State Highway 32 East TIGER Discretionary Grant Application

Building an Alternative Truck Corridor for Brownsville, Texas

April 2016

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I. PROJECT DESCRIPTION

> "This project is a priority to the leadership of Brownsville, Cameron County, and the Port of Brownsville and is a project that I have personally been briefed on during my visits to the Rio Grande Valley that has state, national, and international significance. … The project is a critical component in improving the flow of trade from the Port of Brownsville to industrial facilities in South Texas and Northern Mexico."
>
> *Former Representative James L. Oberstar*
> *2007-2011 Chairman, U.S. House of Representatives Transportation and Infrastructure Committee*

The Texas Department of Transportation (TxDOT) is requesting $8.1 million in funding from the Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant program for the construction of the State Highway 32 East (SH 32E) project in Brownsville, Cameron County, Texas for a total project cost of $29.4 million. The SH 32E project is a proposed four-lane facility from the intersection of Farm-to-Market Road (FM) 1419 and FM 3068 to SH 4. The SH 32E project will reduce truck volumes and congestion on surrounding local roads by providing an alternative route designed to accommodate heavy loads. The SH 32E project is proposed in a rural portion of Brownsville and will be designated as an overweight truck corridor. This designation will allow the trucks currently passing through urbanized portions of Brownsville to be dispersed to a less populated area, reducing gas emissions, traffic incidents, noise, and other issues related to truck traffic in populated areas. SH 32E will also better connect the rural section of Brownsville to more populated areas and employment hubs.

The Brownsville region's economy is heavily dependent on Texas' extensive highway, port, and rail network, and it is vital that TxDOT target improvements that hold the greatest potential for long-term, system-wide impacts.

A. DETAILED PROJECT DESCRIPTION

The SH 32E project, which is currently in the preliminary design and environmental review process, includes the eastern portion of the SH 32 project. The western segment of the project runs from Interstate 69E (I-69E)/U.S. Highway (US) 77/83 at the Veterans International Bridge to FM 1419. The total SH 32 project is approximately 13 miles long.

The SH 32E project is approximately 6.6 miles long and includes approximately three miles of new location highway. The remaining portions of SH 32E would be acquired from the re-designation of portions of FM 1419. Figure 1 provides a map of the proposed project location.

Figure 1. Project Location Map

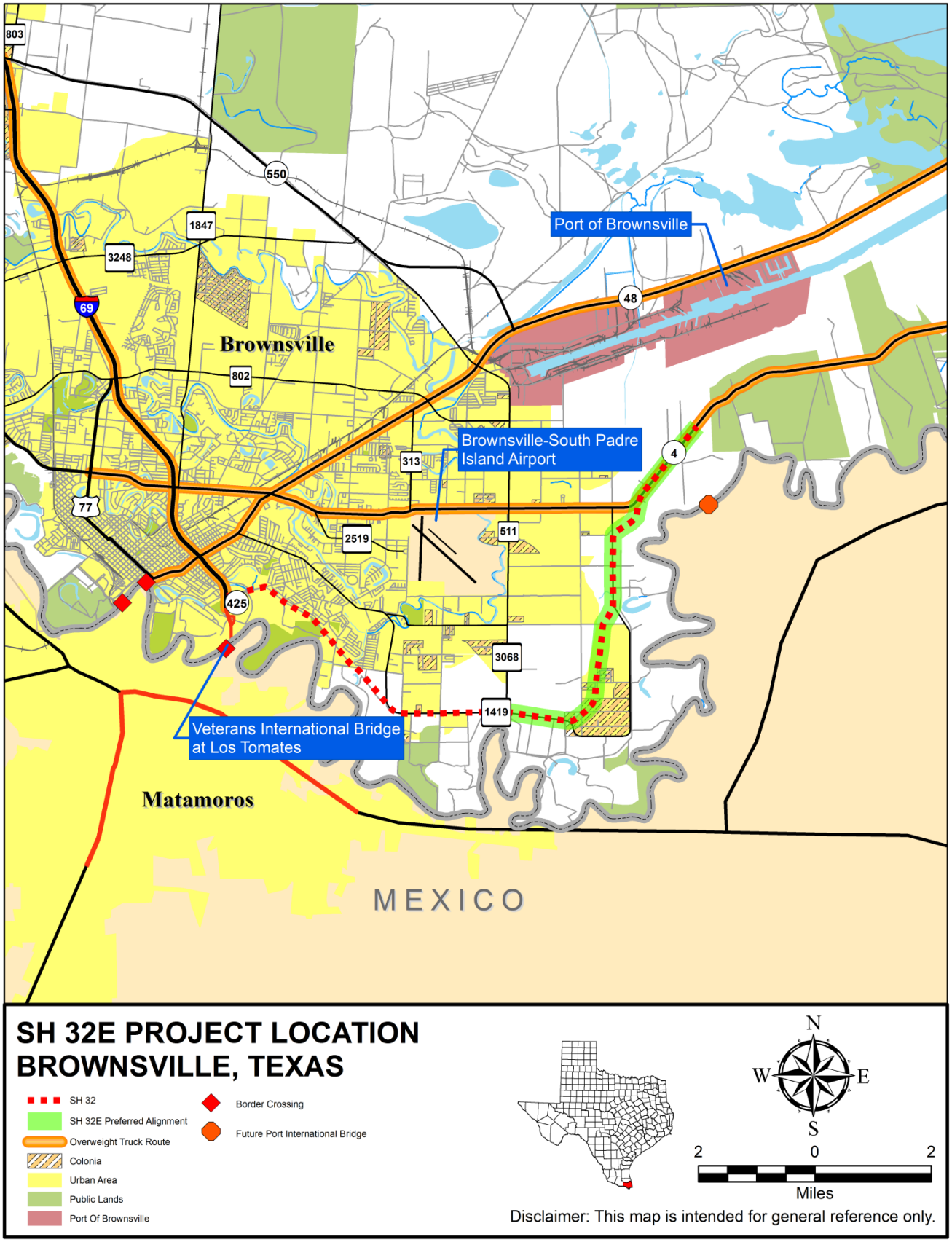
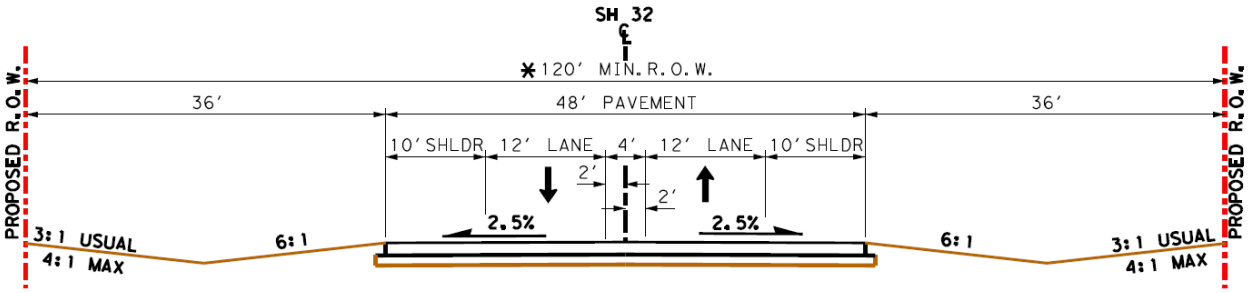


Figure 2. Interim Configuration Proposed Typical Section



This project will complete the interim configuration for SH 32E, consisting of two 12-foot wide mainlanes (one in each direction), a four-foot center median, and two 10-foot wide shoulders. The roadway will be constructed to accommodate overweight trucks. The proposed typical section is shown in Figure 2.

Ultimately, SH 32E will consist of four 12-foot wide mainlanes (two in each direction), a four-foot wide median, and one 10-foot wide shoulder in each direction, though this ultimate configuration is not included in the project for which funding is being requested.

The SH 32E project will help reduce congestion on I-69E/US 77/83, SH 48, and SH 4 by providing an additional travel route. This project is of particular importance to the region because it will provide an additional, rural route for overweight trucks that currently travel through urbanized areas of Brownville. A direct connection to the Port of Brownsville via SH 32 is also proposed to provide direct access for trucks traveling to and from the Port and the Veterans International Bridge. Additionally, SH 32E will be utilized by local, regional and international passenger vehicles traveling through the Brownsville region for work, livelihood, and entertainment.

B. TRANSPORTATION CHALLENGES AND SOLUTIONS

The SH 32E project is needed to provide connectivity to southeast Brownsville, which is currently inadequate. The inadequate connectivity particularly impacts trucks that are required to use SH 4 and SH 48, which pass through heavily populated portions of Brownsville and disturb communities on their way to the Port of Brownsville, the Brownsville/South Padre Island International Airport, and the Veterans International Bridge. In addition, the population of Brownsville is anticipated to increase and lead to an increase in congestion on the local transportation system.

The SH 32E project will reduce truck volumes and congestion on surrounding local roads by providing an alternative route designed to accommodate heavy loads. The SH 32E project is proposed in a rural portion of Brownsville and will be designated as an overweight truck corridor. This designation will allow the trucks currently passing through urbanized portions of Brownsville to be dispersed to a less populated area, reducing gas emissions, traffic incidents, noise, and other issues related to truck traffic in populated areas. SH 32E will also better connect the rural section of Brownsville to more populated areas and employment hubs.

C. LADDERS OF OPPORTUNITY

The SH 32E project promotes Ladders of Opportunity through connectivity to employment destinations and through job creation as summarized in Table 1. Additional details on how the project promotes opportunities of connection, work, and revitalization are discussed throughout this application.

Table 1. Project's Promotion of Ladders of Opportunity

Opportunity	How does the project meet this opportunity?
Connect	The project is a state highway that will provides free access to major trade and employment centers. The project will not only provide enhanced connectivity among three major trade hubs, but it will also provide employees and visitors with access to these destinations.
Work	Both TxDOT and Cameron County Regional Mobility Authority (CCRMA) encourage a diverse workforce through the required participation of disadvantaged businesses in engineering and construction activities. During construction, the SH 32E project will create jobs for local workers and businesses. In addition, the project will help enhance the region's ability to increase trade activities, which would result in the need for more employees at the Port, Airport, trucking companies, and other local and regional businesses.
Revitalize	The SH 32E project will enhance the connectivity of rural parts of Brownsville to the urbanized areas. Better connectivity will provide these rural areas with the opportunity to attract more services, businesses, and residential developments, particularly because these areas will be along a new trade corridor.

II. PROJECT LOCATION

As noted in the Detailed Project Description section, the SH 32E project is located in Brownsville, Cameron County, Texas. The project is located in a region known as the Lower Rio Grande Valley, which encompasses Cameron, Hidalgo, and Willacy counties.[1] The proposed SH 32E project is mainly located in a rural portion of the city with approximately 1.8 miles of the project located in the Brownsville Census Urbanized Area (ID 10972). The remaining portion of the 6.6-mile project (approximately 73 percent) is located within a rural area and therefore qualifies the project as being designated as a rural area. Figure 1 (previously shown) provides a map of the proposed project location and includes outlines of the Census Urbanized Area and existing and proposed transportation connection.

Several existing and proposed transportation facilities are located in the vicinity of the SH 32E project. Major roadways include I-69E/US 77/US 83, SH 4, FM 522, Browne Road, and Dockberry Road. Table 2 below provides the 2013 and 2033 Annual Average Daily Traffic (AADT) for SH 32E and SH 32W from TxDOT's Transportation Planning and Programming (TPP) Division. Table 3 provides the 2013 and 2033 AADT volumes for the existing segments of SH 32E that will be re-designated upon completion of the project.

[1] Lower Rio Grande Valley Development Council. Retrieved from http://www.lrgvdc.org/.

Table 2. Annual Average Daily Traffic for SH 32 in Vehicles per Day

Roadway	Limit From	Limit To	2013 ADT	2033 ADT	2013 ADT Truck Percentage	Proposed Truck Traffic Percent Increase from 2013 to 2033
SH 32E	East Avenue	Port of Brownsville	8,700	12,200	15.3	40.3
SH 32W	US 77/83	East Avenue	21,800	30,400	9.9	39.5

Table 3. Annual Average Daily Traffic for Existing Portions of SH 32E in Vehicles per Day

Roadway	Limit From	Limit To	2013 AADT	2033 AADT	2013 24 Hour Truck Percentage
FM 1419	Dakota	FM 3068	2,223	3,110	24.9
FM 1419	FM 3068	Browne Avenue	1,481	2,070	24.9
FM 1419	Browne Avenue	Dockberry Road	463	640	24.6
FM 1419	Dockberry Road	SH 4	1,024	1,430	24.9
SH 4	FM 1419	1.2 miles within Lower Rio Grande Valley National Wildlife Refuge	285	390	10.5
SH 4	1.2 within Lower Rio Grande Valley National Wildlife Refuge	Ship Channel Access Road	210	290	8.5

In addition to major roadways, the Brownsville/South Padre International Airport, the Port of Brownsville, Veterans International Bridge to Matamoros, Mexico, and Foreign Trade Zone 62 are located near the SH 32E project.

According to the 2010 Census, the city of Brownsville had a population of 175,023, and the project area (Census Tracts 127 and 141) had a population of approximately 17,544. The majority (approximately 88 percent) of residents in Brownsville are Hispanic or Latino, and the median household income from the Census 2010 was $32,288. According to 2009-2014 American Community Survey, approximately 36 percent of all people in Brownsville had incomes below the U.S. Census poverty level. Table 4 provides the population and employment estimates for the project area, city of Brownsville, Cameron County, and the Brownsville Metropolitan Planning Area (BMPO) (including the cities of Brownsville and Los Fresnos, and the town of Rancho Viejo).

Table 4. Population and Employment Characteristics

Geographic Area	2000[1]		2010[2]		2040	
	Population	Employment*	Population	Employment*	Population Forecast	Employment Forecast
Project Area	9,129	3,126	17,544	6,352	–	–
City of Brownsville	139,722	50,622	175,023	67,525	291,995[3]	–
Cameron County	335,227	123,112	406,220	150,626	641,376[3]	–
Brownsville Metropolitan Planning Area[5]	–	–	226,282	87,422	425,723	183,099

Sources:
[1]2000 U.S. Bicentennial Census
[2]2010 U.S. Bicentennial Census
[3]Texas Water Development Board, 2016 Regional Water Plan
[5]2015-2040 Brownsville Metropolitan Transportation Plan
*Employment numbers shown represent the number of individuals over the age of 16 that are within the workforce.

The 2015 Brownsville Economic Development Council identified the major employers to be in the education, government, manufacturing, retail, and medical/healthcare industries. The top five employers in the city included the Brownsville Independent School District, Cameron County, University of Texas (UT) Rio Grande Valley, Keppel Amfels, and Wal-Mart.[2] Another notable industry that is new to Brownsville is the aeronautical industry due to the recent construction of the SpaceX commercial rocket launch facility.

As noted above, the SH 32E project is in close vicinity to the Port of Brownsville, Brownsville/South Padre Island International Airport, and the Veterans International Bridge. These three locations are the major hubs of trade for the Brownsville region and the nation. The economic importance of these hubs and the region has continually increased since the introduction of the North American Free Trade Agreement (NAFTA) and is anticipated to increase in the future along with the increased need for trucks. Each hub is described in further detail below.

[2] Brownsville Economic Development Council. "Top 20 Employers." Retrieved at http://www.bedc.com/sites/default/files/files/Data%20Center/Section%202_2%20-%20Top%2020%20Employers.pdf.

The Port of Brownsville is a deep-water port located less than three miles from the U.S./Mexico border. In 2014, the Port had 7.6 million tons of cargo, which was the highest amount in ten years. The most tons moving through the Port were liquid cargo (3.25 million tons) and dry-break bulk/steel (2.99 million tons). The Port is included in Foreign Trade Zone 62, which is a specialized area that provides national and international companies with economic and tax benefits and is an attractive location for global businesses. The Zone has consistently ranked third in the nation for exports.[3] The SH 32E project provides an essential opportunity for the Brownsville economy by providing direct access to the Port of Brownsville. SH 32 will also connect the Port to the Veterans International Bridge.

The Brownsville/South Padre Island International Airport is another major trade and traffic hub in the Brownsville region. The Airport provides passenger and cargo transport, including over 80,000 passengers and 3 million pounds of cargo in 2014.[4] Currently, the Airport is planning an expansion that will allow it to intake more passengers and cargo. The SH 32E project will improve connectivity to the airport, and this will help move more air cargo into and out of the Airport.

The last major trade hub in the region is the Veterans International Bridge, which serves as a gateway of trade between the U.S. and Mexico and is part of the National Highway Freight Network. According to the Cameron County International Bridge System, approximately 700 trucks per day on average crossed the Bridge.[5] The SH 32 project's connection to the Veterans International Bridge is critical in successfully moving goods to and from maquiladoras, which are Mexican factories that assemble products.[6]

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[3] Port of Brownsville. "Facts." Retrieved from http://www.portofbrownsville.com/facts/.
[4] Brownsville Economic Development Council. "Trade Activity – Brownsville/South Padre Island International Airport." Retrieved from http://www.bedc.com/sites/default/files/files/Data%20Center/Section%203_1%20-%20BRO%20Airport.pdf.
[5] Cameron County (2014). "International Toll Bridge System." Retrieved from http://www.co.cameron.tx.us/document_center/IAR2014.pdf.
[6] Texas State Historical Society (2010). "Maquiladoras." *Handbook of Texas Online*. Retrieved from http://www.tshaonline.org/handbook/online/articles/dzm02.

III. PROJECT PARTIES

> "The Brownsville MPO has supported development of S.H. 32 (East Loop) for several reasons. It will cut travel times to and from the Port of Brownsville, where most of the Mexican deliveries (cargoes) originate or are destined. Also, the East Loop will constitute a safer route for such cargoes. Several schools are located on S.H. 4 and the new route (S.H. 32) will avoid these locations."
>
> *Brownsville MPO 2015-2040 Metropolitan Transportation Plan*

The SH 32E project has wide-ranging support and input from local, regional, and national parties. The project's grant recipient would be the TxDOT Pharr District, which is responsible for executing the regional responsibilities of TxDOT. The other major party involved with the SH 32E project is the Cameron County Regional Mobility Authority (CCRMA).

TxDOT and CCRMA work hand-in-hand with TxDOT owning and operating SH 32E and providing funding for construction. CCRMA has been responsible for the preliminary engineering and environmental review process, and it will continue to act as developer until construction is complete.

Additional parties involved with the SH 32E project include the City of Brownsville, Cameron County, the BMPO, Brownsville Navigation District, the Brownsville/South Padre Island International Airport, and the Lower Rio Grande Development Council, which provide input on the project. Letters of support, included in Appendix F, show wide ranging support for the project amongst government, private, and interdisciplinary sectors.

IV. GRANT FUNDS AND SOURCES/ USES OF PROJECT FUNDS

TxDOT is requesting $8.1 million from the TIGER Discretionary Grant program. The grant funds will be used to construct the SH 32E interim configuration and costs. Funding splits are described in Table 5. TxDOT and CCRMA will provide approximately 72 percent of the $29.4 million total cost of the project through the Categories 3 and 11 state funding mechanisms, which are discussed in further detail in the Financial Feasibility section. In addition, CCRMA has provided over $4 million for preliminary schematics, a value engineering study, and environmental documentation. CCRMA also submitted a $45 million request for the FASTLANE Grant program for the construction of both segments of SH 32 that extend beyond the limits defined for this SH 32E project, which was submitted on April 14, 2016, but is not included under the matching requirements for this TIGER Discretionary Grant application.

Table 5. Funding and Component Splits

			Funding Source			
Project Component	**Component Cost**	**Component Percentage**	**TIGER**	**TxDOT Category 3**	**TxDOT Category 11**	**CCRMA**
Plans, Specifications, Estimates (PS&E)	$2,943,948	10%	$0	$2,943,948	$0	$0
Construction	$20,702,230	70%	$8,117,793	$12,584,437	$0	$0
Construction Contingency	$2,070,220	7%	$0	$371,615	$1,698,605	$0
Utility Relocations/ Adjustments	$2,277,250	8%	$0	$0	$2,277,250	$0
Right-of-Way Acquisition	$1,424,145	5%	$0	$0	$424,145	$1,000,000
TOTAL	**$29,417,793**	**100%**	**$8,117,793**	**$15,900,000**	**$4,400,000**	**$1,000,000**
Percentage of Project		100%	27.6%	54.0%	15.0%	3.4%

V. SELECTION CRITERIA

The SH 32E project successfully aligns with both the primary and secondary TIGER Discretionary Grant criteria as summarized in Table 6.

Table 6. Summary of Qualifications for Selection Criteria

Evaluation Criterion	Does the Project Meet this Criterion?	How does the Project Meet this Criterion?
Safety	✓	Reduces truck conflicts with passenger vehicles and pedestrians in the urbanized portions of Brownsville
State of Good Repair	✓	Disperses passenger vehicle and truck traffic to a new route thus lessening the strain on the surrounding transportation system
Economic Competitiveness	✓	Provides an additional trucking route between major trade hubs, which allows for increased trucking traffic and improvement to the local and regional economy
Quality of Life	✓	Reduces truck pollution, noise, and conflicts in communities, school zones, and other urban portions of Brownsville
Environmental Sustainability	✓	Protects wildlife and reduces vehicle emissions in the region
Innovation	✓	Implements innovative intersection design and funding
Partnership	✓	Collaborates amongst numerous local, regional, and state partners

The following sections provide detailed information on how the project meets each criterion.

A. PRIMARY SELECTION CRITERIA

1. Safety

The SH 32E projects will provide many safety benefits to the Brownsville region. The main benefit to the region is providing an alternative route for truck traffic. SH 32E will help reduce the number of trucks traveling through urbanized portions of Brownsville on SH 4 and SH 48. Currently, trucks using SH 4 and SH 48 pass through school zones, communities, and other population centers. The alternative route provided by SH 32E will allow trucks to move from these population centers to more rural areas. Fewer trucks in urbanized Brownsville will result in fewer truck conflicts with passenger vehicles and pedestrians, less idling at traffic signals, reduced noise, fewer hazardous materials, and reduced travel times for emergency responders due to less congestion. The project is estimated to save approximately $100 million over the 20-year life cycle of the project due to a reduction in accidents.

2. State of Good Repair

The SH 32E project is a new roadway facility that will help enhance the condition and resiliency of the existing transportation system in the Brownsville region and throughout the Rio Grande Valley by providing an additional thoroughfare for trucks and passenger vehicles. The SH 32E project identified in this grant is consistent with the BMPO's 2015-2040 Metropolitan Transportation Plan[7] and the 2015-2018 Statewide Transportation Improvement Program (STIP). An excerpt is found in Appendix E.[8]

Based on TxDOT TPP Division's Statewide Planning Map, trucks make up an average of 20 percent of traffic along the existing portions of SH 32E, including FM 1491. Without the proposed construction of SH 32E, the surrounding transportation facilities will struggle to meet the demands of truck traffic in the region. As noted earlier, the Brownsville region has continually increasing truck traffic. International goods movement and associated jobs has continued to increase since the introduction of NAFTA. The Port of Brownsville, the Brownsville/South Padre Island International Airport, as well as several regional private entities such as warehouses, are planning expansions that will promote continued economic development

[7] Brownsville Metropolitan Planning Organization 2015-2040 Metropolitan Transportation Plan located at https://docs.google.com/viewer?a=v&pid=sites&srcid=Y29iLnVzfG1wb3xneDo0MTAxNDk2OGE1NTY0M2I0.
[8] TxDOT 2015-2018 STIP located at http://ftp.dot.state.tx.us/pub/txdot-info/tpp/stip/2015-2018/highway/pharr.pdf.

in the region. There would be a noticeable impact on truck travel times, job and economic growth, and ancillary residential development associated with more jobs if SH 32E was not developed because growth would be inhibited due to the lack of an additional roadway.

Additionally, SH 32E would provide a more efficient travel route for trucks and passenger vehicles by bypassing the existing traffic signals and school zones located along SH 4, SH 48, and FM 1419. Due to its proximity to the Gulf Coast, SH 32 would also provide an evacuation route for travelers from South Padre Island and other coastal communities in the event of a natural disaster or other major emergency.

3. Economic Competitiveness

The SH 32E project will provide a more efficient and reliable route for trucks traveling in the Brownsville region. The lack of traffic signals and school zones, as well as a more direct and less congested route to and from the Port of Brownsville and the Veterans International Bridge, will help trucks move more quickly through the region, reducing travel costs. The Brownsville region is anticipating an increase in goods movement from the Port of Brownsville, Brownsville/South Padres Island International Airport, and Mexico. An anticipated increase in goods movement is due in part to the following activities within the Brownsville region: the expansion of the Port and Airport; construction of the SpaceX facility; construction of three liquefied natural gas plants; development of a 17,000-acre manufacturing corridor; and a new medical school.[9]

Without the SH 32E project, the region will experience increasing truck traffic without an alternative route to local roadways such as the I-69E/US 77/83 Expressway. Passenger vehicles traveling locally and internationally will also experience reduced travel times with the reduced number of trucks using local roadways.

Additionally, the SH 32E project will better connect colonias neighboring the proposed project. Colonias are low-income residential areas typically found along the Texas/Mexico border that usually do not have access to services such as sewage, water, or electricity.[10] These colonias will have the opportunity to have greater access to urbanized portions of Brownsville and employment centers such as the Port of Brownsville and the Brownsville/South Padre Island International Airport.

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[9] Brownsville Economic Development Council. "Our Focus." Retrieved from http://www.bedc.com/our-focus.
[10] Texas Secretary of State. "What is a Colonia?" Retrieved from http://www.sos.state.tx.us/border/colonias/what_colonia.shtml

The addition of SH 32E will also allow the Brownsville region to remain competitive in the regional, national, and global economies by providing a reliable and efficient route to increase the current cargo capacity in the region. The ability for the region to move additional cargo also helps boost the economy by providing more regional jobs in industries such as trucking, logistics, and manufacturing.

4. Quality of Life

The SH 32 project, including the east and west segments, is identified in the "Transportation Plan Element" of the *Imagine Brownsville Comprehensive Plan* as a short term strategy for improving the regional roadway system.[11] The SH 32E project will provide an additional transportation route for passenger vehicles and trucks. This alternative route helps dissipate truck traffic from the more heavily populated areas where SH 4 and SH 48 are located. This will help move some of the inconveniences associated with truck traffic, such as noise, pollution, and driver discomfort around trucks, to a less populated location of Brownsville. In addition, there are many schools and community facilities located in the vicinity of the current truck corridors. As noted earlier, SH 32E will be located mostly in a rural and sparsely populated area, which will not heavily interfere with community facilities.

Table 7 below describes how the SH 32E project is applicable to the U.S. Department of Housing and Urban Development and Environmental Protection Agency's Livability Principles.

[11] City of Brownsville (2009). "Transportation Plan Element." Retrieved from https://drive.google.com/file/d/0B9WiKrzArJiaTG80d3djbll3b2c/view?pref=2&pli=1

Table 7. Applicability with Livability Principles

Livability Principle	How does the project meet the principle?
1. Provide more transportation choices.	The SH 32E project will provide an additional thoroughfare through southeast Brownsville.
2. Promote equitable, affordable housing.	Although the SH 32E project will not be directly involved in housing, it will allow for colonias and other rural section of southeast Brownsville to have increased connectivity to goods and services located in urbanized portions of Brownsville.
3. Enhance economic competitiveness.	The project will provide an additional route for trucks, which can increase the amount of trucked cargo moving through the region, including to employment centers such as the Port of Brownsville and Brownsville/South Padre Island International Airport.
4. Support existing communities.	The SH 32E project will help better connect existing rural communities, including the colonias, to urbanized areas. In addition, the road could provide an opportunity for growth in the rural portions of the project area.
5. Coordinate policies and leverage investment.	The SH 32 project has been continually coordinated amongst various parties including TxDOT, CCRMA, the Port of Brownsville, and others to ensure that the interest of participating parties are aligned. Not only does the project offer an opportunity to continue increasing trade in the region, but it also provides an opportunity to include a thoroughfare for future growth.
6. Value communities and neighborhoods.	By providing an alternative truck route, the SH 32E project will help enhance the health and safety of communities by reducing the number of trucks in more populated locations of Brownsville. The project will also better connect colonias to the urbanized portions of Brownsville.

5. Environmental Sustainability

The Brownsville region is home to a vast array of unique wildlife and vegetation. This is evidenced by the number of managed areas in the region established to protect the unique and vulnerable wildlife populations. The SH 32E project abuts the Audubon Society's Sabal Palm Grove Sanctuary, the Lower Rio Grande Valley National Wildlife Refuge, the Nature Conservancy's Lennox Foundation Southmost Preserve, and the Texas Parks and Wildlife Department's Las Palomas Wildlife Management Area.

As part of the SH 32E project, the project team will be implementing voluntary conservation measures for the Gulf Coast jaguarondi (*Herpailurus yagouaroundi cacomitli*) and the ocelot (*Leopardus pardalis*), which are endangered species found throughout the region. These voluntary measures, which were approved by the U.S. Fish and Wildlife Service (USFWS), include wildlife/cat crossing, limiting construction to daylight hours, minimizing clearing of vegetation to only when necessary, and limiting roadway lighting to intersections and where necessary for safety.

In addition to the wildlife mitigation efforts, the project will also help improve air quality on SH 4 and SH 48 by reducing the number of trucks traveling on the roadway. The project is estimated to result in over $950,000 emission reduction savings.

B. SECONDARY SELECTION CRITERIA

1. Innovation

The SH 32E project will utilize the Continuous Green T Intersection, which is an advanced design that provides benefits to vehicles traveling along SH 32E. The Continuous Green T Intersection allows mainlane traffic to flow freely through three-way intersections without stopping. Turning vehicles have a dedicated turning lane, which allows for free flow for mainlane traffic. According to the Federal Highway Administration (FHWA), Continuous Green T-Intersections can reduce turning angles, crashes, and severity of injuries compared to traditional T intersections.[12]

In 2015, Cameron County implemented the Countywide Transportation Reinvestment Zone, which was the first of its kind in Texas. By making the entire county a transportation priority, Cameron County can take a percentage of the local taxes and transfer the funds to CCRMA for transportation projects to ensure a reliable revenue stream for CCRMA.

2. Partnership

The SH 32E project has strong support from local, state, and national partners. TxDOT, in conjunction with CCRMA, has worked diligently to build consensus on the pressing need in the Brownsville region for the new facility. TxDOT and CCRMA have worked hand-in-hand on the SH 32E project, which will be developed through a collaborative cost sharing initiative.

Other project partners include the Brownsville Navigation District, the BMPO, state legislators, and local and county officials. Letters of support, included in Appendix F, show wide ranging support for the project amongst government, private, and interdisciplinary sectors.

[12] Federal Highway Administration (2010). "Continuous Green T-Intersections." Retrieved from http://safety.fhwa.dot.gov/intersection/innovative/others/casestudies/fhwasa09016/fhwasa09016.pdf.

VI. RESULTS OF BENEFIT-COST ANALYSIS

A Benefit-Cost Analysis (BCA) was conducted in conformance with US DOT guidance to assess the impacts of the SH 32E project. The grant request is for design and construction, as well as the required right-of-way (ROW) acquisition and utility relocations. The BCA conducted for the SH 32E project indicated a *favorable* benefit/cost (B/C) ratio, with the monetized benefits of the project exceeding the estimated project-related costs. In the summary discussion to follow, individual analysis inputs and results are presented for the BCA.

The 2016 Cal-B/C TIGER Grant Application version of a model developed by the California Department of Transportation (Caltrans) was used for the SH 32E project. This version incorporates project costs by category and benefits related to travel time, vehicle operation, accidents, and emissions. The model incorporated the parameter updates, including unit values emissions, accidents, and other factors made by Caltrans to reflect USDOT guidance for 2016 TIGER grants. The default values were used unless otherwise stated. The average fuel price was updated to reflect the average price in Brownsville, Texas.[13] A summary of the BCA results are provided in this section and more detail regarding the inputs, sources, analysis, and results is provided in Appendix C. All monetary values were adjusted to 2015 dollars, the default value of the "2016 TIGER" version of the Cal B/C model, based on the Gross Domestic Product Price Index, unless otherwise stated. A seven percent discount rate was used to compute net present values of benefits and costs.

Note that there are other potential benefits resulting from the project which have not been included in the BCA analysis summarized below. Some of these additional benefit classes could potentially be quantified, while others are more qualitative. The additional benefits include, but are not limited to: improved travel time reliability, reduced bottleneck delays, increased access and/or mobility, public safety and health benefits, improvements to the human and natural environment surrounding the project, mitigation of stormwater runoff, and noise reduction. Because the Cal-B/C model indicates a favorable B/C ratio with only the four benefit categories directly supported by the model, these additional benefit categories were not analyzed at this time.

[13] Average price of fuel in Brownsville, Texas as of 04/20/2016 retrieved from www.texasgasprices.com.

A. Benefit-Cost Analysis

The Cal B/C model calculates the benefit/cost ratio based on inputs including the type of project, existing and future highway design and traffic data, and estimated project costs. Table 8 provides a summary of the Cal B/C results for the SH 32E project.

Table 8. Itemized Benefits, Present Value

	SH 32E
Life-Cycle Benefits (million dollars)	$52.4
Life-Cycle Costs (million dollars)	$33.9
Benefit / Cost Ratio	**1.54**

Note: 2015 dollars, 20-year life cycle

Figures 3 and 4 graphically depict the share by category of total project life-cycle benefits and total project life-cycle costs associated with the SH 32E project, as discussed in more detail in the following sub-sections.

Figure 3. Itemized Benefits, Present Value

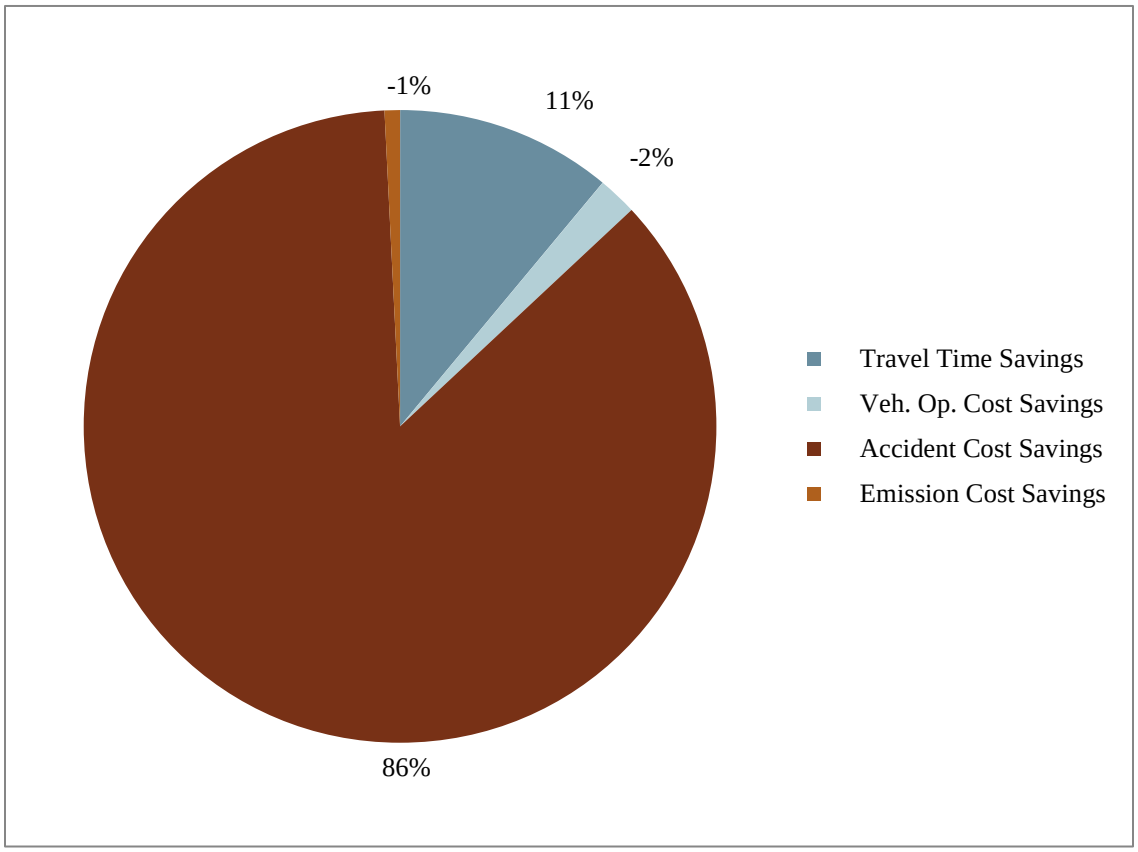


Figure 4. Project Costs, Present Value

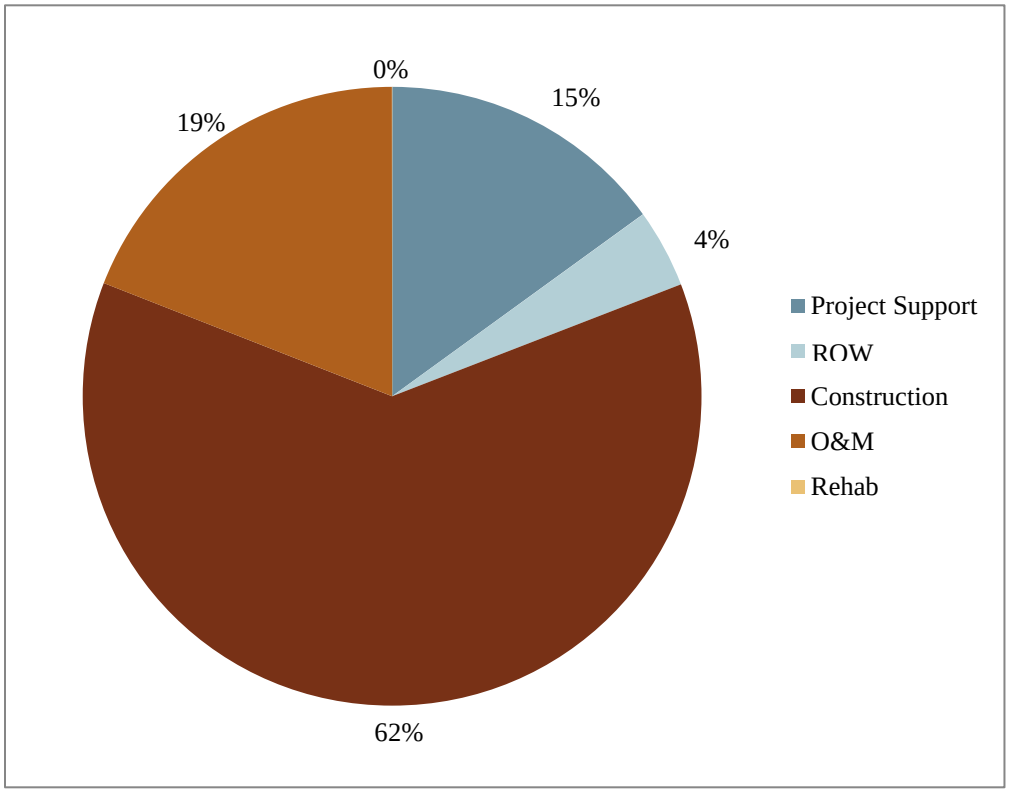


Table 9 provides a general overview of the SH 32E project parameters, as described elsewhere in this application in more detail.

Table 9. Project Matrix

	SH 32E
Current Status / Baseline & Problem to be Addressed	The SH 32E project is needed because there is inadequate connectivity to southeast Brownsville where port-related trucks and other traffic create congestion on surrounding local roads.
Change to Baseline / Alternatives	The construction of SH 32E will provide faster and more reliable access to the Port of Brownsville. By providing an alternative route designed to accommodate heavy loads, the project will reduce the total number of overweight trucks and other cargo vehicles travelling through the City of Brownsville.
Type of Impacts	By diverting traffic from the existing street network to a new divided highway, the project is expected to reduce travel time and improve safety.
Affected Population	The project is expected to accommodate 8,700 vehicles per day (2013 estimate), growing to 21,200 by 2033.
Economic Benefit	The Cal-B/C model indicates that the project will result in travel time, vehicle operating cost savings, emissions reductions, and safety benefits.
Summary of Results	The project's monetized benefits exceed its costs with a benefit-cost ratio of more than 1.5 using conservative assumptions.

B. PROJECT COSTS

Project costs and the length of the construction period were entered into the Cal B/C model. Project costs are included in the following categories, as appropriate: Project Support (includes engineering and utility relocation), Right-of-Way (ROW) acquisition, Construction, and Maintenance/Operations.

The initial design and construction costs for the SH 32E project are approximately $29.4 million as described in more detail in the Grant Funds and Sources/ Uses of Project Funds section of this application. The design and construction period is assumed to be two years, beginning in 2017. Annual construction expenditures were assumed to be allocated proportionally over the 14 months of construction. The total project cost in present value terms including maintenance/operations is $33.9 million. The breakdown of project costs as reflected in the Cal B/C analysis is indicated in Table 10 below.

C. MONETIZED BENEFITS

Table 11 provides a summary of the monetized benefits for travel time savings, vehicle operating costs savings, accident savings, and emissions reduction over the 20-year life cycle of the project that are reflected in the B/C ratio. Annual costs and benefits are presented in constant 2015 dollars. The total by category is then discounted at a seven percent annual rate to convert to present value. More information regarding the input assumptions and data sources underlying these annual benefit totals is provided in Appendix B.

The Cal-B/C model calculates $12.8 million in travel time savings. The model projects $100 million in accident savings due to the change in roadway classification between the build and no-build scenarios.

Table 10. Project Costs

Year	Project Year	Undiscounted						Discounted
		Project Support	ROW	Construct	O&M	Rehab.	Total Costs	PV Costs
2018	Cons 1	$5,221,000	$1,424,000	$3,253,000			$9,898,000	$9,898,000
2019	Cons 2			$19,518,000			$19,518,000	$18,241,121
2020	1				$584,000	$ -	$584,000	$510,088
2021	2				$584,000	$ -	$584,000	$476,718
2022	3				$584,000	$ -	$584,000	$445,531
2023	4				$584,000	$ -	$584,000	$416,384
2024	5				$584,000	$ -	$584,000	$389,144
2025	6				$584,000	$ -	$584,000	$363,686
2026	7				$584,000	$ -	$584,000	$339,893
2027	8				$584,000	$ -	$584,000	$317,657
2028	9				$584,000	$ -	$584,000	$296,876
2029	10				$584,000	$ -	$584,000	$277,454
2030	11				$584,000	$ -	$584,000	$259,303
2031	12				$584,000	$ -	$584,000	$242,339
2032	13				$584,000	$ -	$584,000	$226,485
2033	14				$584,000	$ -	$584,000	$211,668
2034	15				$584,000	$ -	$584,000	$197,821
2035	16				$584,000	$ -	$584,000	$184,879
2036	17				$584,000	$ -	$584,000	$172,785
2037	18				$584,000	$ -	$584,000	$161,481
2038	19				$584,000	$ -	$584,000	$150,917
2039	20				$584,000	$ -	$584,000	$141,044
Total (2015$)		**$5,221,000**	**$1,424,000**	**$22,771,000**	**$16,000,000**	**$ -**	**$11,680,000**	**$33,921,275**

Table 11. Project Benefits

Year	Project Year		Undiscounted				Discounted
		Travel Time Savings	Vehicle Operating Cost Savings	Accident Reduction Savings	Emissions Reduction Savings	Total Benefits	PV Benefits
2021	1	$543,603	($97,632)	$4,241,742	($33,404)	$4,654,309	$4,065,254
2022	2	$553,873	($99,477)	$4,321,883	($34,848)	$4,741,432	$3,870,421
2023	3	$564,144	($101,321)	$4,402,024	($36,347)	$4,828,499	$3,683,639
2024	4	$574,414	($103,166)	$4,482,165	($37,903)	$4,915,510	$3,504,691
2025	5	$584,685	($105,010)	$4,562,306	($39,519)	$5,002,461	$3,333,351
2026	6	$594,955	($106,855)	$4,642,447	($41,196)	$5,089,351	$3,169,392
2027	7	$605,226	($108,700)	$4,722,588	($42,937)	$5,176,177	$3,012,582
2028	8	$615,496	($110,544)	$4,802,728	($40,233)	$5,267,447	$2,865,142
2029	9	$625,767	($112,389)	$4,882,869	($42,049)	$5,354,198	$2,721,803
2030	10	$636,037	($114,233)	$4,963,010	($43,937)	$5,440,877	$2,584,921
2031	11	$646,308	($116,078)	$5,043,151	($45,901)	$5,527,480	$2,454,267
2032	12	$656,578	($117,923)	$5,123,292	($47,942)	$5,614,005	$2,329,613
2033	13	$666,848	($119,767)	$5,203,433	($50,065)	$5,700,449	$2,210,733
2034	14	$677,119	($121,612)	$5,283,574	($52,272)	$5,786,809	$2,097,406
2035	15	$687,389	($123,456)	$5,363,715	($54,566)	$5,873,082	$1,989,416
2036	16	$697,660	($125,301)	$5,443,855	($56,950)	$5,959,264	$1,886,550
2037	17	$707,930	($127,146)	$5,523,996	($59,429)	$6,045,353	$1,788,602
2038	18	$718,201	($128,990)	$5,604,137	($62,005)	$6,131,343	$1,695,368
2039	19	$728,471	($130,835)	$5,684,278	($64,682)	$6,217,233	$1,606,651
2040	20	$738,742	($132,679)	$5,764,419	($67,464)	$6,303,018	$1,522,261
Total (2015$)		**$12,823,445**	**($2,303,112)**	**$100,061,612**	**($953,646)**	**$109,628,299**	**$52,392,063**

VII. PROJECT READINESS

A. TECHNICAL FEASIBILITY

The SH 32E project is in the project development phase. The studies to date include alternatives analysis, draft Environmental Assessment, schematics, and value engineering for the ultimate project configuration. All of the studies and documentation have and will continue to follow state and federal standards, design criteria, and requirements.

As noted, the project is a proposed two-lane facility from the intersection of FM 1419 and FM 3068 to SH 4/Port of Brownsville and includes a four-foot wide median with one 10-foot wide shoulder in each direction. Additional scope items in the project include:

- Project development activities, such as final design of plans, specifications, and estimates (PS&E) for the project limits;
- Project construction activities, including installation of roadway, drainage improvements, bridge elements, signage/pavement markings, and other ancillary construction items;
- Relocation and adjustment of existing underground and overhead utilities in areas of conflict within the project through coordination with existing utility owners; and
- Acquisition of ROW for the project limits.

Risk assessment has been and will continue to be an ongoing process through the project duration. During the advanced planning and development phase of the project, part of the risk assessment took shape in the form of an alternatives analysis. Several alternatives were developed for the project and assessed based on environmental impacts, cost, ROW acquisition/relocation and requirements, and community impacts. Mitigation strategies included continuous outreach to the communities involved through public meetings, stakeholder meetings, and early coordination with regulatory agencies.

The greatest risks currently associated with the project are the environmental impacts and ROW acquisition. The primary environmental risk for the SH 32E project is the potential for impacts to wildlife. Mitigation included the placement of wildlife crossings at designated areas along the route, which started with the early coordination with USFWS. The wildlife crossings are identified, and associated costs have been included in the latest cost estimates.

Mitigation in regards to ROW acquisition is the continuous outreach to the affected property owners. One-on-one meetings with affected property owners have been made available at owners' requests in an effort to reduce any delays to the ROW acquisition schedule. These meetings are documented in the Environmental Assessment documents in Appendix A. Another mitigation strategy that was completed was the implementation of a value engineering study report, which can be seen in Appendix B. Through this process the ROW footprint was decreased, which reduced the number of properties affected as well as created a reduction in the

project's cost. The value engineering study also developed strategies to reduce the overall construction cost of the project.

B. FINANCIAL FEASIBILITY

The project's overall costs were developed from anticipated expenditures based on schematic-level project design, environmental document findings, and a value engineering study to reduce construction and ROW acquisition costs. A contingency of 10 percent was implemented for the construction costs, which is an acceptable level of contingency relative to similar construction activities. The detailed budget breakdowns for the final design, construction, utility relocations/adjustments, and acquisition of ROW are provided in Table 12.

Table 12. Detailed Project Budget

Project Component	Amount
Plans, Specifications, Estimates (PS&E)	$2,943,948
Construction	
Grading	$3,447,000
Small Drainage Structures (Culverts)	$1,260,900
Bridge Structures	$377,400
Subgrade/Existing Base Treatment	$872,375
Concrete Paving	$12,126,595
Surface Course	$1,084,460
Mobilization (8%)	$1,533,500
Construction Contingency (10%)	$2,070,220
Utility Relocations/Adjustments	$2,277,250
Right-of-Way Acquisition	$1,424,145
Project Total	**$29,417,793**

Table 13 identifies the project components, each component's cost, and the anticipated funding source for each component. As noted in the table, the percentage of requested TIGER funding is 27.6 percent ($8,117,793) of the overall project value with the matching funds accounting for the

remaining 72.4 percent ($21,300,000) split between TxDOT Category 3 ($15.9 million), TxDOT Category 11 ($4.4 million), and CCRMA ($1 million) funds.

Table 13. Funding and Component Splits

			Funding Source			
Project Component	**Component Cost**	**Component Percentage**	**TIGER**	**TxDOT Category 3**	**TxDOT Category 11**	**CCRMA**
Plans, Specifications, Estimates (PS&E)	$2,943,948	10%	$0	$2,943,948	$0	$0
Construction	$20,702,230	70%	$8,117,793	$12,584,437	$0	$0
Construction Contingency	$2,070,220	7%	$0	$371,615	$1,698,605	$0
Utility Relocations/ Adjustments	$2,277,250	8%	$0	$0	$2,277,250	$0
Right-of-Way Acquisition	$1,424,145	5%	$0	$0	$424,145	$1,000,000
TOTAL	**$29,417,793**	**100%**	**$8,117,793**	**$15,900,000**	**$4,400,000**	**$1,000,000**
Percentage of Project		100%	27.6%	54.0%	15.0%	3.4%

TxDOT is utilizing two categories of funding for its portion of the project match. Category 3 funding is set aside for transportation-related projects that qualify for sources not traditionally part of the state highway fund such as pass-through financing. Category 11 is District discretionary funding allocated through the State based on the vehicle miles traveled within the District as well as the number of registered vehicles within the District.

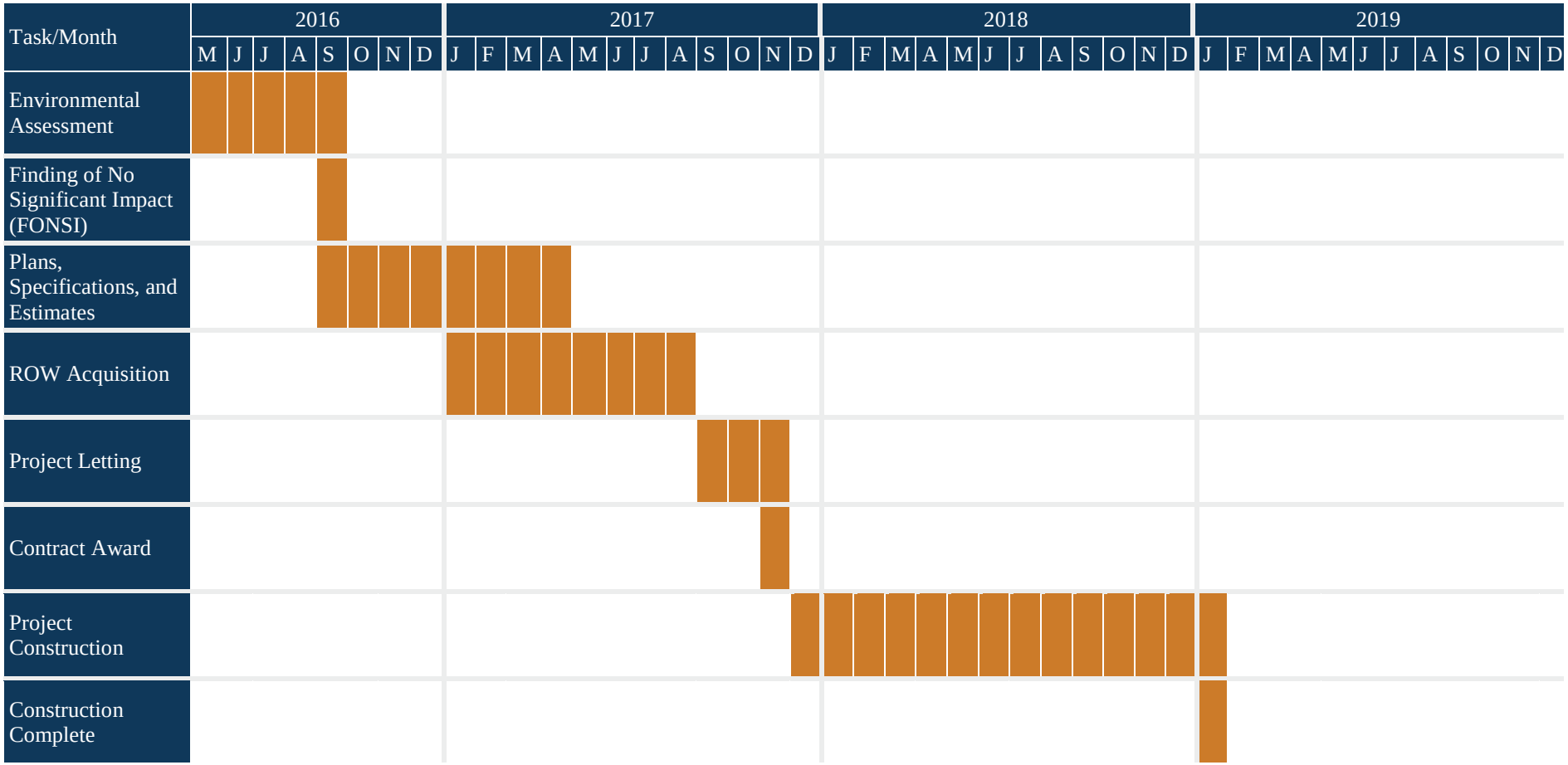
In the 2008 Fiscal Year, the State Legislature of Texas approved legislation that allowed the Cameron County Commissioners' Court to impose an additional $10 fee for each vehicle registered in Cameron County. The additional funds are allocated to the CCRMA for development of projects. With the number of current vehicles registered in Cameron County nearing 300,000 and steadily growing, the source of revenue has been both stable and reliable. In 2010, Cameron County approved a Transportation Reinvestment Zone to capture tax increment value surrounding developed projects. In 2015, Cameron County approved the Countywide Transportation Reinvestment Zone that will provide a steady long-term source of funding for the development of projects. These revenues capture a percentage of tax increment growth in the county on an annual basis, and it is then transferred to the CCRMA to be used in the development of transportation projects. The contract term is for 50 years.

C. PROJECT SCHEDULE

1. Completion of Pre-Construction Activities

The schedule for Environmental Assessment activities, final design, ROW acquisition, and project construction is detailed in Table 14. Critical-path project components allow for funds to be obligated for project construction nearly two years before the September 2019 obligation date.

Table 14. Project Schedule



2. Quick Mobilization of Project after Receiving Funds

A Finding of No Significant Impact (FONSI) is scheduled to be approved in September 2016 for the Environmental Assessment. At that time the development of plans, specifications, and estimates are to commence with ROW acquisition starting soon thereafter. Project advertisement and bidding is anticipated to be from September 2017 to November 2017. Construction is scheduled to begin in December 2017 and complete in January 2019.

3. Right-of-way Acquisition

The acquisition of ROW is required prior to project construction. The ROW acquisition for SH 32E is anticipated to start in January 2017 and will be complete in August 2017.

D. REQUIRED APPROVALS

1. Environmental Permits and Reviews

i. National Environmental Policy Act Status

An Environmental Assessment is currently being prepared for the ultimate SH 32E project to comply with the National Environmental Policy Act (NEPA). The Environmental Assessment is in its final stages of preparation and a FONSI is anticipated in September 2016.

ii. Reviews by Other Agencies

The Environmental Assessment determined that coordination with the following agencies was required for the project. The section below describes all coordination to date and any future coordination that may be required for each agency.

- Texas Commission on Environmental Quality
  - The project is located within five miles of The Brownsville Ship Channel, which is an impaired stream segment. Because the project is adjacent to an impaired stream, pre-construction coordination with the Texas Commission Environmental Quality (TCEQ) will be required along with a Texas Pollutant Discharge Elimination System Construction General Permit administered by TCEQ.
- Local Floodplain Administrator
  - The proposed project crosses approximately 30.5 acres of the 100-year floodplain. Although the project will not increase the base flood elevation, project staff will be required to coordinate with the local floodplain administrator prior to construction beginning.
- U.S. Army Corp of Engineers
  - The project team coordinated with the U.S. Army Corp of Engineers (USACE) through a Jurisdictional Determination report to determine the presence of

jurisdictional wetlands within the project area. The coordination determined that 0.02 acre of emergent wetlands was jurisdictional, and that Nationwide Permit 14 with a Pre-Construction Notice would be necessary.

- State Historical Preservation Officer
  - After conducting an intensive archeological survey in April 2011, the project team coordinated with the State Historical Preservation Officer in December 2011, who found that no archeological historic properties were located within a 50-acre buffer of the project area including the proposed ROW.
- U.S. Fish and Wildlife Service
  - On September 16, 2010, and February 19, 2015, the project team coordinated with the USFWS to determine the likelihood of impacting the ocelot, Gulf Coast jaguarundi, and northern Aplomado falcon (*Falco femoralis septentrionalis*). In addition, the project team also submitted voluntary mitigation measures to protect the ocelot and jaguarundi by providing wildlife crossings as part of the proposed project.

iii. Environmental Studies or Documents

The Environmental Assessment reviewed the resources identified below. The Environmental Assessment document provides detailed information on the analysis, potential impacts, and proposed mitigation of the identified resources.

- Prime Farmland
- Floodplains
- Groundwater
- Water Quality
- Essential Fish Habitats
- Air Quality
- Traffic Noise
- Hazardous Materials
- Cultural Resources
- Cemeteries
- Community Cohesion and Facilities
- Parks
- Vegetation
- Wildlife and Habitats
- Threatened and Endangered Species
- Waters of the U.S. and Wetlands
- Socioeconomic and Environmental Justice
- Indirect and Cumulative Impacts

iv. Discussions with Appropriate DOT Office

FHWA assigned its responsibilities for NEPA and other federal environmental law compliance to TxDOT through a Memorandum of Understanding signed on December 14, 2014. This delegation authorized TxDOT to review and approve environmental documents without seeking approval from FHWA. As such, outside of the agency reviews discussed earlier, no discussions with DOT offices or headquarters were required.

2. Legislative Approvals

As discussed earlier, pre-construction coordination would be required for TCEQ, the local floodplain administrator, and USACE. The project is widely supported by local and state officials as evidenced in the letters of support.

3. State and Local Planning

The SH 32E project identified in this grant is consistent with the BMPO's 2015-2040 Metropolitan Transportation Plan[14] and the 2015-2018 STIP[15]. The project is also identified in TxDOT's 2016 Unified Transportation Program, which serves as a 10-year planning guide and identifies projects and programs that are planned to be constructed and/or developed within the first ten years of the 24-year Statewide Long Range Transportation Plan.

E. ASSESSMENT OF PROJECT RISKS AND MITIGATION STRATEGIES

The SH 32E project has several risks that are typical of any project of this type and magnitude. TxDOT has been very successful in mitigating project risks. One of the key factors contributing to the success is the implementation of a risk management process that identifies potential risks to the project at a very early planning stage and identifies mitigation strategies to manage each risk element. The process tracks each risk element as the project moves along its development phases. Potential risks and mitigation strategies for the project are outlined below.

- ROW: All needed ROW has not been acquired. However, coordination with affected property owners has occurred throughout the planning process. This is considered a

[14] Brownsville Metropolitan Planning Organization 2015-2040 Metropolitan Transportation Plan located at https://docs.google.com/viewer?a=v&pid=sites&srcid=Y29iLnVzfG1wb3xneDo0MTAxNDk2OGE1NTY0M2I0.
[15] TxDOT 2015-2018 Statewide Transportation Improvement Program located at http://ftp.dot.state.tx.us/pub/txdot-info/tpp/stip/2015-2018/highway/pharr.pdf.

medium risk considering the length of the ROW acquisition process and the potential for increasing real estate values.

- NEPA: The corridor has not received NEPA clearance. A FONSI is anticipated in September 2016.
- Water Resources: The required USACE and TCEQ permits have not yet been obtained. However, these permits typically do not pose major complications in processing. This is considered a low level risk element.
- Hazardous Materials: One spill site is located on a property that will be acquired for the project. Additionally, one petroleum storage tank was found within the project ROW. Both sites are considered medium risk due to the potential for contamination, but the project is not reasonably anticipated to assume liability for corrective action for these sites.

VIII. FEDERAL WAGE CERTIFICATION

TxDOT follows federal wage rate requirements and the federal wage rate certification is provided in Appendix G.