timeline of technological, regulatory, and economic feasibility of AV trucking vary: McKinsey Center for Future Mobility’s Route 2030 report anticipates full autonomy sometime after 2027, and the Institute of Electrical and Electronics Engineers predicts that 75 percent of vehicles will be autonomous by 2040.

It is important to note that almost all testing and regulatory changes concerning AV trucking are almost entirely at the state level. Introduction of federal regulations in this arena would likely have significant impacts on the below scenarios.

5.2.1.1  Basemap Approach
One approach has deployed AV trucking operations along specific routes and corridors that have been mapped by the operating company. The mapping process collects detailed information about routes (often using Lidar), including information about the roadway, markings, traffic signals and signs, dividers, utility poles, and other physical infrastructure. The result of this data collection is a basemap that can be sent to AV trucks to navigate even in complex urban environments.

With this type of system the truck can operate autonomously for the entire mapped route, which could allow for travel from an origin to a destination without an interim stopping point. Another version of this deployment would have trucks run autonomously on the highway and use remotely-based human drivers to “teleoperate” the trucks over the first- and last-miles. Implications for truck parking include:

7 Information about which routes are mapped is proprietary and subject to rapid change.
- **Lower rural truck parking demand:** It is anticipated that regulations will not require AV trucks to follow traditional HOS requirements, and therefore will not need to stop at non-destination locations. AV trucks may still require limited rural parking options to manage other things, such as a distant holding lot to realign with a scheduled arrival time or a safe parking area to allow the computer to run diagnostics on an issue.

- **Limited need for staging parking:** Currently, AV trucks following this approach utilize origin and destination points that are fully-mapped locations, and the autonomous trucks are granted immediate access. If this approach is fully deployed, then autonomous trucks, just like trucks with drivers, may need a place to temporarily stage while awaiting access to customer’s properties, maritime ports, or border crossings.

5.2.1.2 *Onboard Vehicle Sensors*

Another common approach for AV trucks is to utilize a robust system of onboard vehicle sensors to read and analyze the road environment. Unlike the previous approach, this approach does not utilize a basemap to determine its environment. It relies wholly on the data received from the sensors and the processor’s capabilities to decipher lane markings, road signs, and other environmental issues. The current state of the practice limits AV trucks using this approach mostly to freeway environments, as these roads have fewer unpredictable events (pedestrians, bicyclists, vehicles entering/exiting driveways, etc.). These environments are easier to process and evaluate given the current processing power of computer hardware. In theory, AV trucks using this technology are capable of expanding to a wide network of freeways more quickly than AV trucks using basemaps. However, operational factors such as poor visibility due to weather or worn/covered lane markings may create geographic limits, at least in the near term.

Developers for AV trucks that follow this approach envision an environment where AV trucks conduct the long-haul trips from city to city, but local short-haul, human-driven trucks complete the last mile. Under this approach, existing truck parking facilities could become transfer hubs where the trailer is picked up by a truck driver. Truck parking spaces will likely still be needed, either for drivers waiting to pick up a transfer or for trailers which are “dropped” and left at the site while waiting to transfer. Transfer hubs would ideally be located immediately adjacent to a freeway and on the outskirts of urban areas. Implications for truck parking include:

- **Lower rural truck parking demand:** It is predicted that regulations will not require AV trucks to follow traditional HOS requirements, and therefore will not need to stop at non-destination locations. AV trucks may still require limited rural parking options to manage other things, such as a distant holding lot to realign with a scheduled arrival time or a safe parking area to allow the computer to run diagnostics on an issue.
Higher truck parking demand on the outskirts of urban areas: Parking demand outside of urban areas would increase in order to accommodate transfer from the AV truck to the truck driver for distribution or navigation through a complex environment. However, the duration of each truck parking event could be significantly shorter than stops made by drivers to fulfill HOS requirements; only the time required to make the trailer exchange is needed. This transfer would likely occur during the day when many non-urban truck parking facilities have greater availability. These lots would also benefit from having direct freeway ramp access so that the AV truck would continue to operate in its freeway environment.

5.2.1.3 Common Truck Parking Implications
By 2050, autonomous trucks could represent a substantial percentage of over-the-road trucks. Both of these autonomous trucking technology approaches will likely reduce the demand for rural truck parking. The rate at which that demand will decrease may be proportionate to the percent of autonomous trucks on the road. However, sites which are currently at or over capacity may continue to be strained if nearby unauthorized truck parking shifts to them.

Under both of these AV technologies, patterns of staging demand are expected to change and possibly increase. Where AV trucks utilize a basemap to travel directly to a facility, staging needs could be reduced if the vehicle is granted immediate entry. However, facilities such as urban distribution centers, maritime ports, and international border crossings will likely still require staging locations to manage vehicle demand or serve as a stopping point for the technology to run routine diagnostics in a safe area. Where AVs are utilized in rural areas and human drivers are utilized in urban areas, staging needs on the outskirts of urban areas are expected to increase due to use as a transfer hub.

5.2.2 Policy
The Federal Motor Carrier Safety Administration (FMCSA) has published a notice of proposed rulemaking (NPRM) on updates to HOS rules to increase safety and provide additional flexibility for commercial drivers. There are five key provisions under consideration:

- The Agency proposes a 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.
- The Agency proposes to modify the adverse driving conditions exception by extending by 2 hours the maximum window during which driving is permitted.
- The Agency proposes to increase flexibility for the 30-minute break rule by tying the break requirement to 8 hours of driving time without an interruption for at least 30

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minutes, and allowing the break to be satisfied by a driver using on duty, not driving status, rather than off duty.

- The Agency proposes to modify the sleeper-berth exception to allow drivers to split their required 10-hours off duty into two periods: an 8 and 2 split or a 7 and 3 split, either off duty or in the sleeper berth. Neither period would count against the driver’s 14-hour driving window.

- The Agency proposes to allow one off-duty break of at least 30 minutes, but not more than 3 hours, that would pause a truck driver’s 14-hour driving window, provided the driver takes 10 consecutive hours off-duty at the end of the work shift.

The last two changes (in italics) could have a large impact on truck parking. The change in the sleeper-berth exception would allow drivers to take the required 10 hours off duty in two periods (either as an 8-hour/2-hour split or as a 7-hour/3-hour split). This change would allow drivers more flexibility in choosing where to stop, and will likely increase the turnover rate at private truck stops as more drivers are able to stay for a shorter duration and cycle through the facility. However, it may generate more intermediate length stops of two to three hour to fulfil the shorter portion of the split sleep period. Driver response to this change and the impact on specific stopping locations is very difficult to predict.

The final proposed change would allow drivers more flexibility to extend their on-duty hours while staging as they wait for a customer or at a port or border crossing. By extending the work day, a driver may be able to avoid running out of duty hours before running out of driving hours, and therefore avoid having to find a parking location sooner than anticipated. If enacted, this change is expected to have the largest impact on urban areas and near intermodal facilities where drivers are most likely to encounter unexpected delays. In this scenario, staging parking will still be needed near customer locations. If the staging lot or customer restricts the duration for parking, drivers may not be able to take advantage of the full 3 hours of the pause to the 14-hour driving window.

5.2.3 Economies
Economic fluctuations have the greatest impact on freight movement and truck parking. During peak periods of global or regional economic growth (such as energy booms in the Permian Basin), more trucks are on the road and requiring parking, which then decreases during economic slow-downs. The baseline forecast presented in this memorandum is based on the 2015 Transearch commodity forecast from IHS Global Insights and accounts for these fluctuations as best as possible. Therefore, no further adjustments to truck parking demand are recommended to account for anticipated macroeconomic changes.

Other shifts in how the economy functions include such factors as the “gig economy” and changes in where goods are produced such as reshoring (production site moves to the U.S.), nearshoring (production site moves nearer the U.S., such as in Mexico), or offshoring
The gig economy describes self-employed individuals working “gigs” rather than consistent employment for a single entity or at a single location. This type of work is available due to technology improving remote work and/or enabling peer-to-peer economic transactions (including transportation of goods). The amount of goods demanded by consumers and businesses remains consistent, but delivery points and patterns of transportation may differ. No changes to truck parking are assumed to be needed under an expanding gig economy.

Changes in where goods are produced and transported would likely not significantly impact overall truck parking needs in Texas. With its extensive network of maritime ports and border crossings, goods will likely always flow through Texas regardless of whether they are produced domestically and exported internationally, or whether trade patterns for foreign imports shift. However, trade scenarios could impact the locations of demand, particularly near the U.S.-Mexico border, maritime ports, or inland ports.

5.2.4 Environment and Extreme Weather Events
Environmental regulations targeting emissions reductions and response to extreme weather events may impact demand for and location of truck parking. Policies that could be developed to lower greenhouse gas emissions could result in a push to increase the use of rail transport, which produces lower emissions than trucks. However, trucking would continue to play a significant role in goods delivery due to its flexibility and speed, vast network of roadways compared to limited rail corridors, cost-effectiveness in some corridors, and increasing demand for just-in-time and next-day deliveries. In this scenario, truck parking demand in urbanized areas and near intermodal facilities would remain constant or increase. A more likely outcome of emissions-reducing policies would be regulations requiring trucks to use alternative fuels, which will only change the fuel type offered at privately-operated truck stops and not change truck parking demand.

Increased frequency of natural disasters such as hurricanes or flash floods will only increase the need for a resilient, multimodal freight transportation network in terms of alternate routes and parking along those routes. These events would not increase or decrease demand, but further necessitate creative partnerships between TxDOT, the trucking industry, and private facilities that can accommodate emergency truck parking needs.

5.2.5 Summary of Scenarios
Exhibit 30 summarizes the anticipated influence of various scenarios related to the freight industry on the baseline truck parking forecast. Policy changes to HOS regulations will almost certainly have an impact on truck parking patterns, but the direction, magnitude, and location of that impact are very difficult to predict. A truck parking model would be necessary to determine the locations of drivers relative to their origin, destination, and parking patterns under various HOS scenarios. Increased HOS flexibility could enable drivers to better optimize their drive and break times according to daily conditions and alleviate pressure on the state’s truck parking capacity. However, if the majority of drivers still require parking
during peak hour(s), capacity will be no less strained than it would be under current HOS regulations.

In general, no scenarios were identified that have potential to increase the baseline forecast of demand for rural truck parking, and no scenarios were identified that have potential to decrease forecasted truck parking demand for urban areas or their outlying areas (exurban areas). While this memorandum has identified many factors that may or may not impact truck parking demand in the future, the magnitude and direction of those impacts is often unknown at this time. Additional research on the evolution of truck parking demand is needed to document and predict changes in truck parking patterns in response to technology, policy, economic, or environmental factors.
### Exhibit 22: Summary of Truck Parking Scenarios and Impact on Baseline Forecast

<table>
<thead>
<tr>
<th>Category</th>
<th>Topic</th>
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<th>Near Urban Areas</th>
<th>Rural Areas</th>
<th>Intermodal Uses</th>
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<td>Alternative Fuel Mandate</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>Natural Disasters</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
5.3  Prioritized Future Truck Parking Needs
The same approach used in assessing current truck parking needs was also used to compare future truck parking needs. Truck parking capacity needs were identified using the baseline forecast outlined in Section 5.1, and this value was combined with current truck parking safety and FSD scores to update the combined truck parking need. While the number and severity of crashes is expected to change over time, the quantities and locations are subject to too many factors to predict in this study. The FSD score includes components of future freight movement and proximity to major generators, and it remains relevant to this analysis. As with the current truck parking need analysis, need was compared relative to other segments in order to identify the highest priority segments for investment.

5.3.1  Future Capacity Need
The future truck parking capacity need was measured in terms of truck parking shortage per mile. This assessment used the current inventory as the basis of analysis to identify the most important locations for investment. It is expected that additional supply will be added over the next 30 years by both the public and private sectors, but current inventory was used to provide a common baseline to inform public investment.

Exhibit 23 displays the forecasted high, medium, and low truck parking needs for 2050. Interstates and urban areas are forecasted to have the greatest demand for and shortage of truck parking in the future. These areas are likely to continue to carry the majority of truck traffic and therefore require the most parking. If AV truck operations are widely adopted or if more freight shifts to rail transport, the amount of truck parking needed on rural interstates is likely to be reduced. This change would likely be complemented by increased demand in and around urban areas. Therefore, recommendations to address future truck parking needs will vary in the two environments. While the urban environment will continue to need capacity in terms of number of locations and spaces, the rural environment may require a network of smaller facilities.

Exhibit 24 displays the locations of high truck parking capacity need for both 2018 and 2050. Urban areas, I-35, I-45, the Permian Basin (especially near I-20), and sections of I-10 are expected to be high-need locations in both 2018 and 2050. Short segments throughout the state are expected to move up or down between medium and high needs. All corridor segments are ranked against each other, and a shift from high to medium should not be interpreted as a reduction in truck parking demand. Several rural highways, particularly near the U.S.-Mexico border and in West Texas, are expected to transition from low current need to high future need. These segments likely have low truck parking inventory currently and are forecasted to have significant traffic growth. Investments in locations that may have high demand in the future despite low capacity need today should be weighed against likely technological, policy, or economic changes that may impact those locations.
Exhibit 23: Prioritized Future Truck Parking Capacity Need, 2050

Exhibit 24: Prioritized Truck Parking Capacity Need, 2018 and 2050

5.3.2 Future Combined Needs

The process for developing the prioritized future combined truck parking need was the same as the process for current needs:

- **Future Capacity Need**: 25 percent of the score
- **Current Safety Need**: 50 percent of the score
- **Freight Network Significance**: 25 percent of the score

Exhibit 25 displays the prioritized combined truck parking needs for 2050 as a result of this analysis, and Exhibit 26 compares the high priority need locations for current and future conditions. Urban areas are forecasted to continue to have significant truck parking needs as population and employment further concentrate in the state’s urban areas. Interstates and major U.S. highways are forecasted to continue carrying significant truck traffic and therefore requiring the most truck parking. The regions identified as high needs now and the future should be the highest priorities for investment in truck parking.

Most interstate highways throughout the state contain segments that are forecasted to move from medium needs in the present to high needs in the future. These segments are often adjacent to segments which are high needs in both timeframes, and they may be served by investments in those areas. Few segments moved from high priority presently to medium priority in the future. This methodology ranks segments against each other, and a reduction in priority should not be interpreted as reduction in demand or shortage.

Much of the consistently high priority truck parking need is located in the eastern half of the state where there are more population centers, but there are several segments in West Texas and the Panhandle as well. The context of these locations relative to safety needs, likely locations of AV truck operation, and policy related to HOS for both human-driven and AV trucks should be considered when assessing future demand and during design of site improvements.
Exhibit 25: Prioritized Future Truck Parking Need – Combined Score, 2050

Exhibit 26: Prioritized Truck Parking Need, 2018 and 2050

6.0 Potential Strategies for Addressing Truck Parking Needs

The following section outlines a broad menu of potential strategies that TxDOT, partner agencies, and local municipalities can take to improve truck parking serving long-haul drivers in the State, from short-term to long-term parking needs. The potential solutions are summarized in Exhibit 27.

Note that the inclusion of a strategy in this list is not an endorsement or a recommendation of that strategy. This section is intended to outline the universe of possible approaches to solving truck parking issues in Texas, drawing on examples from other states, best practices, and stakeholder suggestions. Solutions found to be viable will be advanced to the next phase of the study where specific recommendations will be made regarding where and how they could be completed, and illustrative drawings and the associated impacts and benefits will be presented.
## Exhibit 27: Potential Strategies

<table>
<thead>
<tr>
<th>Category</th>
<th>POTENTIAL STRATEGIES</th>
<th>PARKING NEEDS AND CHALLENGES</th>
<th>AMENITY NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure/Capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Expand and upgrade truck parking at public facilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Rest Area/Travel Information Center</td>
<td>$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Truck pull-off/picnic area</td>
<td>$S</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Add truck parking at existing or new TxDPS weigh stations</td>
<td>$$-$$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Build dedicated truck parking facilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repurpose underutilized or closed DPS/TxDOT facilities</td>
<td>$$-$$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Develop new publicly owned truck parking</td>
<td>$$-$$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Technology/Programs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expand the Truck Parking Availability System (currently being developed on I-10 as a separate effort)</td>
<td>$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Install static signs indicating upcoming locations for truck parking</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Create a reservation system for publicly owned truck parking locations</td>
<td>$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Programs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate discussions for private truck stop development or expansion</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Include driver outreach in “Don’t Mess with Texas” campaign</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Create a public education campaign to inform the public on the importance of truck parking</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Collect truck and car utilization data at publicly owned truck parking facilities</td>
<td>$$-$$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prepare corridor truck parking plans</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Policy/Coordination/Outreach</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TxDOT direct action</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop guidelines for integrating truck parking into the TxDOT project development process</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Consider truck parking needs prior to purchase or sale of right of way</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Reassess public facility closures in high demand areas</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Allow truck parking in auto-designated areas at TxDOT facilities during off-hours</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Include the minimum required amenities at publicly owned truck parking facilities</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Integrate truck parking into the Strategic Highway Safety Plan (SHSP)</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>TxDOT support</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Advocate for truck parking at non-TxDOT public facilities (commuter lots, bus depots, maintenance lots) during off-hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinate with public or private property owners to allow emergency truck parking at large parking facilities when not in use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create guidance to help municipalities include truck parking demand as part of Traffic Impact Analyses for new developments</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Encourage shippers and receivers to provide on-site truck parking or contribute to a common staging lot</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Encourage commercial and industrial property owners to provide truck parking on unused portions of property</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Work with Texas DPS and local law and code enforcement to increase enforcement of unauthorized parking in areas with available truck parking spaces</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Create guidance for next generation logistics parks that includes integrated and full-service truck parking facilities</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Support development of an app that connects property owners with available space, to truck drivers needing parking</td>
<td>$</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*Cost estimates represent TxDOT’s portion of the proposed solution. Other private or public partners could share some of the costs.
6.1 Add Amenities
Perhaps the simplest strategy for increasing the utilization of publicly owned facilities is to add amenities that drivers need. Providing common amenities at truck parking locations makes the site more attractive to drivers, can help prevent environmental degradation, and helps states comply with Jason’s Law. When asked what their desired amenities at a truck stop are, stakeholders identified safety features, such as lighting (83 percent), food availability (75 percent) and shower facilities (65 percent) as their top three desired amenities. A lack of restroom facilities is also one of the largest challenges faced, especially for female drivers.

Discussions with stakeholders indicate that the location and design of the truck parking facility, and the amenities offered there, greatly influence where a driver chooses to park, especially in a corridor with available options. The “Big 3” truck stop operators in the U.S.—Love’s, Pilot/FlyingJ, and TA-Petro—have 150 locations with approximately 16,200 spaces in Texas (70 percent of the private capacity) where utilization data were obtained. Across these locations, the total utilization rate at the peak hour is approximately 105 percent, well above the total for the entire set of other privately owned locations (67 percent), safety rest areas or travel information centers (SRA/TIC) (86 percent) and picnic areas or pull-offs (60 percent). These facilities typically have excellent amenities including showers, food options, wireless internet, and laundry. In addition, these facilities often have rewards programs or fuel cards active with specific fleets, and some allow specific companies (typically those with large fleets) to reserve spaces, guaranteeing a driver a safe place to park. The data indicate that the greater the amenities, the greater the utilization.

When drivers have the choice of parking on the street near a favorite truck stop, or at a lot with no amenities, the data show that many will choose unauthorized street parking. For example, the Love’s Truck Stop in Anthony, TX on I-10 north west of El Paso and just across the border with New Mexico has an estimated utilization rate of approximately 257 percent (shortage of approximately 134 spaces with an inventory of 91) at the peak hour. A FlyingJ and Pilot at the same exit also are overcapacity at the peak hour. However, the Anthony Texas Travel Center located approximately 1 mile south of these locations is consistently below 50 percent utilization and often well below that (shown in Exhibit 28 and Exhibit 29).

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9 Jason’s Law requires states to evaluate their capability to provide adequate truck parking and rest facilities for safe parking of commercial motor vehicles. See:
Exhibit 28: Truck Parking Utilization at Love’s Truck Stop (Anthony, TX)
Exhibit 29: Truck Parking Utilization at Anthony’s Travel Information Center (Anthony, TX)

At a minimum, all publicly owned locations with dedicated truck parking should include the minimal amenities shown in Exhibit 30. These locations should be paved with angled parking and curb space for oversize/overweight (OS/OW) vehicles, and include lighting, flush toilets, enhanced vending machines, and trash cans as driver amenities. Enhanced vending machines can take different forms but could include more nutritious food and drink options, toiletries, small electronics, or medical needs (bandages, aspirin, etc.) beyond the typical drinks and snack items. In addition, depending on the specific location, level of demand, and resources available, TxDOT should consider including some or all of the enhanced amenities. These amenities are more likely to draw drivers and make unauthorized street parking less attractive.

Texas is a leader in providing rest areas that are clean, inviting, well maintained, and with working flush toilets and shaded green space. However, there are a number of locations dedicated to truck parking that currently lack these amenities that truck drivers have indicated that they desire and deserve to have.

**Exhibit 30: Amenities for Consideration at TxDOT Facilities**

<table>
<thead>
<tr>
<th>Minimal amenities at all TxDOT truck parking facilities</th>
<th>Enhanced amenities within TxDOT right of way in high need areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Paved</td>
<td>▪ Staffed</td>
</tr>
<tr>
<td>▪ Angled parking</td>
<td>▪ Driver lounge</td>
</tr>
<tr>
<td>▪ Curb space for OS/OW trucks</td>
<td>▪ Emergency phone/notification system</td>
</tr>
<tr>
<td>▪ Lighting</td>
<td>▪ Wi-Fi</td>
</tr>
<tr>
<td>▪ Flush toilets</td>
<td>▪ Green space</td>
</tr>
<tr>
<td>▪ Enhanced vending machines</td>
<td>▪ Specific to urban facilities:</td>
</tr>
<tr>
<td>▪ Trash</td>
<td>▪ Security fencing</td>
</tr>
<tr>
<td></td>
<td>▪ Truck parking reservation system</td>
</tr>
</tbody>
</table>

A great example provided by stakeholders are the Service Plazas on the Ohio Turnpike. Each Plaza is located approximately every 30-50 miles and includes a Truckers’ Lounge, separate restrooms, shower facilities (at no charge), and coin-operated washers and dryers.

TxDOT can only provide basic amenities consistent with a Federal restriction on commercial activities within the Interstate right-of-way under 23 U.S.C. § 111(b), which prevents the sale of goods and services at rest areas and other DOT facilities. 23 U.S.C. § 111(c) does allow for the use of vending machines in rest areas as an exception to the above rule.
6.2 Infrastructure/Capacity Solutions

There are a number of potential approaches that TxDOT can directly develop to expand the number of truck parking spaces in the State. Some would require little or no additional purchase of right of way while other approaches are new construction. As shown in Exhibit 27, these potential solutions would address all of the different truck parking needs identified in Section 3.

6.2.1 Expand and Upgrade Truck Parking at Existing Public Facilities

These approaches create additional truck parking spaces by expanding existing public facilities. These approaches are intended to utilize existing infrastructure and minimize the need to purchase additional right of way, reducing costs for TxDOT.

6.2.1.1 Expand and Upgrade Truck Parking at Existing Safety Rest Areas/Travel Information Centers

Older rest areas in Texas tend to provide only parallel parking for trucks or a mix of both angled and parallel parking and tend to be smaller ranging from about 5 to 18 truck parking spaces. Some locations with truck parking could be reconfigured to make better use of space to allow more trucks to park within existing site limits. Striping and site flow patterns at these facilities could be examined to determine if there are ways to improve truck circulation and add space without expanding beyond the existing site footprint. For example, drivers often indicate that locations with striped spaces can fit more trucks than those without as the stripping provides direction to drivers on where to park safely. Angled parking, where trucks pull into a space at an angle and then leave by pulling ahead, also tend to provide better capacity where space is available and reduce safety concerns by eliminating the need to reverse or pull out of a tight parallel parking space. In locations where data indicates high utilization rates, expanding the pavement within the existing right of way should be considered as a means for increasing the number of truck parking spaces. In addition, the minimal amenities noted above should be installed at all SRAs/TICs.

The recommendations and actionable steps phase of this study will help identify specific locations where this approach should be considered, but a location such as the Pecos East Rest Area on I-10 (Odessa District) which has no angled parking and is over-capacity during much of the day could represent a potential target for this type of solution. The eastbound SRA is shown in Exhibit 31.
6.2.1.2 Expand and Upgrade Truck Parking at Existing Truck Pull-offs or Picnic Areas

There may be truck pull-offs or picnic areas in locations where the need for truck parking is high but conversion to a full SRA/TIC is not possible or cost-effective. In these situations, minimal amenities (at the least) should be provided, the current truck parking spaces should be examined to determine if a new striping and site flow pattern could allow more trucks to park within the same area, and if utilization data shows a need for additional truck parking, then the location should be examined to determine if there is space within the existing right of way to expand. For example, the Leon County Picnic Area on I-45 (Bryan District) currently is lacking a number of minimal amenities (restrooms, vending machine, etc.) and is over-capacity.

6.2.1.3 Add Truck Parking at Weigh Stations

Weigh stations (also called inspection sites) are a tool used in a number of states to help identify, inspect, and stop commercial vehicles that are traveling in violation of State or
Federal weight and safety regulations. The design and approach used for this enforcement activity varies widely. Weigh stations that are permanently (or nearly permanently) staffed and located near a state border are a common approach in many southern and western states including Texas.

Several states have built truck parking at these locations and allow trucks to park. For example, Exhibit 32 shows the Post 9 Walton Weigh Station on I-71 in Boone County, Kentucky which allows trucks to park overnight.

Exhibit 32: Walton Weigh Station, KY

Source: Google Maps. North is to the top of the image.

The Texas DPS does not currently allow trucks to park at weigh stations. Many of the existing weigh stations do not have space for trucks to park. However, even some newer facilities that do have space (such as the New Waverly Weigh Station on I-45 north of Houston) do not allow truck parking unless trucks are required to stop due to enforcement action (placed out of service due to violation of regulations).

This potential solution would require extensive coordination and buy-in from the DPS and the truck driving community to successfully deploy. Many of Texas’ older weigh stations may not have sufficient space at the existing site to allow parking or have adjacent right of way to expand. At locations where truck parking is available or could be built, communication to the driver community is key as use of these truck parking areas varies widely between states. Because of these challenges, advancing this strategy is not recommended at this time.
6.2.2 Build Dedicated Truck Parking Facilities

TxDOT may need to pursue construction of new facilities for dedicated truck parking if existing locations are not available in key areas or corridors. Options include repurposing recently closed public facilities or building brand new facilities.

6.2.2.1 Repurpose Underutilized or Closed TxDOT or Department of Public Safety Facilities

One option under this category is to repurpose closed TxDOT or Department of Public Safety (DPS) facilities such as safety rest areas, pull-out areas, picnic areas, maintenance facilities, and weigh stations. Land at these locations may still be publicly owned and prior investments (grading, entrance/exit ramps, electricity, pavement, etc.) can reduce up-front costs for TxDOT. The Parking Demand in Dedicated and Unauthorized Locations Memo (Section 3.3) identified a number of closed TxDOT facilities that could be targeted for conversion to truck-only parking.

Missouri DOT is a leader in this area, converting 23 obsolete and expensive rest areas and weigh stations to parking spaces for trucks, typically with no or minimal amenities (lighting, graded/paved, sometimes a vault toilet). An example location on I-70 is shown in Exhibit 33. These conversions supplement private parking facilities in locations with high truck parking demand and insufficient capacity. This approach would require internal coordination between TxDOT divisions and/or DPS to identify potential properties for repurposing and ensure that truck parking needs are considered before the property is offered for sale or considered for other use. In addition, coordination amongst TxDOT divisions is recommended to ensure any areas that could be closed are reviewed for use as truck parking prior to closure.

Exhibit 33: Missouri Converted Rest Area I-70

Source: Missouri DOT Presentation to the I-95 Corridor Coalition, May 1, 2018.
6.2.2.2 Develop New Publicly Owned Truck Parking

Based on the needs analysis, there may be some locations where additional truck parking is needed but there are no existing or recently closed facilities that can be expanded or converted. In this case, a new truck parking facility could fill the need. The exact size, design, and level of amenities could vary greatly depending on need, ranging from a small truck pull-off area with minimal amenities to a new state-of-the-art dedicated truck parking facility or SRA/TIC.

One area of particular concern based on the needs analysis is a lack of capacity in or near urban areas where demand is highest. Urban parking needs are generally more difficult to address than rural long-haul parking needs because State DOTs may have limited options to directly support urban truck parking, and the private sector may run up against zoning issues. More intense and complicated land ownership issues (and more constrained right of way), zoning challenges, community opposition, and higher land prices all make construction of truck parking facilities more difficult. However, as urban areas continue to attract and develop manufacturing, distribution, and warehousing services to meet growing customer needs and demands, and affordable available land decreases, the need for truck parking to serve all of the identified needs (short-term, staging, long-term, storage, ports/border staging, and emergency) will increase.

If located on the outskirts of major urban areas, a new publicly owned, dedicated truck parking facility with a large number of truck parking spaces and a full suite of enhanced amenities could help fill the demand for urban parking, but at a lower initial investment than if placed inside urban areas.

Alternatively, the below sections describe two potential approaches to developing truck parking to serve these urban-specific needs. Both could be built by the public sector and operated as publicly owned truck parking locations. However, private entities may also develop this type of truck parking in collaboration with TxDOT.

6.2.2.2.1 Dedicated Truck Parking Near Shippers/Receivers, Ports, Border Crossings, or Other Areas of High Demand Open 24/7

The need for truck parking and freight staging near freight generators and in urban areas, especially through a collective or multi-facility parking area has been raised in many State Freight Plans, including North Carolina, Colorado, Nevada, Kansas, and others—as well as highlighted by cities such as Cincinnati, Atlanta, and Denver. Truck parking in these areas can address multiple needs including short-term, staging, long-term, storage, and emergency truck parking. Perhaps most critically, if properly developed it can address the need for short-term and staging parking near areas that require large numbers of truck deliveries whether this is an industrial area or a dense commercial district, or as is prevalent in Texas, near sea ports and international border crossings.
This type of parking has historically been difficult to develop for reasons discussed above. However, there are a few examples of local jurisdictions taking the initiative to develop parking in more urban areas, as well as private companies providing parking for a fee.

The City of Weed, CA, is located near Mount Shasta on Interstate 5. The area is home to large lumber mills and a Crystal Geyser Alpine Spring water bottling plant. Residents within the town were complaining of freight trucks parking in residential neighborhoods and on city streets while they waited to make deliveries or take rest breaks.¹⁰ To alleviate this problem, the City used local tax dollars to pave an area near an existing Pilot Travel Center with lodging and food options close by.¹¹ The space has been designated for truck parking only with personal vehicles and RV’s prohibited. To ensure the availability of parking spaces, trucks are given a 72-hour maximum period for parking. There is no fee charged for parking at the facility. The parking location and relevant signage are shown in the image above. Weed also required new development (especially retail food) in the area to include truck parking, and an agreement that trucks may use their parking area and bathroom facilities even if they are not customers, as part of planning approvals. The City of Weed is a good example of the public sector providing low cost additional truck parking in a small urban environment.¹²

Another example is from New York. The City of Elmira added space for truck parking at an existing park and ride facility on the edge of the City and near an interchange with I-86. The City leases the 25 spots to local trucking firms at a cost of $5 per day or $50 per month.¹³ This approach can be considered in combination with the strategy of allowing truck parking at non-TxDOT facilities discussed in Section 6.4.2.1.


¹² Note that the City of Pharr has expressed interest in pursuing this approach

The Oasis Trucking Center (4195 Central St) in Detroit, Michigan is an example of a privately owned and operated secure truck parking facility\(^\text{14}\) that allows for long- and short-term parking near Detroit International Intermodal Terminals and the large auto manufacturing plants such as Ford Motor Company.\(^\text{15}\) The facility also works with local freight centers to assist with the dispatch of trucks to their final delivery points. This facility, developed through private-land acquisition and no public-sector involvement, has security personnel, guarded entry and exit points, high fences, and is connected to a proprietary truck parking notification system and mobile reservation system operated by Truck Specialized Parking Systems. The company is also involved with a number of truck parking information systems across the U.S.\(^\text{16}\) Their approach to short-term parking is based on generating revenue through user fees, which is different from most long-term parking facilities (TA/Petro, Flying J, etc.) that typically generate revenue by selling food, fuel, and other commodities on site.

Truck Depot LLC is another company that operates secure truck parking facilities near urban areas and distribution centers.\(^\text{17}\) The company provides storage parking (rented for 30 days at a time) which can provide space for owner-operators, short-term parking for a set fee, and provides space for trucks to cross dock (shift loads within a vehicle or between vehicles).

\textbf{6.2.2.2.2 Dedicated Truck Parking Near Areas of High Demand With Limited Hours}

Smaller lots with basic amenities and restricted hours could be constructed to counter local resistance to, or the cost of building large, full-service urban lots. These would consist of smaller lots close to a concentration of shippers and receivers and be used for staging only. A limit could be placed on the length of time a driver is allowed to park there, to allow for greater turn-over and therefore accommodate a greater number of trucks per day. In addition, the hours of operation could be restricted to match those of the shippers and receivers, thereby restricting its use during the overnight hours when nearby residents might object to idling trucks. It should be open early enough for drivers to gain access to it prior to the morning commute.

One stakeholder suggestion for urban parking was to construct lots in areas prone to flooding where development is otherwise restricted. Overnight or long-term parking at such a facility would be problematic in the event of a flood warning that occurs after the driver parks there. However, these locations might be able to accommodate short-term parking, with a requirement that the driver stay with the truck, which could be cleared quickly in the event of a potential flood.

These types of staging lots could also be advantageous near ports and border crossings where there is a greater need for short-term and staging parking. A large lot may be required

\begin{itemize}
\item [15]  In-person interview with TSPS on 11 October 2018.
\item [16]  https://tsps.io/
\item [17]  https://www.truckdepotllc.com/about/.
\end{itemize}
if demand is high in these areas, however, operational and maintenance costs would still be lower with few amenities and restricted hours.

6.3 Programs/Technology Solutions
This section describes a number of programs (including technology-focused programs) that TxDOT could develop to help address truck parking needs in the State. Although these approaches will not increase capacity, they can make finding parking easier which can reduce the impacts of idling (noise and air pollution) that are often the impetus behind community opposition to truck parking facilities, reduce truck parking in unauthorized areas by providing drivers with information about nearby options, and will increase public awareness about the importance of trucks and truck parking.

6.3.1 Technology Approaches
Several technology-focused solutions can help with truck parking issues in Texas, such as Truck Parking Availability Systems (TPAS); applications that connect property owners with available space, to truck drivers needing parking; and reservation systems.

6.3.1.1 Truck Parking Availability Systems
Truck parking availability systems (TPAS) are a type of Intelligent Transportation Systems. TPAS makes finding a truck parking space easier and less stressful for drivers by accurately counting and disseminating real-time information of the number of available spaces at connected facilities. This increases the efficient use of existing capacity and more advanced analysis such as predictive analytics can help predict the future supply of truck parking, providing drivers and dispatchers with even more information.

A TPAS relies on accurate and timely collection of truck parking availability and the ability to disseminate that information to users. TPAS uses two common approaches to collect parking availability information: 1) a site volume approach to measure truck volume entering and leaving a site; and 2) a vehicle occupancy approach which detects if a vehicle is in a particular parking space to determine availability. Information on where to find available truck parking is typically communicated to drivers via roadside signs and mobile applications. As noted below, TxDOT has already embarked on the development of a truck parking information system program along the I-10 corridor. In addition to these efforts, TxDOT should consider integrating the data into their DriveTexas.org highway conditions website and application.

Beyond a TPAS, two additional approaches used by the private sector to collect truck parking information is to use crowdsourcing or reporting by private lot owners. For example, TruckerPath is a crowdsourcing application which relies on drivers to report the number of spaces available at a parking location using a scale ranging from “Lots of Spots” to “Some Spots” to “Lot is Full.” This system, while low cost, relies on each driver’s interpretation of capacity and the updates can be infrequent. The Park My Truck application run by National
Association of Truck Stop Operators shows the total number of spaces at each facility and the number of open spaces based on time-stamped inputs from the truck stop operators.

While more precise than the TruckerPath data, owner-reported information typically relies on staff to check availability at their truck stop and enter the information manually, which at best is done hourly, and in some cases rarely. A fully developed, automated TPAS system provides better accuracy, real-time updates, and allows for public control of data.

6.3.1.1.1 I-10 Corridor Coalition Truck Parking Availability System
In June of 2018, TxDOT submitted to USDOT, on behalf of the four states of the I-10 Corridor Coalition (Arizona, California, New Mexico and Texas), an Advanced Transportation and Congestion Management Technologies Deployment grant request for $6.8 million, with an equal amount of state match. The purpose of the grant was to deploy the I-10 Corridor Coalition TPAS. The grant was awarded to the I-10 Corridor Coalition, and TxDOT will be the lead state on the project.

The project began in late 2019 and will deploy a truck parking availability detection and information system at 37 public truck parking locations along the I-10 Corridor from California to Texas. The objective of this system is to make real-time truck parking information available to truck drivers and dispatchers to assist them in making informed parking decisions.

The initial deployment of the I-10 Corridor Coalition TPAS will focus on collecting and publishing truck parking information for public facilities. This will be accomplished through the use of Dynamic Parking Capacity Signs, existing state 511 and road information system platforms, and the potential development of an I-10 Corridor truck parking smartphone application. This application would serve as the basis for anticipated future technology deployments in the I-10 Corridor and ensure that information is available to drivers regardless of private sector involvement. However, as requested, data will also be made available to third-party applications and websites to promote widespread use of truck parking availability information. In the future, the Coalition will explore incorporating the private-sector operated truck plazas into the system and wider options for truck parking dissemination may be developed.
Deploying TPAS statewide would increase the number of locations where information would be available to drivers, helping them make better parking choices, ultimately reducing the number of trucks parking in unauthorized locations, reducing the number of trucks searching for parking (and associated environmental and pavement degradation), and reduce the chance that drivers might drive over the HOS limits and contribute to a fatigue-related crash. In other states where already deployed, smaller independent truck stops have reported a dramatic increase in trucks parking at their facility, indicating that information on availability helps to distribute truck parking more evenly among authorized sites. It would also provide TxDOT with valuable data about parking patterns that can inform investment decisions and eventually help predict future parking demand patterns (predictive analytics).

6.3.1.1.2 Multi-State Coordination For TPAS
Stronger solutions may be found when addressed at a regional or multi-State level, especially applicable for TPAS. Truck drivers benefit from a single, national source for locating available parking, and TxDOT has an opportunity to be at the forefront by promoting and supporting a system that can be connected to other regional systems. Texas is already coordinating with other states in the western I-10 Corridor (California, Arizona, New Mexico) on a TPAS but as the system is expanded to other parts of the state and other corridors, similar partnerships with surrounding states should be explored.

6.3.1.2 Install Static Signs Indicating Upcoming Locations for Truck Parking
In advance of a fully deployed TPAS, TxDOT should install low cost, static signs indicating the exit numbers for upcoming SRAs with truck parking and truck parking areas. These could be placed on major highways at the entrance points to the state, or on the outbound side of major metropolitan areas. These will help truck drivers understand their upcoming parking options and therefore plan their stops to avoid unauthorized parking.

6.3.1.3 Truck Parking Reservation System
Truck parking reservation systems exist at many of the private truck stops around the country and allow reserving parking spaces at predetermined locations along a route in advance. This minimizes the need for drivers to drive around looking for parking. In high demand areas reserved parking spaces sell out quickly. Many privately owned truck stops (including Pilot/FlyingJ and TA-Petro) use reservation systems for a portion of their spaces, ensuring that the truck stop makes income on these spaces even if they are not used, and ensuring the driver or company that reserved them have access to a safe, secure truck parking space.

Reservations systems have not yet been deployed at publicly owned truck parking locations for a number of reasons including restrictions on commercialization of rest areas within the Interstate system and concerns about the ability to enforce a reservation system at unstaffed truck parking locations. In addition, a reserved space that is vacant is one less space for a waiting truck to occupy, which can be seen as contrary to the mission of safety
rest areas to provide a public benefit available to all. For these reasons, it is not recommended that TxDOT allow reservations at any truck parking lot under its control. However, in an urban area where there is municipal metered parking that must be enforced, there may be an opportunity for local cities or counties to deploy a reservation system and utilize existing enforcement options to help manage the system.

6.3.2 Non-Technology Focused Programs

Several actions that TxDOT can take are summarized below to encourage truck parking at authorized locations, improve efficiencies, better utilize available space, educate the public on the importance of truck parking, and educate truck drivers on the importance of being good stewards of public infrastructure.

6.3.2.1 Facilitate discussions for private truck stop development or expansion

TxDOT should meet with the National Association of Truck Stop Operators to define a program and process for supporting development of new or expanded truck parking that would provide tangible benefits to the truck stop operators, without significant costs or complicated programs for TxDOT. Several example initiatives are described below, however only the third is recommended for TxDOT consideration. Some of these have been tried in other states, and others have been proposed by stakeholders.

- **Construct truck parking on a private lot.** Several years ago, an independent truck stop leased a parcel of land adjacent to their truck stop to the Nevada Department of Transportation (NDOT) for $1/month. NDOT constructed a truck parking lot on that parcel and maintained it for two years. At the end of two years the lease was terminated, and the lot turned over to the truck stop. It is not recommended that TxDOT deploy a similar program without a system in place to enable private truck stop operators the opportunity to compete fairly for this type of support.

- **Lease public land to private truck stop operators below the fair market value.** This program is related to the above and would enable private truck stop operators to build or expand parking in areas that otherwise would be cost prohibitive, such as in expensive urban areas. It is not recommended that TxDOT deploy such a program. There may be opposition or legal constraints to disposing of or leasing land below fair market value, and the terms of the lease would need to be carefully written and enforced to ensure the lessee doesn’t use the land for a different purpose in the future. In addition, several truck stop operators have indicated they do not wish to enter into a financial partnership with a public agency, but would appreciate the type of support indicated below.

- **Assistance with permitting and garnering public support.** Several truck stop operators have indicated that permitting requirements can increase the cost of construction and make development at that site infeasible, or that public opposition can kill a project. More important to them than financial support, is assistance with the permitting process and gaining public support for the project.
6.3.2.2 Include Driver Outreach in “Don’t Mess with Texas” Campaign to Encourage Them Not to Litter

Truck drivers who litter contribute to a negative public perception of drivers and an opposition to facilities that attract truckers, such as truck parking lots. Outreach and partnership with the trucking industry specifically may help raise awareness about the importance of litter prevention to the industry and the communities they service. TxDOT launched the “Don’t Mess with Texas” anti-litter campaign over thirty years ago, reaching thousands of Texans through advertising, consumer outreach, and media relations. In addition, TxDOT’s Adopt-a-Highway and the Don’t Mess with Texas Trash-off campaigns have helped reduce roadside trash along state-maintained roadways. These programs could be expanded to target the trucking industry.

6.3.2.3 Create a Public Education Campaign to Inform the Public on the Importance of Truck Parking

Most citizens rely on trucks to deliver food to their supermarket, clothes to their favorite store, or a new toy to their door. However, few people think about how those purchases drive a demand for truck trips and thus the need for trucks to park. Trucks, like much of the freight system that supports Texas’ economy, are often considered a problem rather than a necessity.

Changing this public perception is a critical piece of outreach for TxDOT in partnership with other agencies and the private sector. As described earlier in this memorandum, one of the largest challenges private truck-parking operators face when trying to expand or build new inventory is opposition from local residents who do not want trucks parking near them. In tandem with the above message that drivers need to behave better, TxDOT and its partners need to do more to explain the need for truck parking and examine how the negative impacts (noise, light pollution, traffic, etc.) can be ameliorated.

6.3.2.4 Collect Truck and Car Utilization Data at Publicly Owned Truck Parking Facilities

Truck utilization data at SRAs and TICs can be used for performance reporting, evaluating the effectiveness of public investments in truck parking, and providing data to FHWA for its periodic Jason’s Law survey. In addition, by also collecting data on cars and RVs TxDOT will know how each public facility is being used by vehicle type, time of day, day of week, and services used. This will inform future renovation plans for more efficient configuration and utilization of parking areas. For instance, if few cars utilize the parking area, TxDOT may need to convert some of that space to truck parking. Or if cars are not parking during certain hours, trucks could be allowed to park in those spaces during those hours.

6.3.2.5 Prepare Corridor Truck Parking Plans

Specific recommendations on where to construct, and what amenities or restrictions to apply to new truck parking facilities will need local input and coordination, and should
integrate with other local planning documents. Corridor Truck Parking Plans can also include direct data collection and vehicle counts to provide additional truck parking utilization at key locations. Truck Parking Plans should first be developed for the Interstate corridors, followed by other critical non-Interstate corridors with high truck volumes. Districts and relevant MPO input should be included in each Plan.

6.4 Policy/Coordination/Outreach Solutions
Based upon stakeholder engagement and industry roundtables, a number of policies, coordination efforts, and education and outreach opportunities were suggested to help close the truck parking gap in Texas. Ideas in these categories are described below.

6.4.1 Policy/Coordination/Outreach – Direct TxDOT Action

6.4.1.1 Develop Guidelines for Integrating Truck Parking into the TxDOT Project Development Process
Coordination and communication between the large and varied departments within TxDOT is critical to ensuring that truck parking needs in specific, and freight needs in general, are identified and considered.

Spreading information about the critical role that trucks play in Texas’ economy and the need to recognize and incorporate truck parking issues, facilities, and needs in the planning process, particularly during the development of a project, could help TxDOT plan for truck parking needs more effectively. For example, construction staging areas that are used during a lane widening or interchange project should be evaluated for potential use as truck-only parking areas once the initial project is complete.

6.4.1.2 Consider Truck Parking Needs Prior to Purchase or Sale of TxDOT Right of Way
Similar to the above, as TxDOT continues to purchase new right-of-way, truck parking needs should be considered for future use, just as highway expansion or rail right of way is accounted for in the state’s long-range planning process. In addition, prior to the sale of any TxDOT right of way, the location should be checked against truck parking high-needs areas to ensure that potential expansion or new development opportunities are not missed.

6.4.1.3 Reassess Public Facility Closures in High Demand Areas
Public facilities such as rest areas, picnic areas, weigh stations, and maintenance yards may be closed due to underuse, aging facilities, criminal activity, or limited funding. All of these properties could be valuable options for increasing truck parking inventory through conversion to lower cost, truck parking-only facilities.

Prior to closing any publicly owned facility, the site should be evaluated by TxDOT to determine if it is in a high truck parking demand area and if the parking is not going to be replaced at another nearby facility. If so, the site should be targeted for conversion to truck-
parking only. This policy is meant to avoid the need to completely rebuild a closed facility as described in Section 6.2.2.1. “Repurpose Underutilized or Closed TxDOT or Department of Public Safety Facilities” by identifying and converting these locations prior to closure.

6.4.1.4 Allow Truck Parking in Auto-designated Areas at Exiting TxDOT Facilities During Off-hours
At certain times, especially during overnight hours when automobile traffic is typically lighter at SRAs, TICs, and picnic areas, TxDOT should consider allowing trucks to utilize some of the space typically reserved for cars. Aerial imagery of many rest stops and picnic areas (see Appendix B in the Truck Parking Demand in Dedicated and Unauthorized Locations technical memorandum) shows that trucks are informally using this space, indicating a demand for additional inventory at many locations. Alternatively, a more in-depth study of automobile use at rest areas may identify some locations where additional parking could be turned over to truck parking on a more permanent basis. Site geometry and pavement may need to be examined to confirm the car parking areas are able to accommodate trucks.

6.4.1.5 Include the minimum required amenities at publicly owned truck parking facilities
As discussed in Section 6.1, amenities are a factor in a driver’s decision of where to park, and the lack of amenities may limit utilization at public locations lacking them. All new or renovated public facilities with truck parking should include the following minimum package of amenities: paved, angled parking and curb space for oversize/overweight vehicles; lighting; flush toilets; trash cans; and enhanced vending machines which could include more nutritious food and drink options, toiletries, small electronics, or medical needs. Wireless internet should be provided, especially in rural areas with poor cellphone reception. In some locations additional amenities should be considered, such as a driver lounge, emergency phone/notification system, green space, and security fencing.

6.4.1.6 Integrate Truck Parking into the Strategic Highway Safety Plan (SHSP)
Consider commercial motor vehicles related crashes as a potential area of focus for the SHSP to identify and develop additional mitigation strategies. In addition to improving safety, this may also open up safety funding streams for completion of these strategies.

6.4.2 Policy/Coordination/Outreach – TxDOT Support
Stakeholders within the truck stop industry have commented that one of the best ways public agencies can support development of new or expanded facilities is not with financial support (which often comes with unwanted requirements) but help with local permitting requirements. TxDOT can play a role by supporting municipalities and metropolitan planning organizations that want to add truck parking by coordinating outreach, providing data about the important role trucks play in the local and regional economy, and sharing best practices. Some of the policy recommendations geared towards partner agencies are described below.
6.4.2.1 Advocate for Truck Parking at non-TxDOT Public Facilities

Similar to allowing trucks to park in auto-oriented sections of an SRA or TIC during off-hours, TxDOT could work with partner agencies and municipalities to identify commuter parking lots, bus depots, or other facilities that, while not owned by TxDOT, could support truck parking during off-hours. These facilities are usually located in urban areas where the demand for truck parking is high and have patterns of use that are regular and opposite of the peak demand hours for truck parking. These locations would likely have minimal amenities on-site but in some areas might be adjacent to commercial or retail establishments that could provide food and restrooms for (paid) use. Additional study would be needed to identify areas with a surplus of overnight parking spaces and that are properly built to carry heavier commercial vehicles for longer periods of time. A park and ride lot north of San Diego, California, at I-15 and SR 76 (Exhibit 34) includes an area for dedicated truck parking. Caltrans is exploring the feasibility of allowing trucks to park in the car parking area during the overnight hours when not in use.
Exhibit 34: Park and Ride Lot, I-15 at SR 76, Fallbrook, California

Source: Google Maps. North is to the top of the image.
6.4.2.2 Coordinate with Public or Private Property Owners to Allow Emergency Truck Parking at Large Parking Facilities when not in use

Finding truck parking during emergency events is a particular challenge. Flooding due to periodic rain or extreme events like hurricanes or tornadoes, wildfires, and sandstorms can all create closures that block large amounts of truck traffic from moving for indeterminate amounts of time. Tropical Storm Imelda in September, 2019 was only the latest example, and Exhibit 35 shows trucks parked along I-10 near the Louisiana border.

While it is impossible to provide parking options everywhere that an emergency might arise, some locations have known vulnerabilities that may require emergency parking on a more regular basis. In these locations, TxDOT can work with other public agencies and the private sector to identify potential areas for storing large numbers of trucks that provide drivers with a safe space to park and remove the vehicles from the road so that work crews can more easily access the area.

As an example, when I-80 over Donner Pass in California is closed due to snow, Caltrans works with Gold County to provide parking at a fairground in Auburn, CA approximately 60 miles west of the Pass. Caltrans provides plowing at the fairgrounds and allows trucks a safe place to park prior to being stuck on the highway (which has limited public and private truck parking inventory prior to the Pass).

Fairgrounds, stadiums, racetracks, and other event venues with large amounts of parking close to the highway and in areas that frequently close due to emergency events should be identified and owners contacted to investigate the potential of providing parking during emergency closures. These types of locations have schedules that are known far in advance, often have significant downtime, and are used to accommodating large numbers of vehicles and people in a condensed period of time. Sites owned by public agencies are especially attractive as emergency parking venues.

Commuter park-and-ride lots may also offer provide an opportunity during emergencies. For example, the State of Maryland allows trucks to park in specific park-n-ride lots during inclement winter weather. Additional research would be necessary to identify areas of opportunity in Texas, use patterns at existing locations and confirm that the pavement and geometry of the lot can accommodate large trucks for longer periods of time.

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Exhibit 35: Trucks Stopped on I-10. Beaumont, Texas (September 2019)


6.4.2.3 Create Guidance to Help Municipalities Include Truck Parking Demand As Part of Traffic Impact Analyses for New Developments

Many local jurisdictions have policies or guidelines in place to evaluate the potential traffic impacts of a proposed development project. State and local agencies should ensure that their policies and guidelines also require that a proposed project evaluate the potential increase in truck parking demand and possible impacts on local road safety and condition if that increased parking need is not met. By identifying the truck parking needs before a project is built, projects can incorporate design changes or mitigation to address the potential impacts and help meet truck parking needs as a matter of course. TxDOT could play a leading role in developing guidance or sharing best practices as they emerge with local communities.
6.4.2.4 Encourage Shippers and Receivers to Provide On-site Truck Parking or Contribute to a Common Staging Lot

The private sector should play a role in providing truck parking, particularly shippers and receivers who generate a significant portion of the truck parking demand. This issue relates in part, to evaluating the potential impacts of truck parking demand in traffic impact analyses (identified above). When local jurisdictions allow for new development, but do not also account for the increased level of truck parking needs, the costs for mitigating these needs are passed on to others. Requiring shippers and receivers to provide on-site parking or contribute their fair share to the cost of a common parking area will help meet the parking demand while also help spread the costs of providing truck parking. This parking would be open to all vehicles serving the shipper/receiver(s), not just trucks from that company’s fleet. The FHWA in their *Freight and Land Use Handbook* states:

“Establish staging areas for freight delivery. Many stores and other facilities receiving shipments do not have staging areas or freight loading docks. Trucks making deliveries must park along the curb or in a parking lot, which can impede traffic flow and cause congestion on the streets around the store. One solution calls for municipalities and other zoning authorities to require onsite, and, preferably, off-street staging areas for facilities and businesses that regularly receive freight shipments. In some cases, there may not be sufficient space for onsite loading docks or parking areas. The establishment of common loading areas in multiple-tenant facilities, and/or regulations to effectively manage curbside truck parking may be more suitable solutions.”

Some areas within the U.S. have taken this step. In 2017, the Township of Upper Macungie in the Lehigh Valley passed new zoning requirement which requires one (1) off-street truck parking space for every loading dock at a new warehouse or distribution facility. The new zoning regulations also mandated one (1) truck staging space (with a 10-feet x 80-feet dimensions) for every two (2) loading spaces at a distribution or warehouse facility. The new zoning requirements specifies that “the applicant shall present credible 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.” Legal text from the zoning changes in Township of Upper Macungie can be found in Appendix C.

This approach helps alleviate the issue before it becomes an issue, especially in freight generating areas including border-crossings, ports, warehousing, and industrial developments. In addition, businesses that have truck parking and associated amenities available to drivers—whether on property or in a shared staging lot nearby—become “shippers of first choice” and may receive better rates or preference when trucking capacity

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becomes tight. Industrial development agencies or economic development agencies should partner with TxDOT and local municipalities in stressing the need for and potential benefits from including truck parking in new construction.

6.4.2.5 Encourage Commercial and Industrial Property Owners to Provide Truck Parking on Unused Portions of Property

In industrially zoned areas it is common to find vacant lots, and developed sites with excess space could be used for truck parking. Drivers interviewed as part of this study noted a growing trend for industrial property owners to offer a portion of their property for truck parking, typically on a monthly basis serving owner-operators and small trucking companies. TxDOT could promote or encourage this type of activity throughout the state by bringing together and engaging with property owners, municipalities, economic development agencies, industrial development agencies, and chambers of commerce to highlight the need for this type of truck parking and the potential economic benefits to both property owners, businesses and the public. As noted in Section 6.3.1.2, applications that connect drivers looking for parking to property owners with excess capacity can facilitate development of this policy.

6.4.2.6 Work with Texas DPS and local law and code enforcement to increase enforcement of unauthorized parking in areas with available truck parking spaces

As TxDOT, its partner agencies and municipalities, and the private sector continue to add parking capacity and information systems in Texas, enforcement should become more active in discourageing and enforcing hours of service regulations and restrictions on trucks parked in unsafe, unauthorized locations. Truck drivers often push their HOS to the limit, trying to gain every mile possible on a route before stopping to rest. With limited risk of enforcement, there is less incentive for drivers to stop at an authorized location before they run out of time. More authorized truck parking supply and better access to information about that supply, combined with increased enforcement in those areas will help reduce instances of unauthorized parking and limit the safety, environmental, and infrastructure challenges associated with it.

6.4.2.7 Create Guidance for Next Generation Logistics Parks that Includes Integrated and Full-Service Truck Parking Facilities

Truck parking and staging facilities near their customers helps truck drivers maximize their HOS, thereby improving efficiency and profitability. Anecdotal evidence indicates that truck parking availability inside logistics parks can help tenants receive preferential treatment from trucking companies and drivers, and possibly even lower trucking rates. This in turn makes the logistic park more attractive to prospective tenants.
6.4.2.8 Mobile Applications
Private application developers are creating applications for utilizing public and private spaces more efficiently. SecūrSpace is one example. It “is an online marketplace that connects companies looking for parking and storage options to those with dedicated or excess capacity. Our platform was built to combat issues caused by the lack of adequate space in cities and near major highways and interstates. Businesses and individuals around the world contend with this issue on a daily basis – solving this problem is our specialty.”22

PARKUNLOAD® is another example of a “digital platform to regulate, control and monitor loading zones and other restricted parking areas, based on IoT devices and mobile applications.”23 This application directs city delivery truck drivers to available curb space and indicates any restrictions such as time of day or duration of parking. Law enforcement, with a different interface, can quickly identify those trucks registered and allowed to park at a particular curb, and cite those who are not.

While neither of these offers the ultimate solution—the first does not offer short-term or staging options, and the second is targeted at city delivery trucks—both have interesting components and applications for addressing urban parking and staging needs without adding capacity. For instance, in many areas curbside truck parking is allowed in commercial and industrial areas at certain locations and specified times. An application could indicate to drivers where curbside parking is allowed, at what times of the day, and for what duration—and allow the city to change those restrictions at any time and easily enforce non-compliance. Likewise, private property owners with excess space could also make their space available at the dates, times and durations they desire, and use a private application to communicate those details and availability, and facilitate payment. This would enable them to generate revenue from unused space while helping drivers find available parking. TxDOT could help to facilitate the development of applications that would help to serve truck parking needs in Texas.

7.0 Next Steps
This memorandum summarizes the current and forecasted needs for truck parking and prioritizes those segments of the THFN with the highest priority needs. In the next step of the process the needs identified in the priority segments will be matched with the most appropriate solutions from the toolbox of strategies to identify a specific set of recommendations. The recommendations will be grouped into series of candidate “concepts of operations” of potential physical, policy, regulatory, operational, and technology solutions to address the issues at locations with truck parking needs. The recommendations will include estimated costs and potential funding sources to support next steps.