Texas A&M Transportation Institute

Potential Metrics for Designating and Monitoring Oversize/Overweight Corridors

Final report

PRC 16-10 F

TRANSPORTATION
Policy Research CENTER

Potential Metrics for Designating and Monitoring Oversize/Overweight Corridors

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Executive Summary

This report:

- Discusses how oversize/overweight (OS/OW) corridors are currently designated in Texas.
- Provides information on OS/OW corridors as detailed in the Texas Transportation Code.
- Lists potential metrics (as identified by stakeholder workshop participants) that can be used for designating OS/OW corridors and for monitoring the performance of the corridors once designated.

Introduction

In 1997, SB 1276 authorized port authorities in border counties adjacent to Mexico and the Gulf of Mexico to collect a fee for issuing single-trip permits for OS/OW trucks on designated corridors (*1*). Subsequent to SB 1276, certain marine ports along the Texas coast and counties adjacent to the Texas-Mexico border received authorization to issue single-trip OS/OW permits on designated corridors through legislation. Single-trip permits on designated OS/OW corridors allow businesses to access ports or nearby foreign trade zones efficiently and avoid the cost of repacking containers to meet the 80,000 lb gross vehicle weight (GVW) or 20,000 lb single-axle weight tolerance on non-interstate roads in Texas (*2*).

> The term "corridor" is not defined in the statutes. This report uses the term corridor to refer to a route or network of roads.

Corridors are authorized by individual pieces of legislation. Unlike similarly authorized local infrastructure methods such as utility districts, there are no minimum requirements for designation, assessment, collection of fees, and performance measurement. The result is wide variation among the corridors.

Designating OS/OW Corridors

OS/OW corridors designated to date have been created through individual corridor-specific legislation. The Texas Department of Transportation (TxDOT):

- Analyzes the proposed legislation.
- Calculates the amortization of the pavement and bridge structures and subsequently apportions an amount to heavier vehicles.
- Estimates the operation and maintenance costs imposed by an assumed number of OS/OW vehicles that will use the corridor. If safety issues are suspected, then TxDOT also performs studies and considers the safety impacts.

- Updates the Texas Administrative Code to reflect the changes in law when the proposing entity wants to pursue the implementation of the OS/OW corridor.
- Enters into an agreement with the entities interested in pursuing the issuance of permits on the designated OS/OW corridors in accordance with the Texas Administrative Code and the Transportation Code.
- Recommends a permit fee that supports the maintenance and preservation of the corridor on a cost-neutral basis (*3*).

Oversize/Overweight Corridors in Texas

Table ES 1 summarizes the information on OS/OW corridors as detailed in the Texas Transportation Code and the current operations of these corridors as implemented by the permit-issuing entities. Only the Port of Brownsville, Port Freeport, and Hidalgo County Regional Mobility Authority (HCRMA) are currently issuing OS/OW permits. Chambers County is currently working with TxDOT on the agreement that will allow it to issue OS/OW permits (*4*).

Table ES 1. Oversize/Overweight Corridors in Texas.

	Port Authority Permits	Victoria County Navigation District	Chambers County	Port of Corpus Christi Authority	Regional Mobility Authority	Webb County
Authority under Texas Transportation Code						
Permit Fees	Not to exceed $80 per trip	Not to exceed $100 per trip	Not to exceed $80 per trip	Not to exceed $80 per trip	Not to exceed $80 per trip effective 09/01/2013*	Not to exceed $200 per trip*
Administrative Costs	Not to exceed 15% of permit fee	Not to exceed 15% of permit fee	Not to exceed 15% of permit fee	Not to exceed 15% of permit fee	Not to exceed 15% of permit fee	Not to exceed 15% of permit fee
Permit Revenue	Must be used for maintaining and improving state highways used	Must be used for maintaining state highways used	Must be used for maintaining state highways used	Must be used for maintaining state highways used	Must be used for maintaining roads used	Must be used for operation and maintenance of roads used
Permit Revenue Minus Administrative Cost	Deposited in State Highway Fund	Deposited in State Highway Fund	Deposited in State Highway Fund		Must make payments to TxDOT. Must file a bond payable to TxDOT to cover the annual cost (in excess of payments received) to repair any damage to roads and highways imposed by permitted OS/OW vehicles.	Must be distributed between TxDOT and the City of Laredo based on the on- and off-system lane miles calculated on a biannual basis. TxDOT's share must be deposited in State Highway Fund. City of Laredo may also be required to file surety bond payable to TxDOT in an amount of no less than $500,000.

	Port Authority Permits			Victoria County Navigation District	Chambers County	Port of Corpus Christi Authority	Regional Mobility Authority	Webb County
Gross Vehicle Weight	Cannot exceed 125,000 lb			Not to exceed 140,000 lb	Cannot exceed 100,000 lb	Cannot exceed 125,000 lb	Cannot exceed 125,000 lb	Cannot exceed 125,000 lb
Pavement Management Plan								TxDOT required to develop pavement management plan for impacted roads
Operational Status								
Permit-Issuing Entity	Port of Brownsville	Port Freeport	Port of Harlingen Authority	Victoria County Navigation District	Chambers County	Port of Corpus Christi	Hidalgo County Regional Mobility Authority	City of Laredo
Permits Issued Since	1997	2013	Not operational	Not operational	Not operational	Not operational	2014	Not operational
Permit Fee	$30	$30					$80	
Current Route Miles	22.5	66.5					47	
Number of Bridges	14	33					12	

*Can be adjusted annually based on percentage change in the Consumer Price Index for All Urban Consumers (CPI-U) during the preceding year.

Potential Metrics for Designating and Monitoring OS/OW Corridors

Four metrics can inform the designation of OS/OW corridors, and three metrics can be used for monitoring the performance of designated OS/OW corridors.

Metrics for Designation

The four potential metrics to inform the designation of OS/OW corridors in Texas are:

1. The estimated/expected **economic impacts** of the OS/OW corridor. Although economic benefits are cited by the promoters/proponents of OS/OW corridors, these benefits tend to be qualitative or anecdotal statements of economic development. The promoters could be required to determine potential users and expected usage of the corridor to estimate the economic impacts of the proposed OS/OW corridor. Without a formal cost-benefit analysis or economic impact study, industry support letters expressing commitment to the use of the corridor could be provided.

2. The **safety** of the OS/OW corridor, measured using available crash statistics. Safety improvements may be required before the OS/OW corridor can be designated if high crash rates are experienced.

3. The estimated **infrastructure impacts** (both pavements and bridges) associated with OS/OW vehicles using the proposed corridor. Pavement and bridge models are available for estimating pavement and bridge consumption and the improvements required that will allow potential corridors to handle the anticipated heavier loads.

4. The **local support** for the proposed OS/OW corridor. Local entities tend to be vocal in their support or opposition of OS/OW corridors. Local entities could be provided an opportunity to comment on proposed OS/OW corridors prior to designation.

Metrics for Monitoring

Three metrics could inform the monitoring of OS/OW corridors in Texas: **the economic, safety, and infrastructure impacts** of the corridors. The permit data currently collected are adequate to estimate the economic and infrastructure impacts of designated OS/OW corridors post implementation. Periodic quantification of the economic impacts of the designated OS/OW corridors could demonstrate to the public the benefits of these corridors. Similarly, by tracking the infrastructure impacts of the designated OS/OW corridors, TxDOT could determine if the permit fees cover the pavement and bridge costs imposed by OS/OW trucks using the corridor. In terms of safety impacts, monitoring available crash rates provides insight into the safety of OS/OW corridors.

Conclusion

To date, OS/OW corridors have been created through the passage of individual corridor-specific legislation and without a formal requirement for promoters/proponents to quantify the economic,

safety, and infrastructure impacts associated with the designation of these corridors. TxDOT is often not consulted by promoters/proponents of these OS/OW corridors, and there is no formal monitoring of the performance of OS/OW corridors once designated.

A more informed decision can be made in the designation of OS/OW corridors if TxDOT is involved early in the process. This pertains specifically to the safety and infrastructure impacts of the proposed OS/OW corridors. Alternatively, language could be included in the authorizing legislation that states that the OS/OW corridor would only become effective once TxDOT determined that the corridor is capable of handling the estimated number of OS/OW vehicles.

Introduction

In 1997, SB 1276 authorized port authorities in border counties adjacent to Mexico and the Gulf of Mexico to collect a fee for issuing single-trip permits for OS/OW on designated corridors (*1*). SB 1276 provided for port authorities to:

> The term "corridor" is not defined in the statutes. This report uses the term corridor to refer to a route or network of roads.

- Issue permits specifying the time in which movement is authorized and use permit fee revenues for the maintenance of roads and bridges.
- Prohibit movements authorized by a permit from exceeding 55 mph or the posted limit, whichever is less.
- Deposit all revenues, minus an administrative fee, with TxDOT for maintaining and repairing the impacted OS/OW corridor.

Subsequent to SB 1276, certain marine ports along the Texas coast and counties adjacent to the Texas-Mexico border received authorization to issue single-trip OS/OW permits on designated corridors through legislation. These include Victoria County Navigation District (2003), Chambers County (2005), Port of Corpus Christi (2009), HCRMA (2013), and Webb County (2015) (*5*). However, other entities also have statutory authority to issue permits (addressed in detail later in this document).

Single-trip permits on designated OS/OW corridors allow businesses to efficiently access ports or nearby foreign trade zones and avoid the cost of repacking containers to meet the 80,000 lb GVW or 20,000 lb single-axle weight tolerance on non-interstate roads in Texas (*2*). In some cases, permitted OS/OW corridors serve cross-border traffic and a large array of freight users, while in other cases, these corridors benefit a more limited number of industrial sites or customers.

This study report:

- Discusses how OS/OW corridors are currently designated in Texas.
- Provides information on OS/OW corridors as detailed in the Texas Transportation Code.
- Lists potential metrics that could be used for designating OS/OW corridors and for monitoring the performance of the corridors once designated.

The metrics were identified during a workshop attended by subject matter experts as well as representatives from TxDOT, the Texas Department of Motor Vehicles, the Texas Department of Public Safety (DPS), the Texas Trucking Association, and BNSF Railway.

Designating OS/OW Corridors

Current OS/OW corridors have been designated through passage of individual corridor-specific legislation. TxDOT:

- Analyzes legislation proposing to designate a corridor for potential fiscal impacts associated with an assumed number of OS/OW vehicles using the proposed corridor.
- Calculates the amortization of the pavement and bridge structures and subsequently apportions an amount to heavier vehicles. In other words, TxDOT estimates the percentage of the total loadings attributable to the heavier vehicles over the service life of the corridor and applies that percentage to the amortized cost to estimate the pavement and infrastructure impacts.

> The impetus for the OS/OW corridors in Hidalgo County was the new Mazatlán/Durango-Matamoros toll highway in Mexico that reduced travel time between the agricultural communities in Sinaloa and Durango and the Lower Rio Grande Valley ports of entry. Consultant studies reported the potential for substantial truck traffic to be diverted away from the port of entry (POE) in Nogales (Arizona) to Lower Rio Grande Valley POEs.

- Estimates the operation and maintenance costs imposed by the assumed number of OS/OW vehicles that will use the corridor.[1] Safety and economic impacts are typically not considered by the agency when reviewing bills relating to OS/OW corridors. However, TxDOT does consider the safety impacts when needed and perform studies if safety issues are suspected.
- Updates the Texas Administrative Code to reflect the changes in law upon adoption and when the proposing entity wants to pursue the implementation of the OS/OW corridor. Texas Transportation Code Section 623 lists all current OS/OW corridors in Texas.
- Enters into an agreement with the entities interested in pursuing the issuance of permits on the designated OS/OW corridors in accordance with the Texas Administrative Code and the Transportation Code. These agreements also state TxDOT's requirements in terms of the electronic transfer of fees collected, information on the number of permits sold, access to permit information, document retention policies, agreement termination dates, etc. In other words, these agreements specify the information that TxDOT requires and how TxDOT will interact with the entity (*3*).

[1] TxDOT is consistent in analyzing the different corridors in both the agency's assumptions about the OS/OW traffic and the structural integrity of the pavements. TxDOT typically assumes a structural number of three (i.e., fair quality) for a flexible pavement and considers the thickness of the concrete in the case of concrete pavements. Based on this information, TxDOT determines the capacity of the pavement to handle the truck traffic expressed in terms of equivalent standard axles (*3*).

- Recommends a permit fee that supports the maintenance and preservation of the corridor on a cost-neutral basis (i.e., considering only pavement amortization, maintenance and operations, and bridge consumption).

Permit fees collected (minus an administrative fee) are deposited in the State Highway Fund (Fund 6). Since the corridors are used by the general public and commercial traffic (not only OS/OW vehicles), the permit-issuing entities are not expected to cover the costs imposed by all the traffic (i.e., they are only expected to cover the costs imposed by the permitted loads). The TxDOT districts in which these OS/OW corridors reside are responsible for maintaining the corridors.[2] TxDOT's Maintenance Division provides technical support (*3*).

[2] The TxDOT districts do not prioritize maintenance of the OS/OW corridors over the rest of the state-maintained system. Rather, these corridors are maintained to a condition similar to the rest of the state-maintained system (*3*).

Oversize/Overweight Corridors in Texas

OS/OW corridors in Texas are formally created through legislative actions, detailing the authority to issue permits for each new location. This section summarizes the information on OS/OW corridors as detailed in the Texas Transportation Code and the current operations of these corridors. Only the Port of Brownsville, Port Freeport, and HCRMA are issuing OS/OW permits. Chambers County is currently working with TxDOT on the agreement that will allow it to issue OS/OW permits (*4*).

Port Authority Permits

Transportation Code Section 623.210 provides for a port authority to issue permits for the movement of OS/OW vehicles on state highways in counties adjacent to the Gulf of Mexico[3] and adjacent to at least two counties with a population of 550,000 or more or bordering Mexico. The permit fees may not exceed $80 per trip, and revenues generated (less administrative costs not to exceed 15 percent of the fees collected) must be used for maintaining and improving the state highways used. The generated revenues are deposited into the State Highway Fund (*5*).

The Transportation Code states that the following data must be collected during permit issuance:

- Applicant name.
- Permit issuance date.
- Kind of cargo transported.
- Maximum weight and dimensions of the equipment used.[4]
- Kind and weight of each commodity.[5]
- Conditions on which the permit is issued.
- Designated route that applies.
- Name of the driver of the vehicle in which the cargo is transported.
- Location where the cargo was loaded (*5*).

The permit also has to specify the time in which movement authorized by the permit is allowed. Finally, the port authority has to report on all permits issued to TxDOT (*5*).

The Port of Brownsville and the Port of Freeport are currently issuing permits under this authority.

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[3] Or a bay or inlet opening into the Gulf of Mexico.

[4] To comply with this legislative requirement, ProMiles collects information on the axle configuration options, axle distance, and axle weight from permit applicants (see page 66).

[5] The gross weight of the equipment and load cannot exceed 125,000 lb.

Port of Brownsville

The Port of Brownsville has issued OS/OW permits under 623.210 since 1997. The Port of Brownsville charges a $30 permit fee (*6*). Permits issued by the Port of Brownsville allow vehicles to travel OS/OW between the Gateway International Bridge or the Veterans International Bridge at Los Tomates and the Port of Brownsville. The GVW cannot exceed the Mexican legal weight limit[6] or 125,000 lb, whichever is less. Similarly, the dimensions of the vehicle and load cannot exceed 12 ft wide, 15 ft 6 in. high, or 110 ft long[7] (*7*). The Port of Brownsville issued permits to cover travel on:

- State Highway (SH) 48/SH 4 between the Gateway International Bridge and the entrance to the Port of Brownsville.
- U.S. Highway (U.S.) 77/U.S. 83 and SH 48/SH 4 between the Veterans International Bridge at Los Tomates and the entrance to the Port of Brownsville (see route in red in Figure 1) (*7*).

Transportation Code Section 623.210 also provides for a port authority to issue permits for the movement of OS/OW vehicles between the Free Trade International Bridge and the Port of Brownsville entrance using Farm-to-Market Road (FM) 509, U.S. 77 and 83, FM 511, SH 550, and East Loop (SH 32) (Figure 1) (*5*).

[6] The gross weight of the equipment and load of Mexican trucks operating in Mexico.

[7] Texas mandates the size and maximum weight of trucks that may be operated on Texas's highways without a permit in an effort to preserve (i.e., prevent damage to) the highway and road infrastructure. Currently, the weight of trucks is limited to a maximum GVW of 80,000 lb and the width and height are limited to 8 ft 6 in. and 14 ft, respectively. The maximum length varies depending on vehicle type.

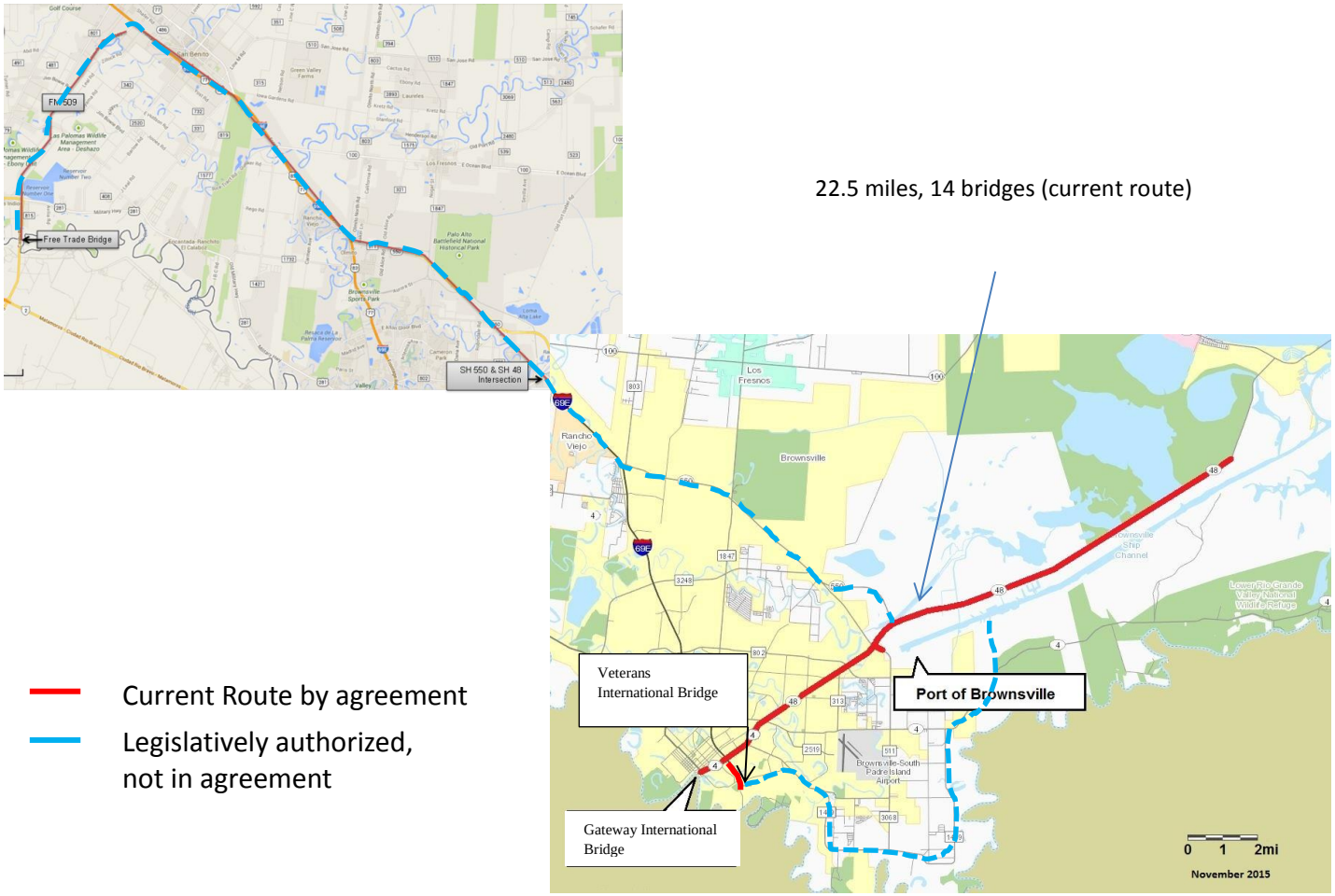

Figure 1. OS/OW Corridors Serving the Port of Brownsville (*8*).

TxDOT's Pharr District is currently working with the Port of Brownsville on an alternative OS/OW corridor that will divert the OS/OW truck traffic around downtown Brownsville. The district and the Port of Brownsville are looking into designating an OS/OW corridor to the east of the city (Figure 1) (*6*).

Port of Harlingen Authority

Transportation Code Section 623.210 also provides for a port authority to issue permits for the movement of OS/OW vehicles between the Free Trade International Bridge and the:

- Port of Harlingen east entrance using FM 509, U.S. 77 Business, and FM 1846 (see Figure 2).
- Port of Harlingen west entrance using FM 509 and 106 (Figure 2).
- Harlingen Industrial Park south entrance using FM 509 (Figure 2).
- Harlingen Aerotropolis south entrance at Valley International Airport using FM 509 (Figure 2) (*5*).

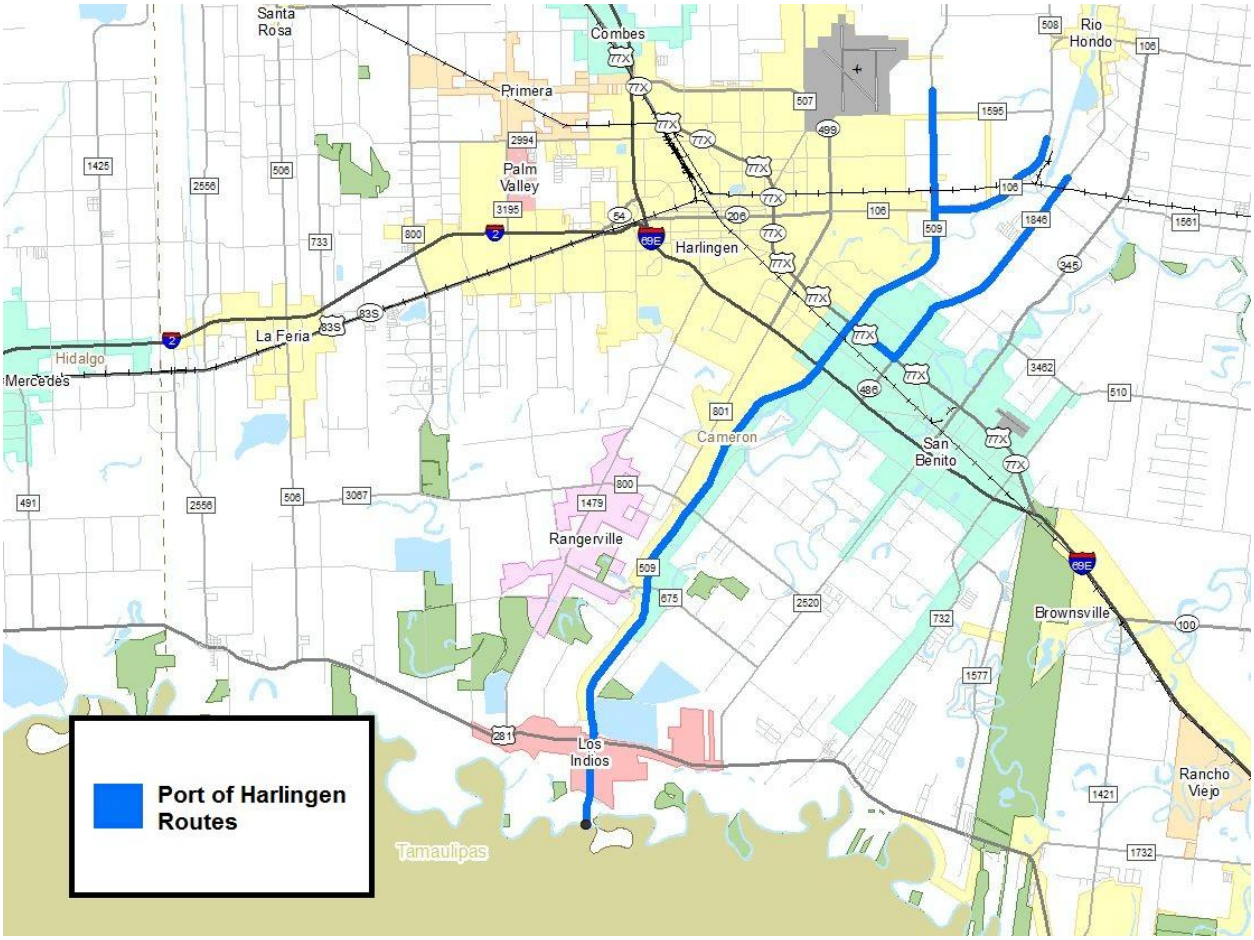

Figure 2. Authorized OS/OW Corridors Serving the Port of Harlingen (*8*).

Port of Freeport

The Port of Freeport (under Transportation Code 623.210) has issued OS/OW permits since 2013. Port Freeport permits allow OS/OW vehicles to travel over specific Port Freeport and state-maintained roads. Port Freeport charges $30 for the permit, of which $26 is deposited in the State Highway Fund for road maintenance, $3 goes to ProMiles (the software company that facilitates the self-issue of the permits), and $1 is an administrative cost (*9*). The GVW cannot exceed the Mexican legal weight limit or 125,000 lb, whichever is less. Similar to the permits issued by the Port of Brownsville, the dimensions of the vehicle and load cannot exceed 12 ft wide, 15 ft 6 in. high, or 110 ft long (*10*). Port Freeport–issued permits cover travel on:

- The intersection of FM 523 and Moller Road (Brazoria County) to Port Freeport using FM 523 and 1495.
- The intersection of SH 288 and Chlorine Road (Brazoria County) to Port Freeport using SH 288.
- The intersection of SH 288 and Chlorine Road (Brazoria County) to Port Freeport using SH 288 and 332 and FM 523 and 1495 (see route in red in Figure 3) (*10*).

Transportation Code Section 623.210 also authorizes permits for OS/OW vehicles between the intersection of North Velasco Boulevard and South Avenue J in the city of Freeport to the entrance of Port Freeport using North Velasco Boulevard and FM 1495; and 21441 Loop 419 in the city of Sweeny to the entrance of Port Freeport using Loop 419, SH 35 and 36, and FM 1495.

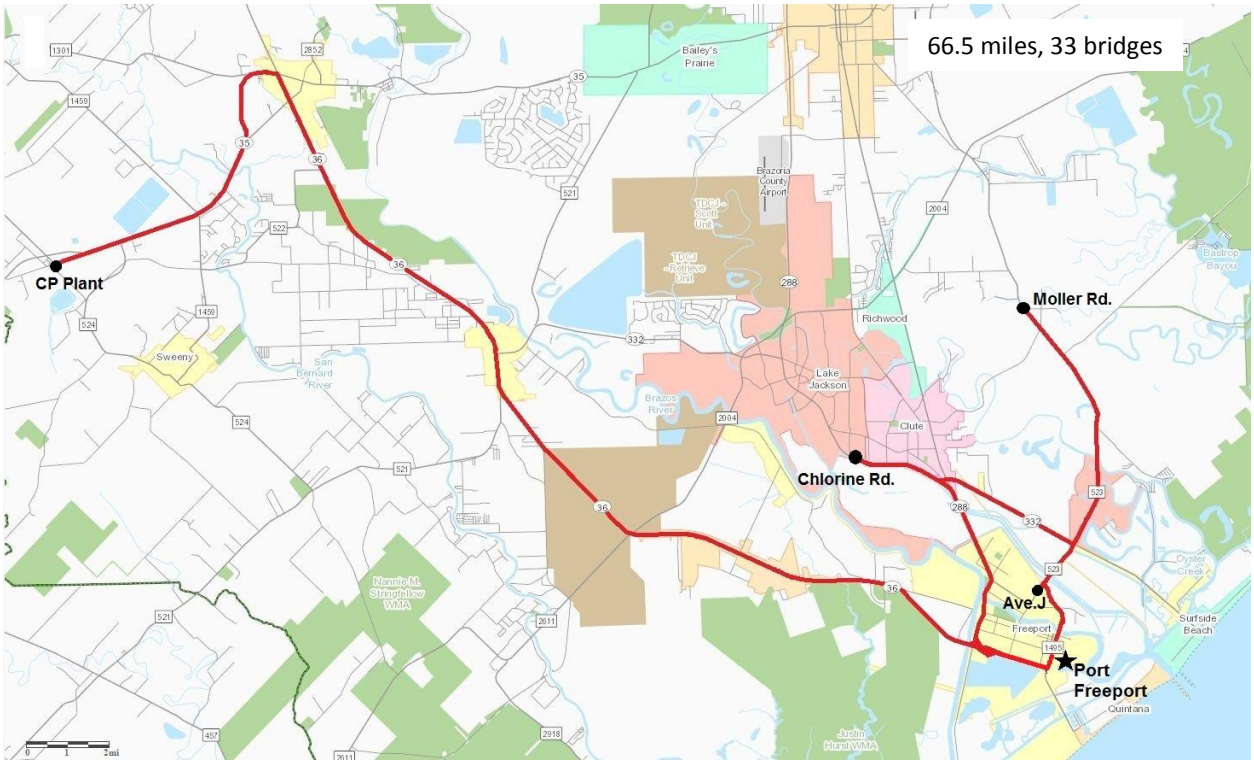

Figure 3. OS/OW Corridors Serving Port Freeport (*8*).

Finally, the Transportation Code states that routes can be adjusted as time and demand requires at the discretion of the Texas Transportation Commission, who must notify the port authority no later than the 60th day before the designation takes effect (*5*).

Victoria County Navigation District Permits

Transportation Code Section 623.230 authorizes the Victoria County Navigation District to issue permits for the movement of OS/OW vehicles in Victoria County. The permit fee may not exceed $100 per trip, and revenues generated (less an administrative fee that may not exceed 15 percent) must be deposited into the State Highway Fund and be used for maintaining the state highways used (*5*).

Transportation Code Section 623.232 provides for the Texas Transportation Commission to authorize the Victoria County Navigation District to issue a permit for the movement of OS/OW vehicles on the following roads in Victoria County (see Figure 4):

- FM 1432 between the Port of Victoria and SH 185.
- SH 185 between U.S. 59 and McCoy Road.
- U.S. 59, including a frontage road of U.S. 59, between SH 185 and Loop 463.
- Loop 463 between U.S. 59 and North Lone Tree Road.

Figure 4. Authorized OS/OW Corridors Serving the Port of Victoria (*8*).

The Transportation Code also states that the following data must be collected/provided during permit issuance:

- Applicant name.
- Permit issuance date.
- Victoria County Navigation District Director's (or director's designee's) signature.
- Kind of cargo transported.
- Kind and weight of each commodity.
- Maximum weight and dimensions of the equipment used.[8]
- Conditions on which the permit is issued.

[8] GVW cannot exceed 140,000 lb. ProMiles collects information on the axle configuration options, axle distance, and axle weight from permit applicants (see page 66).

- Statement that the permit only applies to designated roads.
- Name of the driver of the vehicle in which the cargo is transported.
- Location where the cargo was loaded (*5*).

The permit also has to specify the time in which movement authorized by the permit is allowed. Finally, the Victoria County Navigation District has to report on all permits issued to TxDOT (*5*).

The Port of Victoria, however, stated that the OS/OW corridor has not been activated, and no permits are currently issued by the Port of Victoria to move OS/OW loads. The OS/OW corridor came about because Caterpillar wanted to move OS/OW loads between the Port of Victoria and the Caterpillar facility in Victoria, but the company has not committed to using the corridor.

Another complicating factor is that a segment of the corridor involves a segment of U.S. 59 that is part of the future IH 69 corridor. The Port of Victoria also cannot justify the cost of filing the bond, payable to TxDOT, in the amount of $500,000 for TxDOT to maintain the corridor (*11*). Bonds are required if the permit revenues generated are estimated to be insufficient to cover infrastructure consumption and maintenance costs (*3*). The Port of Victoria OS/OW concept was modeled after the Brownsville example (*11*).

Chambers County Permits

Transportation Code Section 623.250 authorizes Chambers County to issue permits for the movement of OS/OW vehicles in Chambers County. The permit fees may not exceed $80 per trip, and revenues generated (less an administrative fee that may not exceed 15 percent) must be deposited into the State Highway Fund and be used for maintaining state highways (*5*).

Transportation Code Section 623.252 provides for the Texas Transportation Commission to authorize Chambers County to issue permits for the movement of OS/OW vehicles on the following roads in Chambers County (see Figure 5):

- FM 1405 between the intersection of FM 1405 with FM 2354 and the intersection of FM 1405 with FM 565.
- SH 99 frontage road between its crossing with Cedar Bayou and the intersection of SH 99 frontage road with IH 10, including sections of the frontage road located in the Cedar Crossing Business and Industrial Park.
- FM 565 between the intersection of FM 565 with FM 1405 and the intersection of FM 565 with SH 99.
- FM 2354 from the intersection of FM 2354 with FM 1405 (approximately 300 linear feet northwest) to the termination of the state-maintained portion of FM 2354 (*5*).

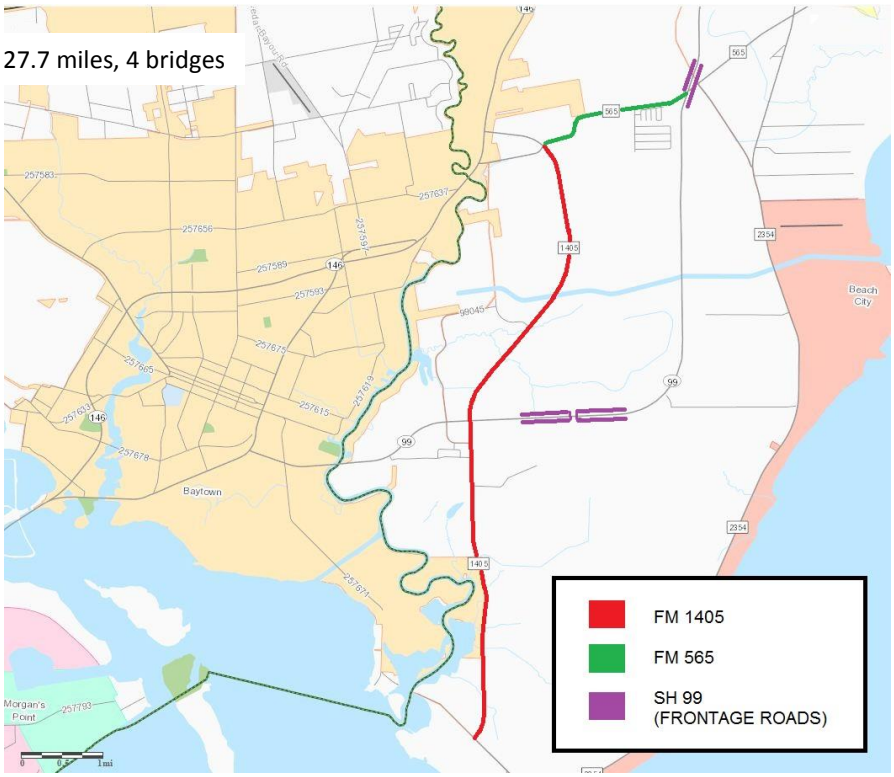

Figure 5. Authorized OS/OW Corridors in Chambers County (*8*).

The vehicle and cargo traveling under this permit cannot exceed 100,000 lb.

The Transportation Code also states that the following data must be collected/provided during permit issuance:

- Applicant name.
- Permit issuance date.
- Signature of a designated person at Chambers County.
- Kind of cargo transported.
- Kind and weight of each commodity.
- Maximum weight and dimensions of the equipment used.[9]
- Conditions on which the permit is issued.
- Statement that the permit only applies to designated roads in Chambers County.
- Location where the cargo was loaded (*5*).

The permit also has to specify the time in which movement authorized by the permit is allowed. Finally, Chambers County has to report on all permits issued to TxDOT (*5*). Chambers County is

[9] GVW cannot exceed 140,000 lb.

currently working on an agreement with TxDOT that will enable the county to start issuing OS/OW permits.

Port of Corpus Christi Authority Permits

Transportation Code Section 623.280 provides for the Port of Corpus Christi to issue permits for the movement of OS/OW vehicles on port-owned and maintained roads in San Patricio and Nueces Counties. The permit fees may not exceed $80 per trip, and revenues generated must be used for constructing and maintaining port authority roads (*5*). The Port of Corpus Christi is not currently issuing any OS/OW permits since no agreement has been established with TxDOT (*3*).

The Transportation Code states that the following data must be collected/provided during permit issuance:

- Applicant name.
- Permit issuance date.
- Port authority transportation manager's signature.
- Kind of cargo transported.
- Kind and weight of each commodity.
- Maximum weight and dimensions of the equipment used.[10]
- Conditions on which the permit is issued.
- Statement that the permit only applies to roads that are owned and maintained by the port authority in San Patricio and Nueces Counties.
- Location where the cargo was loaded (*5*).

The permit also has to specify the time in which movement authorized by the permit is allowed (*5*).

Transportation Code Section 623.301 provides for the Port of Corpus Christi Authority to issue permits for the movement of OS/OW vehicles on the following roads (see Figure 6):

- U.S. 181 in San Patricio County between the intersection of U.S. 181 and Burleson Street and the intersection of U.S. 181 and County Road (CR) 3567 (Midway Road).
- SH 35 between the intersection of SH 35 and Burleson Street and the intersection of SH 35 and FM 3512.

[10] To comply with this legislative requirement, ProMiles collects information on the axle configuration options, axle distance, and axle weight from permit applicants (see page 66).

- SH 361 between the intersection of SH 361 and SH 35 and the intersection of SH 361 and FM 1069 (Main Street).
- The proposed SH 200 between the intersection of the proposed SH 200 and SH 361 and the intersection of the proposed SH 200 and FM 1069 (Main Street).
- Another route designated by the Texas Transportation Commission in consultation with the Port of Corpus Christi.

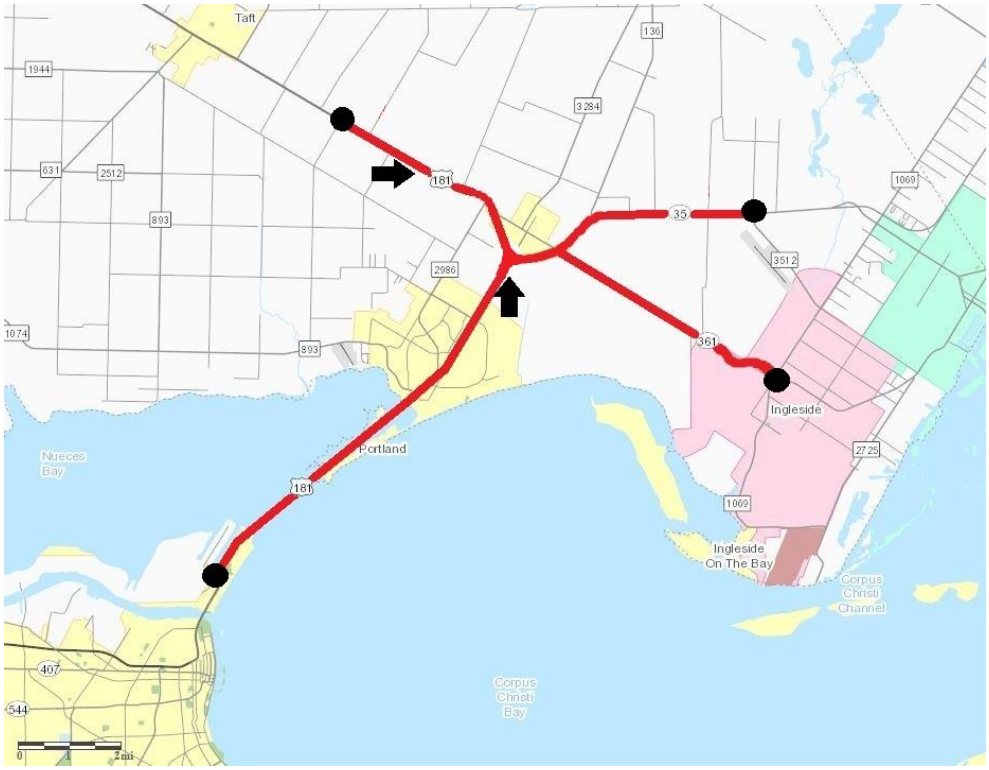

Figure 6. Authorized OS/OW Corridors Serving Port of Corpus Christi (*8*).

The weight of the cargo transported under this permit cannot exceed 125,000 lb. The permit fee cannot exceed $80 per trip, and revenues generated (less administrative costs not to exceed 15 percent of the fees collected) must be paid to TxDOT and used for maintaining the state highways used. The generated revenues have to be deposited into the State Highway Fund (*5*).

The Transportation Code states that the following data must be collected during permit issuance:

- Applicant name.
- Permit issuance date.
- Port authority transportation manager's signature.
- Kind of cargo transported.

- Maximum weight and dimensions of the equipment used.[11]
- Kind and weight of each commodity.[12]
- Conditions on which the permit is issued.
- Described/designated route that applies.
- Location where the cargo was loaded (*5*).

The permit also has to specify the time in which movement authorized by the permit is allowed. Finally, the Port of Corpus Christi has to report on all permits issued to TxDOT (*5*).

Regional Mobility Authority Permits

Transportation Code Section 623.361 provides for a regional mobility authority to issue permits for the movement of OS/OW vehicles on specific roads in Hidalgo County. The permit fees cannot exceed $80 per trip effective September 1, 2013, but can be adjusted on September 1 of each subsequent year by the percentage change in the CPI-U[13] during the preceding year (published by U.S. Bureau of Labor Statistics). Revenues collected (less administrative costs not to exceed 15 percent of the fees collected) must be used for constructing and maintaining the roads used. The regional mobility authority must make payments to TxDOT for maintaining the roads and highways used. Specifically, Transportation Code Section 623.370 states that the regional mobility authority will file a bond with TxDOT, payable to TxDOT, to cover the annual cost to repair any damage to roads and highways subject to the movement of OS/OW vehicles for which permits are issued (*5*). Finally, the regional mobility authority has to report on all permits issued to TxDOT (*5*).

HCRMA has been issuing permits and administering the OS/OW corridors in Hidalgo County under this authority since 2014. The current cost of the permit is $80. Under this permit, the dimensions of the vehicle and load cannot exceed 12 ft wide, 15 ft 6 in. high, or 110 ft long (*12*). HCRMA-issued permits cover travel on the following roads (see highlighted routes in Figure 7):

- U.S. 281 between the intersection of U.S. 281 and the Pharr-Reynosa International Bridge and the intersection of U.S. 281 with SH 336.
- SH 336 between the intersection of SH 336 and U.S. 281 and the intersection of SH 336 and FM 1016.
- FM 1016 between the intersection of FM 1016 and SH 336 and the intersection of FM 1016 and Trinity Road.

[11] To comply with this legislative requirement, ProMiles collects information on the axle configuration options, axle distance, and axle weight from permit applicants (see page 66).
[12] The gross weight of the equipment and load cannot exceed 125,000 lb.
[13] U.S. city average.

- Trinity Road between the intersection of Trinity Road and FM 1016 and the intersection of Trinity Road and FM 396.
- FM 396 between the intersection of FM 396 and Trinity Road and the intersection of FM 396 and the Anzalduas International Bridge.
- FM 2061 between the intersection of FM 2061 and FM 3072 and the intersection of FM 2061 and U.S. 281.
- U.S. 281 between the intersection of U.S. 281 and the Pharr-Reynosa International Bridge and the intersection of U.S. 281 and Spur 29.
- Spur 29 between the intersection of Spur 29 and U.S. 281 and the intersection of Spur 29 and Doffin Canal Road.
- Doffin Canal Road between the intersection of Doffin Canal Road and the Pharr-Reynosa International Bridge and the intersection of Doffin Canal Road and Spur 29.
- FM 2557 (Stewart Road) from U.S. 281/Military Highway to IH 2 (U.S. 83) and FM 3072 (Dicker Road) from Veterans Boulevard to Cesar Chavez Road.
- U.S. 281 (Cage Boulevard) from U.S. 281/Military Highway to Anaya Road.
- U.S. 281/Military Highway from Spur 29 to FM 1015.
- FM 1015 from U.S. 281/Military Highway to Progresso International Bridge (*12*).

There are 47 miles of OS/OW corridors (which includes 12 bridges) in Hidalgo County (*3*).

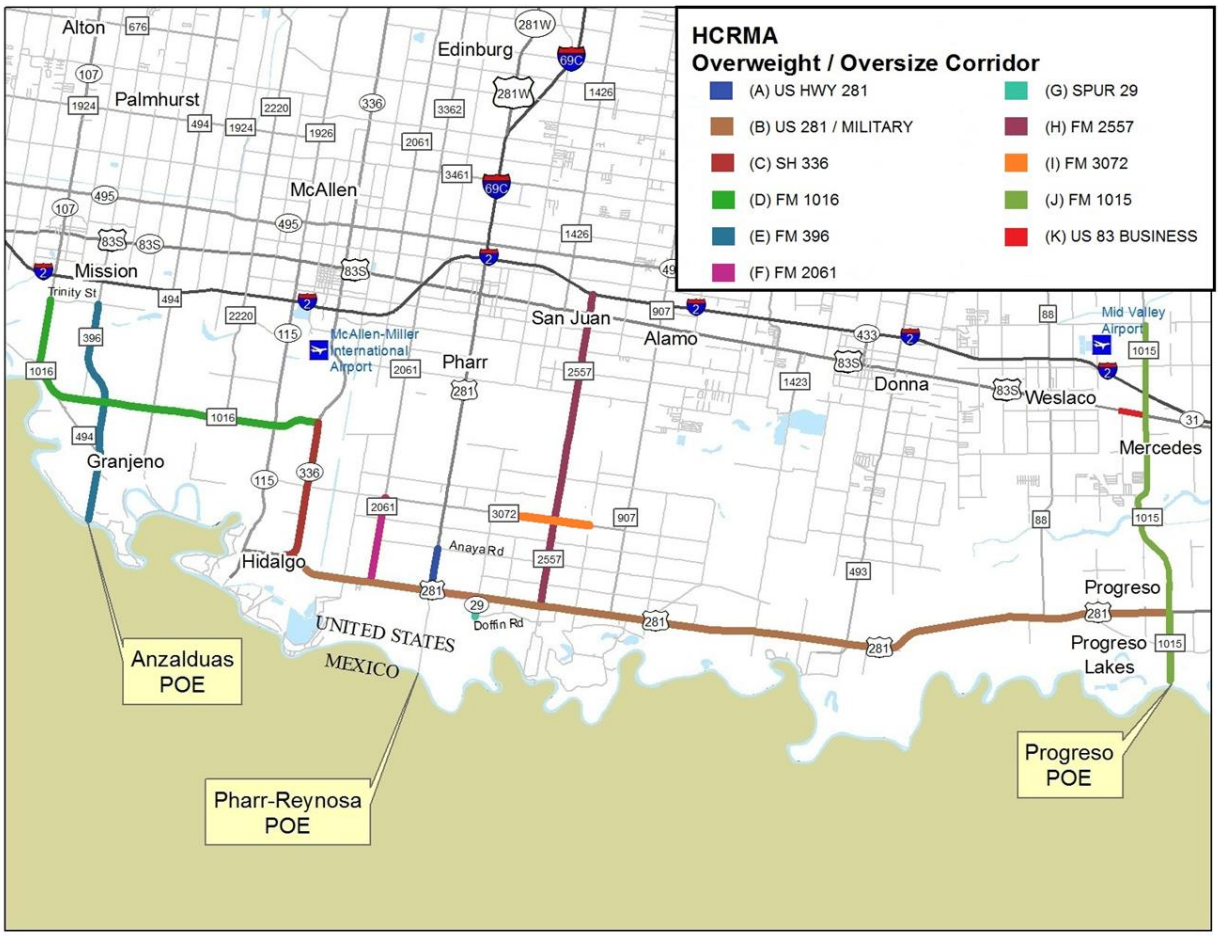

Figure 7. OS/OW Corridors in Hidalgo County (*8*).

Furthermore, Transportation Code Section 623.363 authorizes the regional mobility authority to issue a permit for the movement of OS/OW vehicles on the following roads:

- FM 1015 between the intersection of FM 1015 with U.S. 281 and the intersection of FM 1015 with U.S. 83 Business.
- U.S. 83 Business between the intersection of U.S. 83 Business with FM 1015 and the intersection of U.S. 83 Business with South Pleasantview Drive.
- FM 1015 between the intersection of FM 1015 with U.S. 83 Business and the intersection of FM 1015 with Mile 9 Road North.
- Mile 9 Road North between the intersection of Mile 9 Road North with FM 1015 and the intersection of Mile 9 Road North with Joe Stephens Avenue.
- Another route designated.

The process for designating an OS/OW corridor in Hidalgo County is:

1. The city or petitioner submits a letter to HCRMA requesting that a new OS/OW route be designated for permitting (*13*).
2. Once approved by the HCRMA Board of Directors, the letter is then submitted in a packet to the Texas Transportation Commission for its approval.
3. The packet that is submitted to TxDOT contains the map of the route and the original letter (*14*).

There is no formal requirement for any type of route and engineering study to be performed. TxDOT is not required to monitor the performance of the Hidalgo County OS/OW corridors specifically, but the TxDOT Pharr District is planning a number of capacity enhancement projects on the OS/OW corridors based on projected traffic. TxDOT's Pharr District stated that OS/OW vehicles have not imposed much damage to the corridors because the number of OS/OW permits issued has been relatively low (*6*).

Webb County Permits

Transportation Code Section 623.381 authorizes the City of Laredo to issue permits for the movement of OS/OW vehicles on specific roads in Webb County. The permit fees cannot exceed $200 per trip but can be adjusted on September 1 of each year by the percentage change in the CPI-U[14] during the preceding year (published by U.S. Bureau of Labor Statistics). Revenues collected (less administrative costs not to exceed 15 percent of the fees collected) must be used for operating and maintaining the roads used. The revenues collected (less the administrative costs) must be distributed between TxDOT and the City of Laredo based on the on- and off-system lane miles calculated on a biannual basis. The City of Laredo must send TxDOT's share of the revenue to the Texas Comptroller for deposit into the State Highway Fund. The Transportation Code also states that the Texas Transportation Commission may require the City of Laredo to file a surety bond in the amount of no less than $500,000 payable to TxDOT to cover the cost of maintaining the roads subject to the movement of permitted OS/OW vehicles. TxDOT is required to develop a pavement management plan for the roads that will accommodate permitted OS/OW vehicles (*5*). The Transportation Code states that the following data must be collected during permit issuance:

- Applicant name.
- Permit issuance date.
- Signature of a designated person at the City of Laredo.
- Kind of cargo transported.

[14] U.S. city average.

- Maximum weight and dimensions of the equipment used.
- Kind and weight of each commodity.[15]
- Statement that the gross vehicle weight cannot exceed 125,000 lb.
- Conditions on which the permit is issued.
- Statement that the permit only applies to designated routes in Webb County.
- Statement that the permit does not authorize travel on an interstate highway.
- Location where the cargo was loaded (*5*).

The permit also has to specify the time in which movement authorized by the permit is allowed. The City of Laredo has to report on all permits issued to TxDOT (*5*).

Transportation Code Section 623.382 specifies that the City of Laredo (as authorized by the Texas Transportation Commission) can issue OS/OW permits on the following roads (see Figure 8):

- FM 1472 between the intersection of FM 1472 and SH Loop 20 and the northernmost intersections of FM 1472 with World Trade Center Loop.
- FM 1472 between the northernmost intersections of FM 1472 with World Trade Center Loop and the intersection of FM 1472 with Hachar Loop (if Hachar Loop is constructed in Webb County).
- Hachar Loop between the intersection of Hachar Loop with FM 1472 and the intersection of Hachar Loop with IH 35 (if Hachar Loop is constructed in Webb County).
- Beltway Parkway between the intersection of Beltway Parkway with Hachar Loop and the intersection of Beltway Parkway and IH 35 (if Hachar Loop is constructed in Webb County) (*5*).

[15] The gross weight of the equipment and load cannot exceed 125,000 lb.

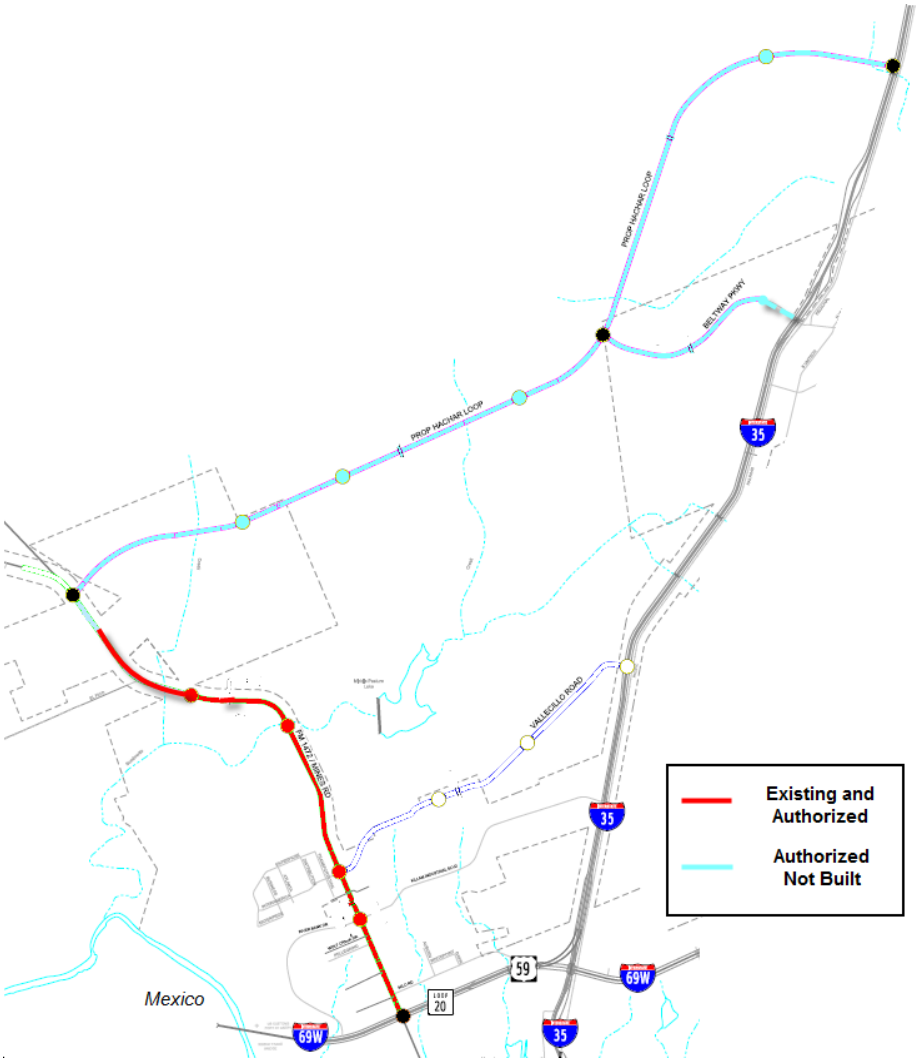

Figure 8. Authorized OS/OW Corridors in Webb County (*8*).

In addition to the roads listed above, Transportation Code Section 623.382 also provides for the City of Laredo to designate and issue permits for the movement of OS/OW loads on roads under the city's jurisdiction and control in Webb County (*5*). The City of Laredo is currently not issuing any OS/OW permits since no agreement has been established with TxDOT (*3*).

Oversize/Overweight Corridor Metrics

Oversize/Overweight Corridor Workshop

TTI hosted the "Oversize/Overweight Corridors in Texas" Workshop on Tuesday, July 19, 2016, from 9:30 a.m. to 3:30 p.m. at the TTI Austin Office (505 E. Huntland Drive). Workshop participation was by invitation only. The study team invited subject matter experts in:

- Infrastructure consumption (from TTI, The University of Texas at Austin, and the University of Texas at San Antonio).
- Economics (from TTI).
- Safety (from TTI).
- Operations (from TTI).

Representatives from TxDOT, the Texas Department of Motor Vehicles, the Texas Department of Public Safety, the Texas Trucking Association, and BNSF Railway were invited to participate in the workshop. Table 1 provides the names of the workshop participants and the agency/company that they represented.

Table 1. Workshop Participants by Agency/Company.

Participant Name	Agency/Company
Andrew Wimsatt	Texas A&M Transportation Institute
Angela Weissmann	University of Texas at San Antonio
Blake Calvert	Texas Department of Transportation
Brianne Glover	Texas A&M Transportation Institute
Daniel Garcia	Texas Department of Transportation
David Newcomb	Texas A&M Transportation Institute
David Schrank	Texas A&M Transportation Institute
Jorge Prozzi	University of Texas at Austin
Jose Weissmann	University of Texas at San Antonio
Kristy Schultz	Texas Department of Motor Vehicles
Les Findeisen	Texas Trucking Association
Lindsay Mullins	BNSF Railway
Major Chris Nordloh	Texas Department of Public Safety
Mark McDaniel	Texas Department of Transportation
Matt Miller	Texas A&M Transportation Institute
Robert Wunderlich	Texas A&M Transportation Institute
Sarah Overmyer	Texas A&M Transportation Institute
Scott McKee	Texas Department of Motor Vehicles
Steven Polunsky	Texas A&M Transportation Institute
Tom Scullion	Texas A&M Transportation Institute
Victoria Wilson	Texas A&M Transportation Institute

Three presentations comprised the morning session:

- Mark McDaniel (TxDOT Maintenance Division) provided an overview of Texas's OS/OW corridors, the process, and the operations of the corridors.
- Matt Miller and Sarah Overmyer (TTI) provided an overview of how highway investments are prioritized in the Unified Transportation Program (UTP) and have been prioritized in a number of TxDOT-funded planning studies (i.e., the Texas Freight Mobility Plan [TFMP], and the Texas Border Master Plans).
- Tom Scullion (TTI), Dr. Jorge Prozzi (The University of Texas at Austin), and Dr. Jose Weissmann (The University of Texas at San Antonio) discussed the approaches and methods employed to estimate the infrastructure impacts imposed by OS/OW vehicles.

After lunch, the workshop attendees participated in group discussions. The appendices contain information used by the afternoon groups for discussion. Appendices A to D summarize the frameworks and metrics that have been used to designate municipal utility districts (MUDs; Appendix A), as well as the metrics that have been used by TxDOT to rank road and interchange projects in the agency's UTP (Appendix B), TFMP (Appendix C), and the Lower Rio Grande Valley/Tamaulipas Border Master Plan (Appendix D). Prior to the workshop, researchers shared with the workshop participants a description of the OS/OW corridors in Texas as included in the Texas Transportation Code and the metrics included in Appendices A to D.

Attendees were pre-assigned to one of two groups to ensure a diverse perspective on the information presented in the morning sessions and to gather input on (1) potential metrics (and data/methods) that can be used for designating OS/OW corridors, and (2) metrics for monitoring the performance of the corridors once designated. Specifically, the two groups discussed:

- Information (metrics) that can inform the decision to designate a specific OS/OW corridor.
- Whether identified metrics can be measured (available data or if the measure has to be qualitative).
- Potential data sources.
- Ease of measuring the metrics if data are available.
- Potential partners/stakeholders that should be consulted/engaged.
- Whether some metrics are more important than others.

Researchers presented seven potential metrics to structure the group discussions:

- Economic Impact—The OS/OW corridor results in an economic benefit to the state/region in terms of job creation, new business development,[16] or retention of existing business.
- Operational Impact—The proposed corridor demonstrates a significant operational benefit in terms of cargo movement, reduction in vehicle wait times, improved access to border crossing or port, or other efficiency factors.
- Safe Operations—The proposed corridor will maintain/improve safe operations.
- Project Readiness—The proposed OS/OW corridor can be implemented with no/minor investments (including geometric considerations, such as road width, turning radius).
- Local Support—The project sponsor has the ability to provide matching funding/issue a bond.
- Pavement/Bridge Impacts—The projected impact on (consumption of) bridges and pavements.
- Other Benefits—The proposed corridor provides additional secondary benefits in the terms of environmental sustainability, air quality, quality of life, or other significant factors.

Table 2 summarizes the discussions by group.

[16] The Port of Brownsville and others, for example, wanted to keep the OS/OW permit fee low to attract business.

Table 2. Summary of Group Discussions.

Metric: Economic Impact		Group Comments
	Importance	• Should form basis for decision. If there is not an economic benefit, why do it? • Should be most important criterion.
Measurement	Quantitative (What can we measure?)	• Measure revenue, taxes, jobs created, value of goods moved. • Measure gross economic impact, but may see only a small change. • Estimate global competitiveness/macroeconomic argument that corridor is best option to move specific commodity. • Recommend calculating the marginal economic benefits.
	How can we measure it? (Available tools?)	• TREDIS can be used to estimate economic impact (benefit-cost analysis, economic impact reports). • Difficult to identify which factor is causing changes in, for example, job growth. • Need to consider that hindering freight movement could hinder the economy. • Also, increasing permissible weights can increase truck traffic (freight can be moved off rail and onto trucks).
	Data available	• Permit data for existing corridors available (see Appendix E). • Data required to quantify economic benefit to state: commodity, origin, destination, and value.
	Ease of quantification?	• Challenging/very hard to estimate (quantify) benefit to Texas to inform designation of corridor (for example, economic benefits of movements to the port aside from port fees; ports obviously benefit). • Impact is commodity/industry specific—sometimes an increase in weight can lead to more traffic. • Impact is also region specific. Some regions move agricultural products—what is the profit margin for different products and how does it affect the economy? Sometimes presents small economic boosts for ports. • Furthermore, every permit has restrictions (e.g., weather restriction). Restrictions reduce the value and positive economic impact of the permit.
	Who should be involved?	• Private entity sometimes approaches county to lobby for corridor. • Multiple agencies/entities should be involved at state and local level. • Public has been involved in Brownsville alternate route considerations. La Porte Independent School District and the city council, for example, do not want trucks nearby.

Metric: Operational Impact		Group Comments
	Importance	• For efficiency, the fewer movements [truck trips] needed, the better. For example, eliminating the need to transfer cargo at the port benefits shippers. On the other hand, longshoreman will argue against corridors because they break down the cargo. • Could, however, still be less efficient due to OS/OW inspection (OS/OW inspection adds another layer). • OS/OW corridors account for only a drop in the bucket in terms of freight moved in Texas. • Low priority metric because people do not see the benefits of this metric.
Measurement	Quantitative (What can we measure?)	• Estimate number of permits that will be sold.
	How can we measure it? (Available tools?)	• Corridor specific. For example, if diverting traffic from Arizona to Texas, then congestion will increase. Alternatively, may have the same number of trucks, but they are loaded heavier. • For Hidalgo, predicted potential number of permits sold by talking to industry (traffic study). • For Hidalgo, assumed same number of trucks but heavier (conducted weigh-in-motion [WIM] study[17]—see Appendix F).
	Data available	• Require traffic study, WIM study. • Permit data for existing corridors available (see Appendix E).
	Ease of quantification?	• Traffic study is required. • WIM study is required.
	Who should be involved?	• Ensure that all modes are treated equitably (e.g., listening to the trucking and rail modes).

[17] WIM data can also be used to compare the number of OS/OW trucks to the number of OS/OW permits issued, which can inform enforcement efforts if the number of OS/OW trucks is substantially larger than the number of permits issued (high OS/OW truck violator rate) (Personal Communication with TxDOT Pharr District Lab/Pavement Engineer, March 2016).

Metric: Safe Operations		Group Comments
	Importance	• Considered very important. • In case of collision, need to know if car caused the crash, or the truck. DPS to enter information/data correctly (i.e., depend on accident reports, but data are often missing).
Measurement	Quantitative (What can we measure?)	• Can calculate crash rates, truck involvement rates, etc. on existing corridor (prior to OS/OW designation) and once OS/OW corridor is designated. • For designation, need to check crash rates on proposed OS/OW corridor. If high crash rates are experienced, need to avoid highway or take steps to improve conditions (e.g., signal timing, curb radii) to make corridor more viable. • For monitoring, crashes would need to be linked to OS/OW permit. Function of who collects the information post-crash—OS/OW information not always captured.
	How can we measure it? (Available tools?)	• TTI calculated the crash rate for every mile of highway on state-maintained system in Texas (TOSTADA). • For monitoring, could compare crash rates and see if increase or decrease after corridor designation.
	Data available	• Crash rate for each mile of state-maintained highway.
	Ease of quantification?	• Very difficult to quantify safety impact of OS/OW vehicles. • Difficult to project safety impacts.
	Who should be involved?	• Need to consider schools and residential areas impacted by OS/OW corridor. • Need to look at safety record of companies operating along corridors (i.e., habitual violators of safety rules). • In Hidalgo, roads were designated as OS/OW corridors without considering safety and without consulting TxDOT. Safety considerations should be addressed before designation.

Metric: Project Readiness		Group Comments
	Importance	• Might be most important metric if homework was done.
Measurement	Quantitative (What can we measure?)	• Estimate the cost of improvements required to accommodate OS/OW vehicles on proposed corridor. • TxDOT needs adequate time to evaluate the condition and capacity of the proposed highway before the designation of roads as OS/OW corridors (in-depth analysis of the road).
	How can we measure it? (Available tools?)	• TxDOT needs to develop the project, specifications, and estimates (PS&E) of required infrastructure and safety improvements to develop appropriate cost estimates.
	Data available	• Pavement condition rating data are available from TxDOT.
	Ease of quantification?	
	Who should be involved?	• Recommended that legislature approve roads for designation as OS/OW corridors, but allow time for the road to be improved before activation. • TxDOT should have final word.

Metric: Local Support		Group Comments
	Importance	• Should be important metric.
Measurement	Quantitative (What can we measure?)	• Determine how much local monetary support is available (but public may not agree to bond). • Port of Brownville has an escrow account;[18] TxDOT Category 1 Funds were used for the Hidalgo OS/OW system.
	How can we measure it? (Available tools?)	
	Data available	
	Ease of quantification?	
	Who should be involved?	• Public citizens and companies. • Local entities are vocal about their support or opposition of OS/OW corridors. • Some areas do not want OS/OW corridors; citizens will go to governor's office to complain about large loads. • You almost never see OS/OW corridors implemented in areas that do not want them. • Option could be to treat legislation as a local bill (i.e., put in class of bills that require publication of local notice before consideration) to recognize that some proposed corridors have opposition. However, no practical way to enforce requirement without amending constitution.

[18] Designated roads are used as OS/OW corridors. Permit fees are deposited in an escrow account that is available for subsequent maintenance of the OS/OW corridor.

Metric: Pavement/Bridge Impacts		Group Comments
	Importance	• Of critical importance. • Pavement and bridge impacts should be considered in preliminary analyses (no corridor should proceed without understanding the pavement **and** bridge impacts/requirements). • Different considerations for pavements and bridges. Pavements only considers costs, but in case of bridges, need to consider cost and capacity (bridges have a capacity limit[19]; pavements do not). Some corridors not viable as OS/OW corridors without significant investment.
Measurement	Quantitative (What can we measure?)	• Pavement consumption. • Bridge consumption. • Required bridge capacity.
	How can we measure it?	• Pavement and bridge models have been developed by University of Texas at Austin (pavements),[20] University of Texas at San Antonio (bridges), and TTI (pavements).
	Data available	• Pavement and bridge data from TxDOT. • Need following data for each OS/OW vehicle using corridor: number of axle groups, number of axles per group (single, tandem, or tridem), individual axle weights, and distance between axles.
	Ease of quantification?	• Pavement and bridge models exist.
	Who should be involved?	• Recommended that corridor only be designated once entire corridor is capable of handling the heavier loads. • TxDOT should be involved early on; have been times that TxDOT finds out very last minute that the legislature passed a bill that trucks will be traveling through an area. In some cases, TxDOT has not planned to invest in the OS/OW corridor. • Ideal if private sector can help fund corridor.

[19] OS/OW corridors had been designated in the past without considering bridge capacity. The OS/OW corridor in Corpus Christi serves as an example of a corridor that is not viable because of inadequate bridge capacity.

[20] The 82nd Texas Legislature required TxDOT to conduct a study to evaluate the increased pavement and bridge consumption by OS/OW vehicles, including exempt OS/OW vehicles carrying loads such as agricultural products, solid waste or recycled materials, ready mix concrete, and milk. The study, referred to as Rider 36, also required TxDOT to provide recommendations for permit fee and fee structure adjustments to the governor and the Legislative Budget Board by December 2012. TxDOT commissioned the Center for Transportation Research at the University of Texas at Austin to undertake this study. Pavement consumption, bridge capacity, and consumption models were developed as part of this study.

Metric: Other Benefits		Group Comments
	Importance	• Should consider all costs **and** benefits.
Measurement	Quantitative (What can we measure?)	• Can estimate emissions. • Can use travel time (for both passenger vehicles and trucks) to quantify quality-of-life impacts.
	How can we measure it? (Available tools?)	• Require an environmental impact study for all corridors.
	Data available	
	Ease of quantification?	
	Who should be involved?	

Potential Metrics for Designating and Monitoring OS/OW Corridors

Workshop participants identified four metrics that can inform the designation:

- Economic impacts.
- Safety.
- Infrastructure (pavement and bridge) impacts.
- Local support for the corridor.

Participants also identified the three metrics to consider when monitoring the performance of OS/OW corridors:

- Economic impacts.
- Safety.
- Infrastructure impacts.

Economic Impacts

Workshop participants agreed that the economic benefits of the corridor should be an important consideration in the designation of an OS/OW corridor. Specifically, one participant remarked that "if there is not an economic benefit, why do it?" Participants proposed a number of metrics for quantification (e.g., revenue, taxes, jobs created, value of goods moved).

Proponents of OS/OW corridors typically cite economic benefits, but there is no requirement to quantify the potential economic impacts. Various economic models (e.g., TREDIS) estimate the economic impacts of a proposed corridor, but the application of these types of models is often limited by a lack of data when attempting to estimate the economic impacts of proposed corridors. Specifically, estimated origin, destination, commodity, number of truck trips, and value data are required to run the TREDIS model.

Participants proposed that the proponents of an OS/OW corridor identify potential users and obtain information about the expected usage of the corridor to help estimate the economic impacts of the proposed OS/OW corridor. Failing a formal cost-benefit analysis or economic impact study, support letters from industry expressing commitment to the use of the corridor could be an alternative.

For monitoring purposes, the permit data available are adequate to estimate the economic impacts of designated OS/OW corridors post implementation. Participants recommend periodically quantifying the economic impacts of the designated OS/OW corridors to demonstrate the benefits.

Safety

Workshop participants also considered safe operations very important in the designation and monitoring of OS/OW corridors. Although crash rates on existing state-maintained highways are available per mile (calculated by TTI in the TOSTADA tool) and can be considered in the designation of the OS/OW corridor, data on OS/OW vehicle collisions are often not available or reliable.

However, in the designation of the corridors, participants proposed that the crash rates on the proposed OS/OW corridor be considered. If high crash rates are experienced, the corridor should only be designated once conditions are improved (e.g., signal timing, curb radii) to make the corridor more viable.

Workshop participants also felt it was important to consider the schools and residential areas impacted by the OS/OW corridor, along with the safety record of the companies operating along the corridor (i.e., habitual violators of safety rules). In the absence of robust OS/OW vehicle crash data, crash rates can be monitored to provide insight into the safety of the OS/OW corridors once designated.

Infrastructure Impacts

Workshop participants considered infrastructure impacts (both pavements and bridges) critically important in the designation and monitoring of OS/OW corridors. A participant stated that no corridor should proceed without understanding the pavement and bridge impacts, as well as the bridge capacity requirements. A number of pavement and bridge models have been developed by The University of Texas at Austin (pavements), The University of Texas at San Antonio (bridges), and TTI (pavements) to estimate pavement and bridge consumption and the improvements required (e.g., a revised pavement design structure) that will allow the corridor to handle the anticipated heavier loads.

Estimating infrastructure impacts of proposed OS/OW corridors requires assumptions about the OS/OW traffic (or traffic and WIM studies) and available infrastructure capacity and condition data. A more informed decision about the infrastructure impacts/requirements can be made if TxDOT is involved early in the process. Alternatively, the bill could include language that states that the OS/OW corridor would only become effective once TxDOT determined that the corridor is capable of handling the proposed OS/OW vehicles.

For monitoring purposes, the permit data available are adequate to estimate the infrastructure impacts of designated OS/OW corridors post implementation. Specifically, the existing models require the following data for each OS/OW truck permit: number of axle groups, number of axles per group (single, tandem, or tridem), individual axle weights, and distance between axles. Periodically quantifying the infrastructure impacts of the designated OS/OW corridors in comparison with the revenues generated from the permit fees would determine if the permit fee is adequately recuperating the damage imposed by OS/OW vehicles.

Local Support

Although participants regarded local support as an important metric, workshop participants felt that local entities tend to be vocal in their support or opposition of OS/OW corridors. It is rare that an OS/OW corridor is implemented without local support, so participants proposed that local entities be provided an opportunity to comment on proposed OS/OW corridors prior to designation. One idea proposed was to treat OS/OW legislation as a local bill (i.e., put in a class of bills that require publication of local notice before consideration) to recognize that some proposed corridors have opposition. There is, however, no practical way to enforce this requirement without amending the constitution.

Conclusion

To date, roads have been designated as OS/OW corridors without a formal requirement for promoters/proponents to quantify the economic, safety, and infrastructure impacts associated with OS/OW vehicles and, oftentimes, without consulting TxDOT. This is important because the potential benefits that OS/OW special permit corridors bring to local trade and economic development, the costs imposed on the transportation infrastructure, and safety conditions differ based on the characteristics of the freight traffic, a host of market and network connectivity factors, and the attributes of the OS/OW route and local transportation network. Furthermore, there is no formal monitoring of the performance of OS/OW corridors once designated.

Workshop participants identified the following four potential metrics to inform the designation of OS/OW corridors in Texas:

- The estimated/expected **economic impacts** of the OS/OW corridor.
- The **safety** of the OS/OW corridor as measured using available crash statistics.
- The estimated **infrastructure impacts** (both pavements and bridges) associated with OS/OW vehicles using the proposed corridor.
- The **local support** for the proposed OS/OW corridor.

Three potential metrics could inform the monitoring of OS/OW corridors in Texas: the economic, safety, and infrastructure impacts of the corridors. The permit data currently collected are adequate to estimate the economic and infrastructure impacts of designated OS/OW corridors post implementation. Periodic quantification of the economic impacts of the designated OS/OW corridors could demonstrate to the public the benefits of these corridors. Similarly, by tracking the infrastructure impacts of the designated OS/OW corridors, TxDOT could determine if the permit fees cover the pavement and bridge costs imposed by OS/OW trucks using the corridor. In terms of safety impacts, monitoring available crash rates provides insight into the safety of OS/OW corridors.

Finally, a more informed decision can be made in the designation of OS/OW corridors if TxDOT is involved early in the process. This pertains specifically to the safety and infrastructure impacts of the proposed OS/OW corridors. Alternatively, language could be included in the authorizing legislation that states that the OS/OW corridor would only become effective once TxDOT determined that the corridor is capable of handling the proposed OS/OW vehicles.

Appendix A—Municipal Utility Districts

Texas has many special purpose districts that can be larger or smaller than local government, such as:

- Independent School Districts.
- Underground Water Conservation Districts.
- Water Control and Improvement Districts.
- Municipal Utility Districts.
- Ship Channel Security Districts.
- Arts and Entertainment Districts.
- Public Improvement Districts.
- Homestead Preservation Districts and Reinvestment Zones.
- Crime Control and Prevention Districts.
- Wind Erosion Districts.
- Noxious Weed Control Districts.
- Road Utility Districts.
- Navigation Districts (*15*).

Special districts serve the needs of citizens and businesses operating in Texas. MUDs help new neighborhoods receive adequate local funding to develop high-quality water, sewer, drainage, and park systems (*16*). Road utility districts enable the use of taxes and bonds to reimburse private companies for private roads that are then turned over to the public for public use as long as they meet county road construction standards (*17*).

However, special purpose districts are often not monitored for the quality of service provided. This can be partially attributed to vague business cases for their founding, which can result in an ever-expanding scope. In some regions of Texas, the increased use of MUDs in urban and suburban communities has resulted in MUDs expanding into other services such as library services and fire protection. This leads to further jurisdictional fragmentation that impacts the quality of local government services to larger communities that are not part of the MUD (*16*), resulting in the creation of new MUDs to protect services for communities impacted by adjacent MUDs and further fragmentation. The study team reviewed the information required to designate MUDs in Texas as a model framework to inform the development of a framework for designating OS/OW corridors in Texas.

Designating Municipal Utility Districts

Establishing MUDs involves a formal request from district stakeholders (such as property developers and landowners) for new special functions, rights, and powers, and perhaps more importantly, the authority to collect revenue. Typically, these new rights/powers are unavailable or perceived as unavailable due to existing policies and regulations at the local or state government.

MUDs are currently under the jurisdiction of the Public Utilities Commission (PUC). MUDs were formerly approved by the Texas Commission on Environmental Quality (TCEQ), based on a petition submitted by the majority (in terms of the value of the title of the land) in the proposed district (or at least 50 people if there are more than 50). Chapter 54 of the Texas Administrative Code provides for TCEQ to confer various rights, privileges, authority, and functions to each MUD (*15*). However, these various rights, privileges, and functions may be truncated by terms established by the city to obtain the city's consent. Written consent is needed from cities where the MUD is located within the city's corporate or extraterritorial limits. The additional requirements for the petition include:

- Market study: projections for proposed development (units per year, specific years) of single family, commercial, and retail units.
- Table summarizing the MUD's overlapping tax rates.
- Fire plan approval (if application includes a request for a fire plan/facilities, etc.).
- Financial statement and experience with MUDs.
- Recreational facility summary: costs, financing methods, and a detailed summary of proposed facilities.
- Boundary maps showing metes and bounds.
- Vicinity map.
- Preliminary plan showing existing facilities, proposed facilities, and areas in the 100-year flood plain.
- Engineering report including a land use plan, 100-year flood computations, projected populations, cost estimates for proposed improvements, projected tax rates, availability of comparable services, impact of the MUD on water quality, land elevation, subsidence, and groundwater level within the region (*15*).

Once the petition and all required documentation have been submitted, the PUC panel reviews the petition and may approve the MUD or require changes to the proposal. Some of the overarching criteria considered in the evaluation are whether the MUD leads to improvements in

water storage, preservation, functional use, and control, and whether it will lead to a fracturing or coordination of regional water supply management (*15*).

Reviewing Municipal Utility Districts

The MUD is created with multiple stakeholders involved, extensive documentation, plans, summaries, and a PUC approval process. There does not appear to be any consistent review of established MUDs after they have been created, documenting their impact on the region to confirm that the details within the engineering plan and the estimates provided match the actual costs and scope of development. The PUC has a limited role in terms of supervision and enforcement of MUD activities. Local law enforcement handles any violations.

Appendix B—TxDOT's Unified Transportation Program Scoring Criteria

TxDOT's Unified Transportation Program provides a 10-year schedule of projects that receive authority for development and construction. TxDOT is required to "establish criteria to rank the priority of each project listed in the UTP based on the transportation needs of the state and the goals identified…project will be ranked within its applicable program funding category and classified as tier one, tier two, or tier three for ranking purposes" (*18*). The three categories used for ranking projects in the 2016 UTP were:

- Funding availability (33 points).
- Project development (33 points).
- TxDOT's strategic goals (34 points) (*18*).

The ranking framework is currently being revised, but Table 3 provides the criteria and points that were assigned to projects ranked in the 2016 UTP (*18*). The associated metrics for each of the criteria are discussed below.

Table 3. Overview of UTP Project Ranking Criteria.

Category	Criteria	Points
Funding Availability	• Secured/committed funding • Current district cost estimates	33 points
Project Development	• Let date • Project readiness (environmental, right of way, plans, specifications, and estimates)	33 points
TxDOT Strategic Goals	• Maintain a safe system • Connect Texas communities • Become a best-in-class state agency • Address congestion • District priority	34 points

Projects that scored 75 points or higher were ranked tier 1, projects that scored between 50 and 74 points were ranked tier 2, and projects that scored less than 50 points were ranked tier 3.

The remaining sections provide the criteria, metrics, and points used in the ranking framework to score highway and interchange projects included in TxDOT's UTP.

Funding Availability (Score up to 33)

Funding availability is calculated based on TxDOT's Design and Construction Information System (DCIS) data and district/division input. Funding availability is a function of the funding

secured for a project (i.e., authorized amount) and current project cost as estimated by the TxDOT district. Table 4 shows the points that are assigned to the metrics.

Table 4. Funding Availability Score.

Funding	Funding Available	Points
No Funding Identified	0%	0.00
Little Funding Identified	>0%–<50%	6.60
Some Funding Identified	≥50%–<75%	13.20
Most Funding Identified	≥75%–<90%	19.80
Almost Funded	≥90%–<95%	26.40
Funded	≥95%	33.00

Project Development (Score up to 33)

The project development category assesses a project's progress through the project development and planning process. Each project in the UTP is scored using data contained in the DCIS and information collected from TxDOT district/division staff. The project development category contains two criteria: project phasing (maximum score of 16.5) and project readiness (maximum score of 16.5).

Project Phasing

Project phasing is assessed based on the project's proposed let date in the DCIS (see Table 5).

Table 5. Project Phasing (Score up to 16.50).

DCIS Let Date	Points
Let Date ≥ 09/01/2025	4.13
Let Date ≥ 09/01/2019	8.25
Let Date < 09/01/2019	16.50

Project Readiness

Project readiness is a function of the status of the project and has three subcriteria:

- Status under the National Environmental Policy Act (maximum score of 7).
- Right-of-way requirements and acquisition progress (maximum score of 7).
- Status with PS&E (maximum score of 2.5).

The scores for the three subcriteria are summed for a total possible score of 16.5 points. Table 6 includes scoring details for project readiness.

Table 6. Project Readiness (Score up to 16.50).

Subcriteria/Metric	Points
Environmental Status (select one)	
• Has Federal Record of Decision (ROD)/Finding of No Significant Impact (FONSI) and permitting (U.S. Army Corps of Engineers [USACE]/4f)	7.00
• Requires minimal environmental (categorical exclusion [CE]) activity[21]	7.00
• Has ROD/FONSI but needs re-evaluation and/or lacks permitting (USACE/Section 4f)	5.00
• Draft environmental impact statement is available for comments/environmental assessment (EA) public hearing has occurred	2.00
• Environmental impact statement (EIS)/EA started, but ROD/FONSI not yet received	1.00
• EIS/EA started but on hold	0.00
• EIS/EA not started or is in scoping phase	0.00
Right-of-Way Status (select one)	
• 50–100% of right-of-way parcels have been acquired, and utilities have been relocated or relocation is ongoing	7.00
• Within operational right of way; needs minimal right of way (e.g., corner clips); right of way to be acquired concurrently with construction	7.00
• 25–50% of right-of-way parcels acquired	3.50
• 0–25% of right-of-way parcels acquired or right of way not released	0.00
PS&E Status (select one)	
• PS&E 90% or ready to let	2.50
• PS&E 60%–90% complete	1.50
• PS&E 30%–60% complete	0.75
• PS&E not started/less than 30% complete	0.00

TxDOT's Strategic Goals (Score up to 34)

Each project in the UTP is assessed in terms of meeting TxDOT's strategic goals. This category has five criteria:

- Connect Texas Communities (maximum score of 8).
- Maintain a Safe System (maximum score of 8).
- Become a Best-in-Class State Agency (maximum score of 8).

[21] Example TxDOT projects that require CEs and minimal right of way include overlays, corridor traffic management, traffic signal, safety, bridge replacement, bridge widening or rehabilitation, landscape and scenic enhancement, and restoration.

- Address Congestion (maximum score of 8).
- District Strategic Priority Rating (maximum score of 2).

The data used to score projects in terms of meeting TxDOT's strategic goals were:

- Obtained from TxDOT's TPP Data Analysis, Mapping, and Reporting Branch.
- Included in the DCIS.
- Obtained from INRIX® (e.g., hourly speed data).
- Obtained from TxDOT district/division staff.

Connect Texas Communities

The Connect Texas Communities criterion has four subcriteria:

- Project facilitates connectivity, assessed by functional classification (FC; maximum score of 4.5).
- Project is on the Texas Trunk System or on the Texas Freight Network (maximum score of 1.5).
- Project serves truck freight, measured by trucks per day (maximum score of 1).
- Whether the project facilitates an alternative mode (e.g., a project includes wide shoulders or bike lanes to facilitate travel by bicycle; maximum score of 0.5).
- Whether the project fills a system gap (e.g., the widening of a section of road from four lanes undivided to four lanes divided to join two other four-lane divided sections of the same road; maximum score of 0.5).

The scores for the four subcriteria are cumulative. Table 7 includes scoring details for Connect Texas Communities.

Table 7. TxDOT Strategic Goals—Connect Texas Communities (Score up to 8.00).

Subcriteria/Metric	Points
Connectivity by Functional Classification (select one)	
• Highest FC: Rural Interstate, Urban Interstate, Urban Principal Arterial	4.50
• Second Highest FC: Other Urban Principal Arterial, Rural Principal Arterial	3.00
• Third Highest FC: Rural Minor Arterial, Rural Major Collector, Rural Minor Collector, Urban Minor Arterial, Urban Collector	2.00
• Lowest FC: Rural Local, Urban Local	0.35
Texas Trunk System/Texas Freight Network (select one)	
• Yes	1.50
• No	0.00
Trucks per Day (select one)	
• No truck data	0.00
• ≤ 500 trucks per day	0.00
• > 500 trucks per day	0.10
• > 1,000 trucks per day	0.20
• > 5,000 trucks per day	0.50
• > 10,000 trucks per day	1.00
Facilitates Alternative Mode (select one)	
• Yes	0.50
• No	0.00
Project Fills a Gap (select one)	
• Yes	0.50
• No	0.00

Maintain a Safe System

The Maintain a Safe System criterion has two subcriteria:

- Safety concern (maximum score of 7).
- Energy-sector concern (maximum score of 1).

The scores for the two subcriteria are summed for a total possible score of 8 points. Two methods are used to calculate the safety concerns depending on the available data. The crash rate method calculates the number of crashes per 100 million vehicle miles traveled and compares the outcome to the statewide average crashes per 100 million vehicle miles traveled. The fatality rate is calculated similarly. The relative crash and fatality rates are scored given the metrics included in Table 8. The second method offers districts an override opportunity to assign a safety score to projects lacking data or the safety concern is unrelated to crashes and fatalities as a principal measure of safety. The energy-sector concern point is based on the project's location in a county

previously identified as recently experiencing substantial energy-sector growth (specifically, growth resulting in higher truck transportation on Texas roadways). Table 8 shows scoring details for Maintain a Safe System.

Table 8. TxDOT Strategic Goals—Maintain a Safe System (Score up to 8.00).

Subcriteria/Metric	Points
Safety Concern (select method)	
Crash Rate Method	
Crash Rate Criteria (select one)	
• 2x average crash rate	3.50
• Above average crash rate	1.75
• Below average crash rate	0.00
Fatality Rate Criteria (select one)	
• 2x average fatality rate	3.50
• Above average fatality rate	1.75
• Below average fatality rate	0.00
District Input Method (select one)	
• Low safety concern	1.40
• Medium safety concern	3.50
• High safety concern	7.00
• No data	0.00
Energy-Sector Concern (select one)	
• Yes (project is located within a county with substantial energy-sector activity)	1.00
• No	0.00

Become Best-in-Class State Agency

The Become Best-in-Class State Agency criterion has two subcriteria:

- Whether the project is included in a regional planning document (maximum score of 4.5).
- An estimate of project cost/benefit (maximum score of 3.5).

The scores for the two subcriteria are summed for a total possible score of 8 points. For the first subcriterion, points are awarded based upon the project's inclusion in either a metropolitan transportation plan or in the Texas Rural Transportation Plan. For the second subcriterion, two methods are provided for estimating project cost/benefit. The first method estimates the cost per vehicle miles traveled relative to the statewide average. The second method uses district input to assign a system user benefit to projects lacking data or if the project addresses a specific need such as network circulation, freight connectivity, or mobility. Table 9 presents scoring details for Become Best-in-Class State Agency.

Table 9. TxDOT Strategic Goals—Become Best-in-Class State Agency (Score up to 8.00).

Subcriteria/Metric	Points
Included in Regional Transportation Plan (select one)	
• Included in Metropolitan Transportation Plan	4.50
• Included in Texas Rural Transportation Plan—in Top 10 for District	4.50
• Included in Texas Rural Transportation Plan—in Next 20 for District	2.25
• Included in Texas Rural Transportation Plan—Other Scored Project in District	0.90
Project Cost/Benefit Estimate (choose method)	
Cost per Vehicle Miles Traveled Method (select one)	
• Average/below average	3.50
• Above average	1.00
System User Benefit Method (select one)	
• High benefit	3.50
• Medium benefit	2.45
• Low benefit	1.05
• No benefit	0.00

Address Congestion

The Address Congestion criterion has two subcriteria:

- Congestion/user benefits (maximum score of 7).
- Top 100 Congested Roadway or Top 100 Congested Freight Facility (maximum score 1).

The scores for the two subcriteria are summed for a total possible score of 8 points. Two methods exist for congestion/user benefits. The first method measures the level of service (LOS) on the existing road. The LOS for freeways and multilane highways is based on INRIX peak-hour speed data and peak-hour volume in terms of passenger car equivalents. The LOS for two-lane roads is determined on the facility type and a Highway Capacity Manual LOS lookup. The second method provides districts an override to assign a system user benefit to projects lacking data or if the project addresses a specific need such as network circulation, freight connectivity, or mobility. A project can earn an additional point if it is located on a segment identified as a Top 100 Congested Road or is on the Texas Freight Highway Network (identified within Texas by TxDOT). Table 10 provides scoring details for Address Congestion.

Table 10. TxDOT Strategic Goals—Address Congestion (Score up to 8.00).

Subcriteria/Metric	Points
Congestion/User Benefits (select method)	
Level of Service Method (select one)	
• LOS A (freeway volume density < 10; multilane highway density < 10; 2-lane roadway daily volume per 2 lanes < 1,980 urban/< 2,016 rural)	0.00
• LOS B (freeway volume density < 15; multilane highway volume density < 20; 2-lane roadway daily volume per 2 lanes < 3,300 urban/< 3,360 rural)	0.00
• LOS C (freeway volume density < 25, multilane highway volume density < 35; 2-lane roadway daily volume per 2 lanes < 7,700 urban/< 6,720 rural)	0.70
• LOS D (freeway volume density < 35, multilane highway volume density < 55; 2-lane roadway daily volume per 2 lanes < 14,300 urban/< 11,200 rural)	2.80
• LOS E (freeway volume density < 50, multilane highway volume density < 80; 2-lane roadway daily volume per 2 lanes < 26,400 urban/< 22,400 rural)	6.30
• LOS F (freeway volume density ≥ 50, multilane highway volume density ≥ 80; 2-lane roadway daily volume per 2 lanes ≥ 26,400 urban/≥ 22,400 rural)	7.00
System User Benefit Method (select one)	
• High benefit	7.00
• Medium benefit	4.90
• Low benefit	2.10
• No benefit	0.00
Top 100 Congested Roadway/Freight Facility	
• Yes	1.00
• No	0.00

District Strategic Priority Rating

The District Strategic Priority Rating criterion measures the strategic priority of the project relative to the district's overall needs. Scores are assigned using the metrics in Table 11.

Table 11. TxDOT Strategic Goals—District Strategic Priority Rating (Score up to 2.00).

District Priority	Points
Highest Priority	2.00
Medium-High Priority	1.50
Medium Priority	1.00
Medium-Low Priority	0.50
Lowest Priority	0.10

Appendix C—Texas Freight Mobility Plan

TxDOT's consultant that developed the TFMP extracted the highway projects that were included in the TFMP from planned projects already included in the agency's previous and existing plans (i.e., TxDOT's UTP and previous studies, such as the Texas Border Master Plans). Highway projects important to freight also emerged from the Texas Freight Advisory Committee meetings, the public listening/dialogue sessions, the Freight Leadership Summit, and a review of TxDOT legislative appropriation requests (*19*). The identified projects were subsequently prioritized (high, medium, and low) considering the TFMP goals and given the input from stakeholders. Table 12 lists the criteria and metrics associated with each goal that were used to prioritize the identified highway projects. No additional details on the framework used or the points assigned to each metric were included in the TFMP.

Table 12. Highway Infrastructure Goals.

Goal Area	Criteria	Metric
Safety	Commercial truck crash hot spots	Crash hot spots on the Primary Freight Network were determined based on analysis of the total number of commercial motor vehicle crashes per mile, commercial vehicle crash rate, crash severity, and roadway classification.
	At-grade rail crossings	All at-grade highway/rail crossings on the Texas Highway Freight Network were identified.
	Commercial truck rollover locations	Locations with the highest number of commercial motor vehicle rollover incidents in 2012 were identified.
Mobility and Connectivity	Commercial truck bottleneck locations	Commercial motor vehicle bottlenecks (delays) were identified based on data collected from global positioning system receivers.
	High percentage of trucks	Portions of the Texas Highway Freight Network with more than 50 percent trucks were identified, based on TxDOT's 2011 Road-Highway Inventory Network data.
	LOS	Portions of the Texas Highway Freight Network with at least 25 percent trucks and operating at an LOS E were identified.
	Average annual daily traffic (AADT)	Two-lane portions of the Texas Highway Freight Network with at least 25 percent trucks and an AADT of at least 10,000 were identified, as were four-lane portions of the network with at least 25 percent trucks and an AADT of at least 20,000.
	Top congested truck corridors	TxDOT lists the 100 Most Congested Truck Roadways annually by combining roadway inventory and traffic volume data with speed data from INRIX, a private

Goal Area	Criteria	Metric
		company that provides data to several navigation and traveler information services.
	On or connected to intermodal connector	Intermodal connectors are roads that provide access between major intermodal facilities and the National Highway System. The Federal Highway Administration maintains a list of all intermodal connectors.
	Alternative routes	A network of alternate routes for the Primary Freight Network was identified.
	Connecting to freight gateways	Roadway sections within 10 miles of major seaports, freight airports, and international border crossings were identified, with a focus on last-mile connections.
	Connecting to employment centers	Roadway sections adjacent to employment centers (at least 100 employees in rural areas and 10,000 employees in urban areas), with a focus on last-mile connections, were identified based on Global Insight's Freight Finder data.
Asset Management	Bridges restricted to loads less than 80,000 lb	
	Bridges in poor condition	
	Bridges with less than 15' clearance	Bridges with a clearance of less than 15' are more likely to be struck and damaged by trucks.
	Bridges with less than 16'6" clearance	Current design standard for bridges crossing an interstate highway is 16'6".
	Bridges with less than 18'6" clearance	One of the long-range policies of the Freight Plan is for all bridges crossing the Texas Highway Freight Network to have a minimum clearance of 18'6".

Appendix D—Lower Rio Grande Valley/Tamaulipas Border Master Plan: Road and Interchange Prioritization Framework

A key objective of the Texas Border Master Plans was to develop and implement a framework for prioritizing planned POEs and transportation projects that serve POEs. The framework included evaluation criteria and rankings over the short, medium, and long terms. Development of the ranking framework required stakeholders to reach consensus on the elements of the framework (categories, category weights, criteria, criterion weights, and scoring metrics) that would be used to prioritize the projects. Table 13 provides the 17 prioritization criteria and weights assigned to the road and interchange projects that were included in TxDOT's Lower Rio Grande Valley/Tamaulipas Border Master Plan (*20*).

Table 13. Road and Interchange Project Prioritization Criteria (*20*).

Category	Criteria	Weight (%)
Capacity/Congestion (Weight = 25.3%)	Increase in number of lanes	26.0
	Improvement in LOS	25.6
	Number of POEs served	24.2
	Connectivity	24.2
Demand (Weight = 19.2%)	Increase in AADT[22]	34.4
	Percentage of trucks	25.6
	Multiple mode demand	12.5
	Estimated demand at 20 years	27.5
Cost Effectiveness/Project Readiness (Weight = 16.9%)	Cost/capacity criterion	23.4
	Cost/demand criterion	18.2
	Land availability	26.5
	Partially funded project	19.8
	Phase of project development	12.1
Safety (Weight = 16.3%)	Accident rate per mile	57.6
	Diversion of non-radioactive hazardous materials	42.4
Regional Impacts (Weight = 22.3%)	Wider geographical impacts	50.0
	General development	50.0

This appendix provides the criteria, definitions for each of the criteria, metrics, and points used in the ranking framework to prioritize highway and interchange projects included in the Lower Rio Grande Valley/Tamaulipas Border Master Plan.

[22] The increase in AADT is calculated as the difference between the expected AADT in 2030 and the current AADT.

Definitions: Capacity/Congestion Criteria

The capacity/congestion criteria are:

- **Increase in Number of Lanes**—An increase in the number of lanes is a measure of added road capacity. In the case of a new road or interchange project, the final number of lanes equals the increase in the number of lanes. The higher the number of added lanes is, the higher the added road capacity.
- **Improvement in LOS**—An improvement in the LOS measures a change in congestion experienced. Typically, LOS of E or F is considered congested, while LOS of A–D is considered acceptable. The higher the change in LOS achieved (e.g., from LOS F to LOS A or B), the higher the score assigned.
- **Number of POEs Served**—This criterion measures how many POEs are served by a proposed project by directly connecting to the POE or by connecting to a POE road. The higher the number of POEs served (directly or indirectly), the higher the score assigned.
- **Connectivity**—Connectivity describes the extent to which urban forms permit (or restrict) movement of people or vehicles in different directions. Connectivity is generally considered a positive attribute of an urban design because it permits ease of movement and avoids severing neighborhoods. Better connectivity will provide smoother flow of traffic and help alleviate problems associated with traffic congestion.

Table 14 shows the capacity/congestion criteria scores.

Table 14. Capacity/Congestion Criteria Scores.

Criterion	Levels	Score
Increase in Number of Lanes	No change	0.00
	Full shoulder (minimum 8')	0.25
	Additional left turn lane	0.50
	2 lanes	0.75
	More than 2 lanes (or create overpass)	1.00
Improvement in LOS	See Table 15	See Table 15
Number of POEs Served	1	0.25
	2	0.50
	3	0.75
	More than 3	1.00
Connectivity	No connectivity	0.00
	Gap closure	0.25
	New connection/location	0.50
	Relief route/loop	1.00

Table 15. Capacity/Congestion—Increase in LOS Scores.

		To LOS					
		F	E	D	C	B	A
Change from LOS	F	0	0.30	0.70	1.00	1.00	1.00
	E		0	0.30	0.70	1.00	1.00
	D			0	0.30	0.70	1.00
	C				0	0.30	0.50
	B					0	0.30
	A						0

Definitions: Demand Criteria

The demand criteria are:

- **Increase in AADT**—AADT is a measure of travel demand or usage of a facility and is calculated by dividing the total annual vehicle traffic by 365 days. An increase in the AADT is a measure of the demand satisfied or additional usage of the facility. In the case of new road or interchange projects, the final AADT equals the increase in AADT. The increase in AADT will be calculated as the difference between the expected AADT in 2030 and the current AADT. The higher the increase in AADT, the higher the demand satisfied or additional usage of the facility.

- **Percentage of Trucks**—The percentage of trucks is the share of the AADT that is trucks and is an indicator of the importance of the road or interchange to goods movement. The higher the percentage of trucks, the higher the importance of the road or interchange to goods movement.

- **Multiple Mode Demand (expressed public demand for alternative mode)**—The road and interchange projects will receive a score considering the expressed public demand for an alternative mode facilitated by the proposed project.

- **Estimated Demand at 20 Years**—The estimated demand is calculated based on the initial demand and a certain growth rate that is typical for a certain geographic region. The growth rate is often determined based on historical data. Planned projects that have a higher forecasted demand should be prioritized because they would provide higher utility by catering to a larger population than others. Such projects need to be assigned relatively higher scores.

Table 16 lists the demand criteria scores.

Table 16. Demand Criteria Scores.

Criterion	Levels	Score
Change in AADT	No change	0.00
	1st Quartile	0.25
	2nd Quartile	0.50
	3rd Quartile	0.75
	4th Quartile	1.00
Percentage of Trucks	None	0.00
	1st Quartile	0.25
	2nd Quartile	0.50
	3rd Quartile	0.75
	4th Quartile	1.00
Multiple Mode Demand: Additional Modes	No	0.00
	Yes	1.00
Estimated Demand	1st Quartile	0.25
	2nd Quartile	0.50
	3rd Quartile	0.75
	4th Quartile	1.00

Definitions: Cost-Effectiveness/Project-Readiness Criteria

The cost-effectiveness/project-readiness criteria are:

- **Cost Effectiveness ($/Capacity Criterion)**—The cost-effectiveness criterion is defined as the public cost (i.e., project cost – private participation, $) of the project per lane-mile for roads and interchanges. The higher the cost effectiveness (i.e., lower the value), the higher the score assigned.
- **Cost Effectiveness ($/Demand Criterion)**—The cost-effectiveness criterion is defined as the public cost (i.e., project cost – private participation, $) of the project divided by change in AADT. The higher the cost effectiveness (i.e., lower the value), the higher the score assigned.
- **Land Availability**—The land availability criterion is a measure of the available land or the necessary funds for the land. The project sponsor will need to describe in detail to the study team and justify that the required land or funding for the land for the project is available.
- **Partially Funded Project**—Available project funding can be considered a measure for project readiness. A planned project that has allocated/secured a relatively higher proportion of the total project budget is more likely to be completed and should be assigned a higher score.

- **Phase of Project Development**—There are a number of phases in project development: conceptual, preliminary feasibility (includes cost of project, acreage, etc.), planning/programming, all environmental permits in hand (local/state/federal), greater than 80 percent right of way (ROW) in hand, local/state/federal permits in hand, or project is ready to go. This is another measure of project readiness. A higher score will be assigned to projects that have reached certain levels of maturity as opposed to those that are in the conceptual phase.

Table 17 displays the cost-effectiveness/project-readiness criteria scores.

Table 17. Cost-Effectiveness/Project-Readiness Criteria Scores.

Criterion	Levels	Score
Cost Effectiveness ($/Capacity Criterion)	No change	0.00
	1st Quartile	0.25
	2nd Quartile	0.50
	3rd Quartile	0.75
	4th Quartile	1.00
Cost Effectiveness ($/Demand Criterion)	No change	0.00
	1st Quartile	0.25
	2nd Quartile	0.50
	3rd Quartile	0.75
	4th Quartile	1.00
Land Availability	No land availability	0.00
	Low land availability (<50%)	0.33
	Medium land availability (50% to 80%)	0.67
	High land availability/no land needed (>80%)	1.00
Partially Funded Budget: Funding Secured (% of Project Budget)	No funding	0.00
	0 to ≤25%	0.25
	>25 to ≤50%	0.50
	>50 to ≤75%	0.75
	>75 to ≤100%	1.00
Phase of Project Development	Conceptual	0.00
	Preliminary feasibility (includes cost of project, acreage, etc.)	0.25
	Planning/programming	0.50
	All environmental permits in hand (local/state/federal)	0.75
	>80% ROW in hand, local/state/federal permits in hand	1.00

Definitions: Safety Criteria

The safety criteria are:

- **Accident Rate per Mile**—The annual accident rate per mile criterion is a measure of the level of safety experienced on a given facility. The higher the accident rate per mile on an existing facility, the higher the need for a project to improve the level of safety on the facility and the higher the score assigned. In the case of a new project, the accident rate per mile on a parallel and similar road or interchange will be used.
- **Diversion of Non-radioactive Hazardous Materials**—This criterion is a qualitative measure of whether a proposed/planned road or interchange project aids in diverting non-radioactive hazardous materials from populated areas or resources vital to those areas. The project sponsor will need to describe in detail to the study team how the proposed/planned project diverts non-radioactive hazardous materials from populated areas or resources vital to those areas.

Table 18 presents the safety criteria scores.

Table 18. Safety Criteria Scores.

Criterion	Levels	Score
Accident Rate per Mile	No Data	0.00
	1st Quartile	0.25
	2nd Quartile	0.50
	3rd Quartile	0.75
	4th Quartile	1.00
Diversion of Hazmat	No	0.00
	Yes	1.00

Definitions: Regional Impacts Criteria

The regional impacts criteria are:

- **Wider Geographic Impacts**—This criterion attempts to measure the wider geographic impacts of proposed/planned projects (i.e., local, regional, statewide, or bi-national). The wider the geographic impact, the higher the score assigned.
- **General Development**—General development impacts of planned projects may refer to a project's annual impact on the general quality of life and economic climate of a region. It can involve multiple aspects including the development of human capital, critical infrastructure, regional competitiveness and the enhancement of trade, and safety. The project sponsor will need to describe in detail to the study team how the proposed project impacts the socioeconomic characteristics of the area.

Table 19 shows the regional impacts criteria scores.

Table 19. Regional Impacts Criteria Scores.

Criterion	Levels	Score
Wider Geographic Impacts	No impact	0.00
	Local impact (within 1 county)	0.25
	Regional impact (more than 1 county)	0.50
	Statewide impact (more than 2 counties)	0.75
	Bi-national impact (Mexico and United States)	1.00
General Development	No benefit (<$250,000/year)	0.00
	Minor benefit ($250,000–$500,000/year)	0.33
	Moderate benefit (>$500,000–$1 million/year)	0.67
	Major benefit (>$1 million/year)	1.00

Appendix E—Permit Data

In terms of permit data collected, the Port of Brownsville requires that companies applying for single-trip OS/OW permits provide the following information, which is collected and transmitted to TxDOT:

- USDOT#.
- MC/MX#.
- Driver name.
- Cargo origin.
- Type of cargo.
- Activation date.
- Axle configuration options.

- Load information.
- Truck information (unit, no.).
- Make, VIN, license no., state.
- Trailer information (unit, no.).
- Axle distance: Axle 1, Axle 2, Axle 3, Axle 4, and Axle 5.
- Axle weight: Axle 1, Axle 2, Axle 3.
- Number of tires: Axle 1, Axle 2, Axle 3, Axle 4, Axle 5, and Axle 6.
- Tire size: Axle 1, etc.
- Fee amount (*7*).

The same permit data collected by the Port of Brownsville are also collected at Port Freeport and by HCRMA as part of their permitting processes. The permit data can be made available from the entities' contractor (ProMiles). To date, all entities with OS/OW corridors have contracted with ProMiles (*3*).[23] In addition, TxDOT also has access to/can obtain the following data:

- Total fees.

[23] ProMiles is a software development company based in Bridge City, Texas. ProMiles developed the software that allows trucking companies to self-issue and pay for OS/OW permits on designated OS/OW corridors in Texas. ProMiles collects the required permit information and submits it to the entities with authority to issue OS/OW permits in Texas.

- Number of permits sold.
- Radar data to determine surface condition.
- Roadway surface type (*3*).

Appendix F—Hidalgo County Traffic and Pavement Impact Studies

TTI conducted a pavement impact study for TxDOT's Pharr District to assess how the OS/OW route (U.S. 281/Military Highway) will be impacted given the forecasted truck and OS/OW truck traffic volumes. This appendix summarizes the data that were gathered as part of past efforts in Hidalgo County.

HCRMA and TxDOT's Pharr District funded the traffic and pavement impact studies of the OS/OW corridor system in Hidalgo County. In 2013, C&M Associates Inc. conducted a traffic analysis for HCRMA given the construction of the Mazatlán-Durango toll highway in Mexico and the highway's potential impact on diverting truck traffic from Arizona to POEs in the Lower Rio Grande Valley. Specifically, the study considered:

- Truck travel times from Mazatlán to multiple Texas and Arizona POEs.
- Total truck shipment costs for various east and west coast destinations.
- Cargo origin and destination data for movements to and from the United States.
- Truck commodity type.
- Average annual daily truck traffic (AADTT).
- Crossing times at the POEs.
- Warehouse locations on the Mexican and U.S. sides.
- Special districts, including OS/OW special permit corridors and foreign trade zones (*21*).

In a 2014–2015 study, the TTI research team used a 20-year OS/OW truck forecast for the Pharr International Bridge on the rise and compared it to Pharr truck counts from WIM data to estimate truck use for 20 years into the future. The traffic estimates were combined with the FPS 21 (Flexible Pavement Design System) to evaluate how the OS/OW route (U.S. 281/Military Highway) as designed will be impacted. The truck volume estimates were combined with the actual AADTT volumes, which included the percentage of overloaded trucks obtained from a portable WIM system with piezoelectric sensors. Soil data and pavement cores were obtained to confirm the current quality of the roadway and estimate the impact of heavier trucks on the pavement (*22*).

The end result was a recommended revised flexible pavement design that could accommodate the heavier traffic with service/overlay year estimates and salvage factors. Table 20 details some of the measurements and data obtained from the TxDOT and TTI studies. To support the anticipated heavier traffic, findings from these studies indicated a revised pavement design structure requiring a total of 10-inch-thick asphalt and 10-inch-thick cement treated base over a 12-inch treated (lime) subgrade, with at least 2-inch-thick overlay after 16 years of service. With

the current in-situ structure of not more than 8-inch-thick asphalt, this means that a minimum of 2- to 3-inch-thick overlay may be required, if not full-depth rehabilitation. For the highway intersections with stopping, braking, and turning traffic, the following revised design recommendations were made: 11.5-inch-thick concrete (continuously reinforced concrete pavement) and 2-inch-thick asphalt (bond breaker) over a 12-inch treated (lime) subgrade (*22*).

Table 20. TxDOT OS/OW Special Permit Corridor Pavement Impact Measures Considered (*22*).

Portable WIM Measures/Quantifies	Flexible Pavement System (FPS 21) Designs/Estimates	Field and Lab Tests Measures/Quantifies	Annual Average Daily Truck Traffic
Daily truck count (ADTT)	Pavement structure to mitigate rutting and cracking damage	Pavement damage	AADT-based truck volume predictions—20 years
Truck speed (mph)	Pavement layer/overlay thickness	Surface rutting (straightedge)	
No. of axles, axle spacing, and truck classification	Material type for the pavement layers/overlay	Cracking (visual/coring)	
Truck GVW	Material strength for the pavement layers/overlay	Subsurface defects (ground penetrating radar)	
Truck axle weights/ distribution: – Single/steering – Tandem – Tridem – Quad	Pavement performance life (number of periods and time in years)	Pavement structural strength (falling weight deflectometer)	
No. or % of overloaded trucks in the ADTT	Structural stress-strain analysis	Base structural strength (dynamic cone penetrometer)	
Average daily overloaded trucks	Subgrade strength check (triaxial check)	Soil classification (soil maps)	
Magnitude of truck overweight (kips)	Load cycles to failure		
No. or % of overweight axles: – Single/steering – Tandem – Tridem – Quad	Material, construction, and maintenance costs	Material densification, strength, stripping, thickness, and remaining life (coring)	
18-kip ESALs (daily, yearly, 20 yr, etc.)	Material salvage value	Pavement core rutting life (Hamburg wheel tracking test)	
Average 10 heaviest wheel loads		Pavement core cracking life (overlay	

Portable WIM Measures/Quantifies	Flexible Pavement System (FPS 21) Designs/Estimates	Field and Lab Tests Measures/Quantifies	Annual Average Daily Truck Traffic
		tester/indirect tensile)	
Load equivalent factors		Soil properties and treatment type (sampling/lab testing)	
Truck loading and growth projections (i.e., 20 yr)			

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