

# OVERVIEW OF STATE FERRY SYSTEM OPERATIONS

Texas operates two ferry routes that provide a shorter route than existing roads for travel from Port Aransas to Harbor Island and from Galveston to Port Bolivar. Ferries enable local residents and tourists to avoid traveling solely on state highways to reach their destination, which reduces travel time and fuel consumption. These routes also serve as primary means of evacuation during hurricane threats. The two routes operate 24 hours a day, 365 days a year, weather permitting, and more than 9.1 million passenger trips and 3.9 million vehicle trips were taken on the ferries during fiscal year 2017.

This report provides an overview of ferry system operations, including funding sources, traffic and congestion, vessel maintenance and replacement, and opportunities for diesel emission reductions.

## FACTS AND FINDINGS

- ◆ During fiscal year 2017, 3.9 million vehicle trips were taken on the Port Aransas and Galveston–Port Bolivar ferries. According to the Texas Department of Transportation, wait times to board a ferry are minimal during most of the year, and projected traffic growth for both ferry operations can be managed with existing vessel assets.
- ◆ The Texas Department of Transportation was appropriated approximately \$96.2 million in Other Funds from the State Highway Fund for the 2018–19 biennium to support the operation of the

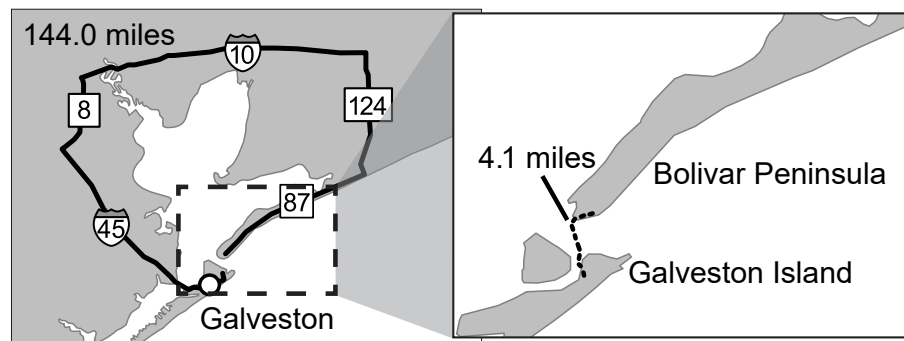
ferry systems. In addition, the Port Aransas operation has received federal competitive grants for various infrastructure projects and vessel construction.

- ◆ Effective December 14, 2016, the U.S. Environmental Protection Agency determined that the Houston–Galveston–Brazoria ozone nonattainment area failed to attain the 2008 8-hour ozone National Ambient Air Quality Standard by the applicable deadline. Diesel emission grant funding may be available to replace or upgrade ferry engines and help reduce ozone emissions.

## DISCUSSION

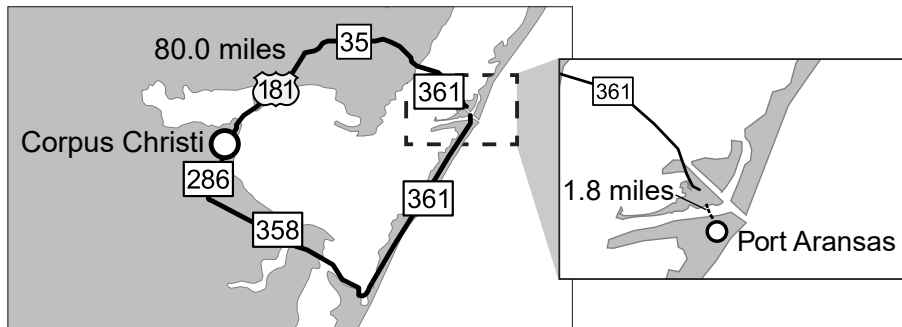
The first ferry operated by the State of Texas left Port Bolivar on July 1, 1934. Texas operated the ferry service toll-free for approximately six months, but the service was so popular that Galveston County officials asked the state to impose a charge of \$0.25 to reduce traffic congestion. The \$0.25 toll continued, except for a brief experimental period in 1934, until 1949. Since then, the ferry operation has been operated as a toll-free service. As of February 2018, the Galveston–Port Bolivar ferry fleet consists of six 60-car vessels that connect Galveston to Port Bolivar via a route across the Houston Ship Channel. According to the Texas Department of Transportation (TxDOT), travel time is 18 minutes to cross on the ferry compared to approximately 2 hours and 20 minutes to drive the 144.0 miles around Galveston Bay. **Figure 1** shows the ferry route from Port Bolivar to Galveston and the alternative highway route.

**FIGURE 1**  
**PORT BOLIVAR TO GALVESTON HIGHWAY ROUTE COMPARED TO FERRY ROUTE**  
**APRIL 2018**



SOURCE: Legislative Budget Board.

**FIGURE 2**  
**ARANSAS PASS TO PORT ARANSAS HIGHWAY ROUTE COMPARED TO FERRY ROUTE**  
**APRIL 2018**



SOURCE: Legislative Budget Board.

Ferry operations to Port Aransas date to 1911, first privately owned and later transferred to Nueces County. In 1968, TxDOT assumed ownership and operation of the ferries and removed the existing tolls. As of February 2018, the Port Aransas ferry fleet consists of five 20-car vessels and three 28-car vessels that connect Aransas Pass (Harbor Island) to Port Aransas (Mustang Island) via a route across the Corpus Christi Ship Channel. According to TxDOT, travel time is 15 minutes to cross on the ferry compared to approximately 1 hour and 15 minutes to drive the 80.0 miles around Corpus Christi Bay. **Figure 2** shows the ferry route from Aransas Pass to Port Aransas and the alternative highway route.

**TRAFFIC AND CONGESTION**

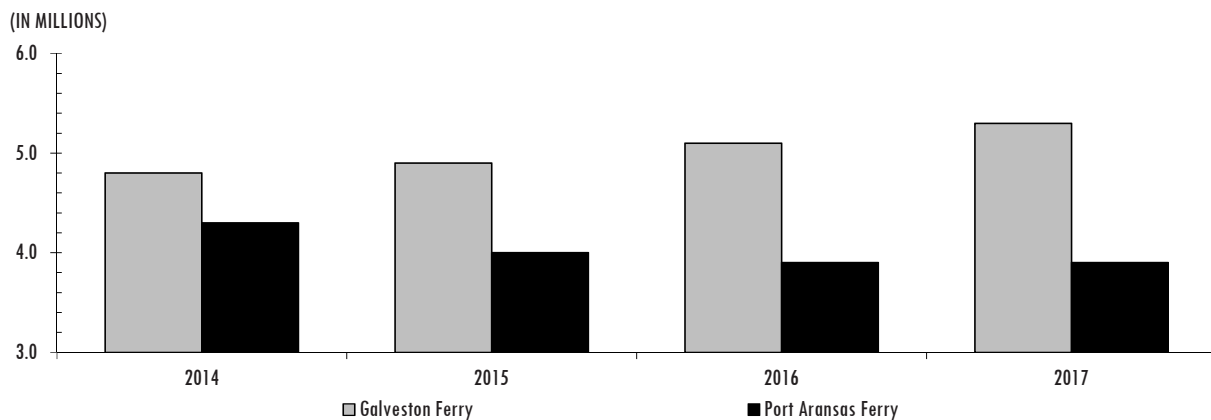
During fiscal year 2017, more than 9.1 million passenger trips and 3.9 million vehicle trips were taken on the Port Aransas and Galveston-Port Bolivar ferries. **Figure 3** shows the number of ferry passenger trips on the Galveston and Port Aransas operations from fiscal years 2014 to 2017.

TxDOT ferry management staff studies traffic patterns and adjusts vessel schedules based on wait times at both ferry operations locations.

**TRAFFIC PATTERNS AND WAIT TIMES**

At the Galveston–Port Bolivar ferry, traffic patterns consist of six months of the busy season (from March to August) due to

**FIGURE 3**  
**FERRY PASSENGER TRIPS, FISCAL YEARS 2014 TO 2017**



NOTE: For Galveston–Port Bolivar Ferry Operations, passenger trip numbers are estimated as three people per vehicle plus any walk-on passengers. For Port Aransas Ferry Operations, actual vehicle, passenger, and pedestrian counts are logged, pursuant to requirements from the U.S. Coast Guard Marine Safety Office – Corpus Christi Sector.  
 SOURCE: Texas Department of Transportation.

increased tourist traffic and six months of the nonbusy season (from September to February). The Port Aransas ferry traffic patterns are consistent throughout the year, because tourists and local residents use the ferry.

TxDOT considers wait times to board a ferry to be minimal during most of the year. However, long lines occur during the busy season at peak times, such as summer weekends and holidays. During peak traffic times, the wait time to board a ferry can exceed two hours. TxDOT utilizes Bluetooth technology and cameras installed on roadways to provide motorists with wait time and travel time estimates at key decision-making points leading up to ferry landings. This information enables drivers to decide whether they would rather travel on an alternate route. TxDOT’s lowest traffic times are from 11:00 PM to 5:30 AM.

**PRIORITY BOARDING SYSTEM**

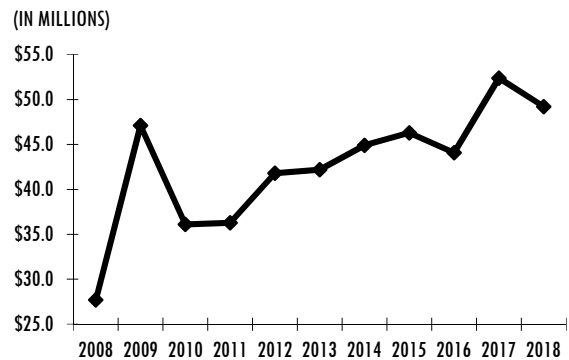
TxDOT has statutory authority to adopt rules to establish a priority boarding system for vehicles that show an annual, fee-based, priority boarding sticker. Pursuant to the Texas Transportation Code, Section 342.004, TxDOT may grant access to a new lane that would authorize priority boarding. TxDOT rule states that it will not issue priority boarding stickers for a ferry location until it has received approximately 500 applications for that location.

Although the Galveston operation has not received enough applications, the Port Aransas operation has received the 500 applications required to proceed. The operation is planning a new lane for priority boarding vehicles on both sides of the landings. Work is expected to begin in early 2019. TxDOT rules establish that no more than 50.0 percent of the ferry capacity will be allocated to priority boarding by annual permit during high-demand periods. The rules also establish the following fees for an annual permit:

- \$250 for a two-axle vehicle, including a motorcycle, car, pickup, or van;
- \$500 for a bus, motor home, or a single-unit truck with up to three axles; and
- \$1,000 for a multiunit truck or other vehicle with more than three axles.

TxDOT must deposit each fee collected pursuant to the Texas Transportation Code, Section 342.004, to the credit of the State Highway Fund.

**FIGURE 4  
TEXAS DEPARTMENT OF TRANSPORTATION  
EXPENDITURES FROM STRATEGY B.1.3, FERRY  
OPERATIONS  
FISCAL YEARS 2008 TO 2018**



NOTE: Totals include funding from the State Highway Fund, federal reimbursements, and the federal American Recovery and Reinvestment Act.  
SOURCE: Legislative Budget Board.

**STATE FUNDING**

A priority boarding system enables passengers to avoid waiting in the ferry boarding line. However, passengers do not have to pay to ride the ferry. The Texas Transportation Code, Section 342.001, requires TxDOT to use money from the State Highway Fund for ferry operations. Texas is the only state with a ferry operation that does not charge a toll for vehicles and passengers. For the 2018–19 biennium, TxDOT was appropriated approximately \$96.2 million to support the operation of the ferry systems. **Figure 4** shows the amount of TxDOT expenditures from Strategy B.1.3, Ferry Operations for the ferry system from fiscal years 2008 to 2018. In addition to State Highway Funds, expenditures from fiscal years 2008 to 2010 include about \$17.8 million in federal reimbursements and funds received through the federal American Recovery and Reinvestment Act of 2009.

The major revenue sources deposited directly to the State Highway Fund include motor vehicle registration fees, Federal Funds (primarily federal-aid highway reimbursements), and sales tax on motor lubricants. Additional allocations to the fund include a significant portion of motor fuel tax revenue, and, beginning in fiscal years 2018 and 2020, respectively, revenue from the first \$2.5 billion of state sales tax collected in excess of \$28.0 billion during a fiscal year and 35.0 percent of motor vehicle sales and rental taxes collected in excess of \$5.0 billion during a fiscal year.

**AVAILABLE FEDERAL GRANT FUNDING**

In addition to State Highway Fund appropriations, TxDOT has received approximately \$29 million in federal grant money for certain projects at the Port Aransas operation as shown in **Figure 5**. One federal grant program, the federal Ferry Boat Discretionary (FBD) program provided funding for certain vehicular or passenger ferry facilities. The program funded facilities that are on a non-Interstate public road and are publicly owned, publicly operated, or majority publicly owned, providing substantial public benefits. Projects selected for funding from this program were funded at an 80 percent federal share. The FBD program was discontinued by the federal Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012, and the last FBD project solicitation was for federal fiscal year 2011. MAP-21 established the Construction of Ferry Boats and Ferry Terminal Facilities Formula Program (FBP). In accordance with this program, federal-aid highway funds are available, through state transportation agencies, for designing and constructing ferry boats and for designing, acquiring right-of-way, and constructing ferry terminal facilities. Ferry boats and terminal facilities that serve vehicular travel as links on public highways (other than Interstate highways), and ferry boats and terminals only serving passengers as fixed-route transit facilities may be eligible for certain types of federal-aid highway funding. Both Galveston and Port Aransas operations have applied for these federal grants, but only Port Aransas has been awarded funding. **Figure 5** shows the grant awards that TxDOT has received in accordance with the FBD and FBP programs for the Port Aransas operation.

**VESSEL MAINTENANCE**

Each vessel is subject to all United States Coast Guard (USCG) regulations and is inspected four times per year by the USCG. Regular vessel maintenance is performed daily by vessel crew members and TxDOT ferry maintenance crews ashore year-round. Each year, some vessels also are sent to a shipyard for scheduled maintenance and repairs. In addition to scheduled maintenance and repairs in the shipyard, the American Bureau of Shipping inspects the hull and machinery of each vessel during the shipyard cycle. The operations coordinate repairs and endeavor to maintain ferry service. The combination of USCG oversight and regular maintenance and repairs are intended to ensure a safe ferry fleet.

According to TxDOT, a competitive market exists for vessel maintenance, and all ferry maintenance contracts are bid

**FIGURE 5  
FEDERAL FERRY BOAT DISCRETIONARY PROGRAM AND  
CONSTRUCTION OF FERRY BOATS AND FERRY TERMINAL  
FACILITIES FORMULA PROGRAM AWARDS FOR THE PORT  
ARANSAS OPERATION  
FISCAL YEARS 2006 TO 2016**

YEAR	PROJECT	AWARD
2006	Design and construction of new ferry boat	\$393,879
2007	Removal and replacement of wooden ramp fender systems with composite-material fender system	\$2,404,664
2008	Design and construction of new ferry boat	\$750,000
2009	2009 Recovery Act: Construction and Inspection	\$7,200,000
2009	Ferry boat expansion – Clusters	\$475,000
2010	Replacement of fender system on Port Aransas landings	\$2,745,802
2010	Replacement of fender system on Harbor Island landings	\$738,039
2011	Bulkhead repairs to Harbor Island	\$790,000
2011	Installation of lead pilings for new 28-car ferry boat on Port Aransas side	\$730,000
2012	Installation of lead pilings	\$1,772,237
2015	Design and construction of new 28-car ferry boat	\$5,080,745
2016	Design and construction of new 28-car ferry boat	\$5,913,261

SOURCE: Texas Department of Transportation.

competitively. The Port Aransas operation has noted limited shipyard capabilities in its area due to the size of the vessels. A shipyard in Palacios is used for the 20-car ferryboats, and a shipyard in Houston is used for the 28-car ferryboats.

In addition to ferry vessels, other marine operations also affect the market for vessel maintenance. When the price of oil is relatively high, offshore companies operate more vessels, thereby increasing the cost of repairs and limiting available dry-dock space. During recent years when the price of oil has been relatively lower, competition for access to shipyards decreased. However, as the price of oil rises, the ferry operations expect that competition for marine services and crew members will increase, which will increase maintenance costs.

**VESSEL REPLACEMENT**

The ferry fleets range in age from newly operational to 40 years old. As vessels near the end of their service life, TxDOT

**FIGURE 6  
COST OF OPTIONS TO REDUCE FERRY VESSEL EMISSIONS OF NITROGEN OXIDES (NO<sub>x</sub>)  
APRIL 2018**

VESSELS	ANNUAL NO <sub>x</sub> EMISSIONS (IN METRIC TONS)	ANNUAL NO <sub>x</sub> EMISSIONS WITH ENGINE REPLACEMENT (IN METRIC TONS)	COST PER VESSEL	COST PER TON OF NO <sub>x</sub> REDUCED
Galveston ferries (pre-tier diesel engines)	103.3	9.6 to 19.2	\$3.2 million to \$12.0 million	\$34,151 to \$142,687
Port Aransas 20-car ferries (pre-tier diesel engines)	8.0	3.7	\$450,000	\$104,651
Port Aransas 28-car ferries (Tier 2 diesel engines)	9.2	7.2	\$1.4 million	\$700,000

SOURCES: Legislative Budget Board; Texas Department of Transportation.

considers the following factors to determine when replacement is necessary or cost-effective:

- the frequency of repairs resulting in time the vessels are unavailable for use;
- fuel economy of the vessels;
- the availability of new technology and engine efficiency;
- the age of the vessels;
- availability of replacement parts;
- traffic volumes;
- cost to modify equipment;
- market pricing for materials; and
- newer regulations, which may increase cost.

The service life of a vessel ranges from 30 years to 40 years. A recent cost estimate for the replacement of a Galveston–Port Bolivar 60-car vessel is about \$26.3 million; replacement of the smaller Port Aransas 28-car vessels are estimated at about \$9.0 million. TxDOT has explored the market for used ferry vessels, but multiple factors make it impractical to pursue this option. The majority of vessels on the used market are older vessels and would not be an improvement from a current vessel. A vessel also must be designed to fit the existing infrastructure at the ferry landings. These factors make it more effective to design and build a new vessel when adding to the fleet. Each vessel requires about 18 months to build. Before a vessel is placed into service, maintenance crew and vessel crew members also must complete training.

**REDUCTION OF DIESEL EMISSIONS**

All Texas ferry vessels are powered by diesel engines, which emit certain exhaust pollutants that affect air quality. As of December 2016, the U.S. Environmental Protection Agency (EPA) determined that the Houston-Galveston-Brazoria area failed to attain the National Ambient Air Quality Standard for ozone. The EPA regulates certain exhaust pollutants, but the agency’s established limits apply only to newly constructed engines. The EPA regulates the following marine diesel-exhaust pollutants: oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM), total hydrocarbons (THC), and carbon monoxide (CO). The EPA has phased in increasingly stringent regulatory limits on these pollutants since the late 1990s and has divided the phased regulatory limits into tiers. Tiers are numbered 1 through 4 with higher numbers corresponding to more stringent limits on these pollutants. The timeline of which tier is in effect depends on engine characteristics such as cylinder displacement and overall engine power.

The majority of ferry vessels in the Texas operations are powered by diesel engines that predate the EPA’s tiered regulations. The state has several options to reduce diesel exhaust emissions produced by these vessels. These options include an engine rebuild, a full engine replacement, and retrofitting the existing diesel engines with after-treatment devices. All vessels’ engines are overhauled or rebuilt every five years to 10 years, depending on running hours and preventive-maintenance needs. **Figure 6** shows the annual NO<sub>x</sub> emissions for ferry vessels and the estimated annual NO<sub>x</sub> emissions if the engines were replaced with Tier 3 engines.



**GRANT FUNDING AVAILABLE TO REDUCE DIESEL ENGINE EMISSIONS**

Instead of using State Highway Fund appropriations to update engines to reduce emissions, TxDOT could apply for two grant programs that fund diesel-emission-reduction efforts. Although ferry operations would be eligible, it is unclear whether the operations would be competitive against other grantees.

**CLEAN DIESEL PROGRAM**

The EPA's Clean Diesel Program provides support for projects that protect human health and improve air quality by reducing harmful emissions from diesel engines. This program includes grants and rebates funded in accordance with the federal Diesel Emissions Reduction Act. The following diesel vehicles, engines, and equipment are included as eligible uses for Clean Diesel Program funding:

- school buses;
- Class 5 to Class 8 heavy-duty highway vehicles;
- locomotive engines;
- marine engines; and
- nonroad engines, equipment, or vehicles used in construction, handling of cargo (including at ports or airports), agriculture, mining, or energy production (including stationary generators and pumps).

A number of entities in Texas have received grant money from the Clean Diesel Program. Though TxDOT's ferry operations are eligible for grant funding through Clean Diesel Program, TxDOT has not applied for any Clean Diesel Program grants to date.

**TEXAS EMISSIONS REDUCTION PROGRAM**

The Texas Emissions Reduction Program (TERP), administered by the Texas Commission on Environmental Quality (TCEQ), was established by the Seventy-seventh Legislature, 2001. The statutory objectives of TERP include the following:

- achieving maximum reductions in nitrogen oxides to demonstrate compliance with the Texas State Implementation Plan;
- preventing areas of the state from being in violation of National Ambient Air Quality Standards established by EPA as authorized by the federal Clean Air Act;

- achieving cost-saving and other benefits by reducing emissions of other pollutants;
- achieving reductions of emissions of diesel exhaust from school buses; and
- advancing technologies that reduce NO<sub>x</sub> and other emissions from facilities and other stationary sources.

TERP is funded from fees and surcharges on obtaining a certificate of vehicle title for all vehicles, purchase or lease of heavy-duty vehicles and equipment, and registration and inspection of commercial vehicles. Revenue into the TERP Fund for the 2016–17 biennium is projected to be \$427.0 million. Biennial appropriations and statutorily required transfers and deductions from the TERP Fund are expected to be \$241.1 million. This amount includes \$236.3 million appropriated to TCEQ to fund TERP grant programs and to administer those programs. The balance at the end of the 2016–17 biennium is projected to be \$1.2 billion.

TERP includes incentive funding for a variety of programs. The primary TERP grant program provides grants to reduce NO<sub>x</sub> emissions from mobile sources in the state's nonattainment areas and areas of concern. Areas that do not meet the National Ambient Air Quality Standards are designated nonattainment areas, one of which is the Houston–Galveston–Brazoria area. TxDOT previously has not applied for any TERP grants. If TxDOT explored the replacement of diesel ferry engines or retrofitting diesel ferry engines with after-treatment devices, TxDOT would be eligible for funding from TERP's Diesel Emissions Reduction Incentive (DERI) program. Since 2001, the DERI program has awarded more than \$1.0 billion in grant funding to more than 10,000 projects. The average cost per ton of NO<sub>x</sub> reduced for a DERI grant project is about \$6,000 per ton of NO<sub>x</sub> reduced. As shown in **Figure 6**, the cost per ton of NO<sub>x</sub> reduced by replacing a diesel ferry engine would range from about \$34,000 to \$700,000. Although costs per ton of NO<sub>x</sub> reduced from ferry engines may not be competitive compared to other grantees, they may become competitive. The Legislature also could directly appropriate TERP funds to purchase new engines.