



Grand Parkway: Houston's Freight Highway

Project Name: SH 99 (Grand Parkway) – Segment I-2	
Previously Incurred Project Cost	0
Future Eligible Project Cost	\$170,200,000
Total Project Cost	\$170,200,000
FASTLANE Request	\$45,000,000
Total Federal Funding (including FASTLANE)	\$55,300,000
Are matching funds restricted to a specific project component? If so, which one?	No
Is the project or a portion of the project currently located on National Highway Freight Network?	No (However, potential to be part of Critical Rural Freight Corridor designation)
Is the project or a portion of the project located on the National Highway System?	Yes
<ul style="list-style-type: none"> Does the project add capacity to the Interstate system? 	No
<ul style="list-style-type: none"> Is the project in a national scenic area? 	No
Do the project components include a railway-highway grade crossing or grade separation project?	Yes
Do the project components include an intermodal or freight rail project, or freight project within boundaries of a public or private freight rail, water, or intermodal facility?	No
If answered yes to either of the two component questions above, how much of requested FASTLANE funds will be spent on each of these projects components?	\$0.0
State(s) in which project is located.	Texas
Small or large project	Large
Also submitting an application to TIGER for this project	No
Urbanized Area in which project is located, if applicable.	Houston
Population of Urbanized Area.	4.9 million
Is the project currently programmed in the (please specify in which plans the project is currently programmed):	
<ul style="list-style-type: none"> TIP 	Yes
<ul style="list-style-type: none"> STIP 	Yes
<ul style="list-style-type: none"> MPO Long Range Transportation Plan 	Yes
<ul style="list-style-type: none"> State Long Range Transportation Plan 	Yes
<ul style="list-style-type: none"> State Freight Plan 	Yes

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Project Purpose

The Texas Department of Transportation (TxDOT) is pleased to submit a proposal for **\$45 million** for improvements along Segment I-2A and the construction of Segment I-2B of the State Highway (SH) 99 Grand Parkway project in the greater Houston-Galveston metropolitan region. This project will have direct, significant benefits to regional and national freight movement.

The purpose and need of the proposed transportation improvements in Segment I-2 study area is to support ladders of opportunities by providing system linkage to economic generators, improving mobility, enhancing safety, and providing infrastructure to support population growth. The study area lacks efficient connections to major radial roadways, suburban communities, local ports, and industries, which cause congestion and safety concerns on the existing local roadways. **The proposed project would**

interface directly with the Port of Houston including the Barbours Cut terminal. Freight destined to and from the Port would use the proposed facility. The segment would provide for more direct routes of travel to and from the Port of Houston, the Barbour's Cut marine terminal, the

Port of Galveston, the Texas City Ship

Houston: A National Freight Hub

The Houston-Galveston region is a freight hub of statewide and national importance. Houston ranks:

- **1st** in Pipeline Volumes
- **2nd** in Port Volumes
- **4th** in Truck Volumes

In the **national rail system** and home to a major rail carload market. About **1.2 million tons of freight** valued at more than **\$2 trillion** annually moves throughout the Houston region annually.

The **Port of Houston** handles **30.5 million tons** of cargo and **2.1 million TEUs** and **8,000 ships** annually.

Annual Cost of Truck Congestion, 2015

Rank	County	Total Cost
1	New York-Newark-Jersey City, NY-NJ-PA	\$4,060,571,449
2	Chicago-Naperville-Elgin, IL-IN-WI	\$1,915,070,975
3	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	\$1,539,185,875
4	Washington-Arlington-Alexandria, DC-VA-MD-WV	\$1,508,625,815
5	Miami-Fort Lauderdale-West Palm Beach, FL	\$1,331,032,562
6	Dallas-Fort Worth-Arlington, TX	\$1,001,066,579
7	Atlanta-Sandy Springs-Roswell, GA	\$991,678,664
8	Houston-The Woodlands-Sugar Land, TX	\$917,681,071
9	Los Angeles-Long Beach-Anaheim, CA	\$896,918,309
10	Boston-Cambridge-Newton, MA-NH	\$875,940,026

Source: ATRI, Cost of Congestion to the Trucking Industry, 2016.

Channel and Cedar Port Industrial Park (Cedar Port), the fifth largest intermodal logistics facility in the world with connections to I-10, I-69/U.S. 59 and I-45.

The Houston-Woodlands-Sugar Land MSA ranks 8th in the nation in terms of the cost of congestion on trucking, ahead of Los Angeles-Long Beach. Harris County is 4th in the nation in terms of county-level trucking congestions costs, incurring over \$534.6 million in truck congestion costs in 2015. It is estimated that the proposed project will

Annual Cost of Congestion on Trucking, 2015

Rank	County	Total Cost
1	Cook, IL	\$932,264,272
2	Los Angeles, CA	\$648,233,355
3	Miami-Dade, FL	\$594,263,128
4	Harris, TX	\$536,631,381

Source: ATRI, Cost of Congestion to the Trucking Industry, 2016.

reduce delay in the study area by 32% for trucks, by 26% for auto

commuters, and by 20% for non-commuting auto trips, for an annual total of 2 million hours of delay avoided by year 2040. Transportation cost savings yields a robust Benefit-Cost Ratio (BCR) ranging from 1.75 to 3.14. The project is also projected to give rise to economic growth in the region by supporting 2,216 short-term construction related job-years.

In addition to enhancing and preserving freight efficiency in Houston and access to the Port of Houston, *Grand Parkway* creates safe and efficient highway access in and out of the major regional developments site, fostering economic growth and regional connectivity – true ladders of opportunity. Development at Cedar Port Industrial Park has already begun. There are already 15 new businesses operating in Cedar Port, including numerous Fortune 1000 companies (Walmart, Home Depot, Borusan Mannesmann, JSW Steel, Ravago, PBP, DHL, IPSCO, National Oilwell, and GE Water), existing industrial facilities that require freight movement, and additional businesses that are nearing construction completion. With proper planning and investments in roadway and highway infrastructure, moving freight and people through and around this site – especially via Grand Parkway– will avoid unintentional externalities, negatively impacting national and regional economic efficiency and connectivity, environmental sustainability, and quality of life in the surrounding communities.

Additional detail on the project, the critical freight and economic issues it addresses, and anticipated impacts are provided below.

Project Description

The Grand Parkway Segment I-2 project will increase capacity of the NHS and enhance the movement of goods and services by providing the following improvements to two segments:

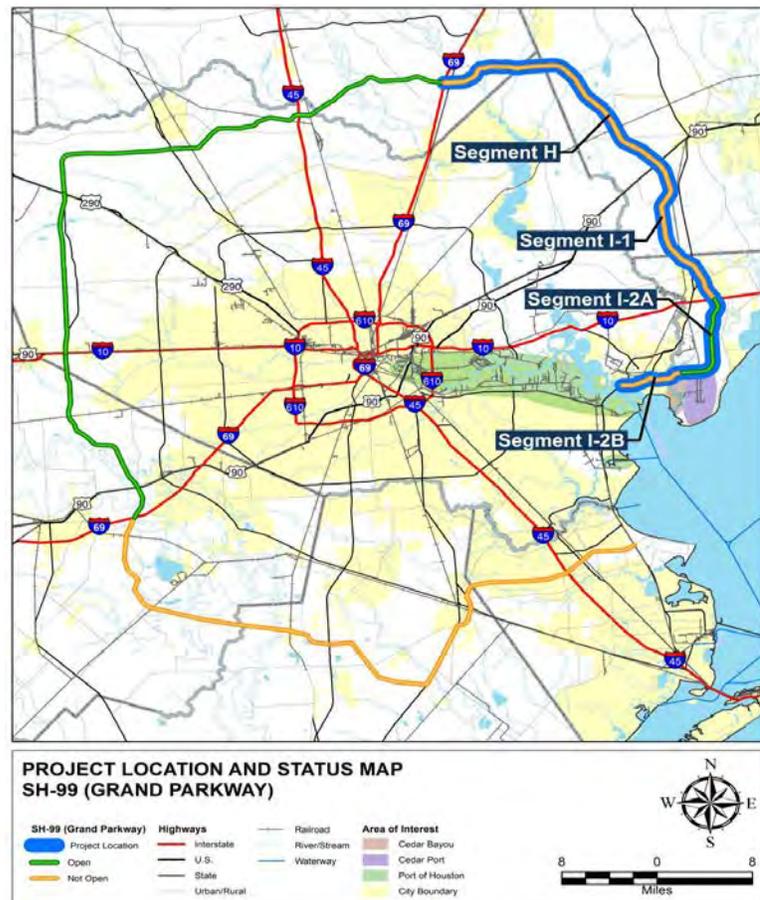
- Construct Segment I-2B, approximately 6.1 miles, as four new toll lanes from Farm-to-Market (FM) 1405 to SH 146 with four non-tolled frontage roads; and
- Enhance Segment I-2A, existing 8.7 miles, by upgrading tolling equipment on the existing facility from I-10(E) to FM 1405. Segment I-2A was opened to traffic in March 2008.

Segment I-2 B of the Grand

Parkway is located in Harris and Chambers counties. The entire Grand Parkway is a 180-mile loop around the greater Houston metropolitan area (Figure 1). Grand Parkway is divided into 11 segments, each of which has logical termini and can function separately to facilitate planning, design, and construction. Each segment connects at least two existing major transportation corridors to ensure independent utility as well as independent significance as required by the Federal Highway Administration (FHWA) regulations (23 Code of Federal Regulations [CFR] 771.111(f)). The FASTLANE grant application is for the following improvements:

- A construction contract from I-10(E) to FM 1405, known as Segment I-2A was awarded in 2003 and the road opened to traffic in March 2008. The project would fund needed enhancements to toll technology to this segment.
- Segment I-2B is an 8.7-mile portion with an estimated cost of \$170.2 million. The funding plan includes 41 percent local and state funding and 59 percent Federal funding sources (including this grant request) This Nationally Significant Freight and Highway Projects (NSFHP) grant request is for \$45 million, which is approximately 26 percent of

Figure 1: Grand Parkway Location and Status Map



the future eligible project costs. Grand Parkway Segment I-2B is anticipated to begin construction in late 2017.

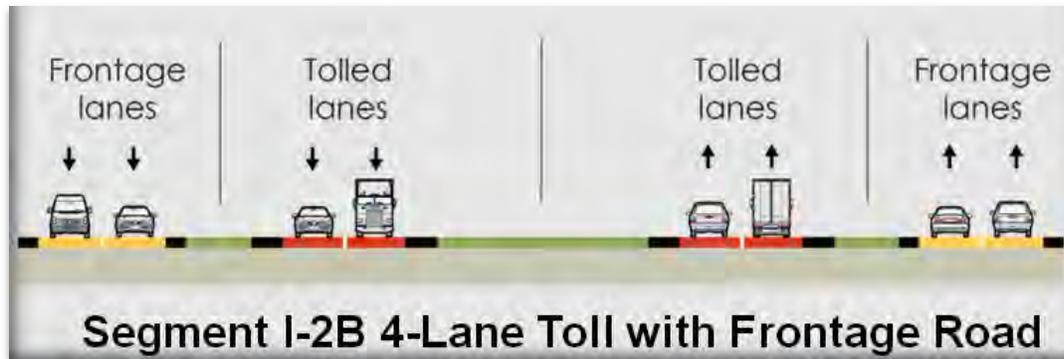
Segment I-2B includes:

- Five bridged overpasses for the following cross streets: Wyoming, Lee Drive, M.L. Wisner, Business 146, Tri-Cities Beach Road, and FM 1405 (Figure 2);
- Widening of existing bridges over Goose Creek;
- Retaining walls;
- Drainage storm sewer and outfall structures;
- Utility adjustments;
- Removal of railroad bridge underpass; and
- Reconstruction of four-lane frontage road (two lanes each way) between Lee Drive and Business 146.

Figure 2: SH-99 Segment I-2



Figure 3: Proposed Typical Sections



Source: TxDOT, 2012.

The proposed improvements will provide direct connectivity from SH 146 and the Port of Houston Authority (PHA) Container Terminal facilities along SH 146 to existing SH 99 Segment I-2A, allowing continuous non-stop movements from SH 146 to I-10 and to Segments H and I-1 that will integrate with I-69 around the east side of the Greater Houston Area. Cedar Port is located at the connection of Segment I-2A and Segment I-2B. The improvements will provide overpasses allowing continuous movement over five existing at-grade intersections; greatly enhance mobility and reduce existing congestion; increase capacity and improve the movement of goods to Port of Houston, Cedar Port, associated container terminals, petrochemical facilities, Greater Houston Area; and enhance connectivity between existing interstate systems including I-10, I-69 and I-45. Figure 2 illustrates project components that will be funded by the FASTLANE grant.

The project will provide much needed relief for trucks accessing critical regional and national freight gateways and staging areas. In 2014, the Houston region was home to five of the top 25 nationally significant freight bottlenecks. In 2015, the Houston region ranked 8th among metro areas in terms of the highest cost of congestion to the trucking industry with over \$917 million annually. Harris County had the 4th highest cost of congestion for truck when looking at individual counties.

While the FASTLANE grant application seeks funding for the Grand Parkway Segments I-2A and I-2B only, the project is being procured as a single complete project (in addition to the Segments H and I-1) to be delivered in a design-build contract. The design-build developer will construct the 43.6 miles (Segments H, I-1, and I-2B) and will maintain the entire 52.3 miles of the project.

The overall project statement of work for the improvements includes:

- Design-build construction of the project segment (I-2). Segment I-2B (6.1 miles) will add four toll lanes to the existing frontage lanes, and upgrades to the tolling equipment will be made in Segment I-2A (8.7 miles).

- Acquisition of right-of-way for Segment I-2B. This includes negotiation and purchase of properties as well as other ancillary activities associated with the ROW acquisition.
- Utility relocation activities. In locations that require removal/replacement, abandonment, or adjustment of existing utilities there will be coordination with the utility owners to clear utilities as needed to construct the project.
- Management and consultant services. This includes project management activities for construction, financing and bond counsel consultant, general engineering consultant, toll integration, and legal consultant.
- Maintenance agreement between TxDOT and the design-build developer to maintain the facility once constructed.

Project Location

The Grand Parkway is a 180+ mile ring road around the Houston metropolitan area. To date, approximately 85 miles of the 180+ mile route are open to traffic and are already generating a positive influence on freight and passenger traffic by providing an alternative route to many of the major highways on the northern and western portions of the Houston region. This project comprises Segment I-2B located on the eastern side of the Greater Houston Area (see Figure 1). When completed, Segment I-2 will further facilitate the efficient movement of freight and passenger traffic by servicing the heavily congested and commercialized areas around the Port of Houston, Cedar Bayou and Cedar Port with connections to I-10, I-45, I-69, and other major highways designated as part of the freight network.

“The completion of the Grand Parkway is essential and urgent, as construction of the projects would alleviate congestion and improve traffic flow in the greater Houston metropolitan area and the surrounding region.”

April 2003 Texas Transportation Commission Minute Order 109226

Project Parties

In developing the Grand Parkway, TxDOT has been involved with FHWA, the Grand Parkway Association (GPA), Union Pacific Railroad (UPRR), the US Army Corps of Engineers, the U.S. Coast Guard, the Port of Houston and Cedar Port and Harris and Chambers counties. TxDOT will continue to coordinate with public and private entities affected by the projects as Segment I-2A is upgraded and Segment I-2B is completed, , such as the Union Pacific Railroad (UPRR) regarding railroad overpasses; the U.S. Army Corps of Engineers (USACE) regarding Clean Water Act Section 404 permits for Segment I-2B; the U.S. Coast Guard (USCG) for Cedar Bayou Section 9 permit for Segment I-2B; and the Port of Houston, container terminals and Cedar Port regarding traffic control, roadway closures and any navigable waterway closures associated with the construction of the Grand Parkway.

Additionally, TxDOT will be in coordination with the two counties the project traverses: Harris and Chambers Counties.

Merit Criteria

Table 1 illustrates the benefits resulting from Grand Parkway Segment I-2. When completed, the project will play a vital role in ensuring ladders of opportunities by providing safer and more efficient access and connectivity between regional and statewide economic engines and local communities. The sections below illustrate the broad categories of regional issues addressed by the project. Quantification of the project benefits are presented in the cost effectiveness section.

Table 1: Project Merits

Impacts of the Project	Project Benefits	Page
Travel Time/Delay Reduction	✓	10
Vehicle Operating Cost Savings	✓	13
Sate-of-Good-Repair	✓	11
Ladders of Opportunity		
Safety	✓	11
Mobility	✓	10
Air Quality	✓	12
Other Environmental (Noise and Local Impacts)	✓	13
Direct Jobs	✓	12
Other Indirect Economic Benefits	✓	12
Security (Emergency Evacuation and Emergency Response)Safety (Crashes)	✓	11

Large Project Requirements

National and Regional Freight Movement and Trade

The Grand Parkway Segments I-2A and I-2B will help facilitate efficient and effective movement of freight and goods in the region and to the national freight network. The Houston region is a significant hub for trade, due to its international ports and local industry.

Houston is home to the Port of Houston, a strategic global trade gateway and is the leading container port in the Gulf of Mexico, handling 2.1 million Twenty-Foot Equivalent (TEU) containers in 2015 and accounting for over 67 percent of Gulf Coast container traffic. The Port handles over 8,000 ships annually. The Port of Houston handles the most foreign import and export cargo of all ports in the United States.¹ Providing enhanced access and capacity to the national freight network is vital for truck traffic accessing these facilities. According to the Greater Houston Partnership, in 2015, the Houston metropolitan area had over \$196.4 billion in total trade and the region was the top goods exporter with over \$110.2 billion in exports and \$8.2 billion in imports

In terms of local industry, Harris and Chambers counties contain major industrial complexes related to oil and gas refining, oil and gas storage facilities, and transportation of petrochemical products. The Houston region also has the highest concentration of petrochemical industries and facilities in the nation while also generating large volumes of imports and exports. The recent expansion Panama Canal also increases opportunities with the Port of Houston to expand export of dry bulk, liquid bulk, value added manufacturing, and break bulk cargo and containers to existing, new and emerging markets.

Continued growth of the Houston region and the state of Texas, combined with continued growth of international trade and the opening of the expanded Panama Canal, has the potential to increase truck freight from its current one billion annual tons to 2.15 billion annual tons in 2040. The Grand Parkway Segment I-2 specifically is in proximity to the Port of Houston and Cedar Port, making it a primary truck route. Truck traffic in the region is projected to reach approximately 37 percent of total traffic in 2039.² In the surrounding area truck traffic on local roads could reach as much as 20 percent of total traffic. This large volume of trucks would strain the existing network, lead to increased wear and tear on local streets and potentially increase the number of crashes on the roadways. The Grand Parkway will provide essential roadway infrastructure to address these issues and relieve congestion.

Overall, the 2016 Texas Freight Mobility Plan indicates that intrastate truck traffic is expected to double between 2014 and 2040 and 46 percent of the primary freight network is anticipated to operate under unacceptable conditions. Figure 4 presents the forecasts by direction.³ The 2011 Houston-Galveston Area Council (H-GAC) Regional Goods Movement Profile concurs that the level of service (LOS) on significant portions of key freight highway corridors such as I-10, I-45, I-610, and U.S. 59/I-69 is D or F, indicating that volume to capacity ratios are approaching or exceeding 1.0. H-GAC is anticipating that truck volume

¹ Panama Canal Expansion Study, Phase I Report: Development in Trade and National and Global Economics, U.S. Department of Transportation Maritime Division, November 2013.

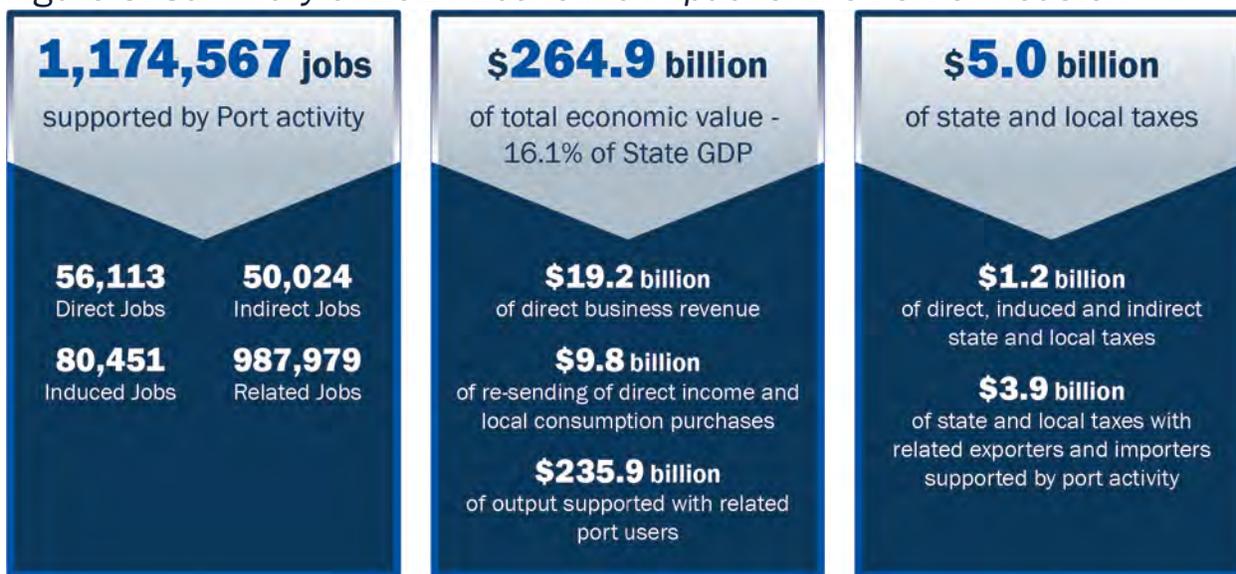
² *Consideration for Truck Lanes on the Grand Parkway Segments H and I-1*, TxDOT, August 20, 2007.

³ 2016 Freight Mobility Report, TxDOT.

will increase by 77 percent by 2035; meaning that for every 100 trucks on the road today, there will be 177 trucks in 2035.⁴

A 2015 study conducted for the PHA estimated that Houston Ship Channel-related businesses are the economic engine for the Houston region, the state of Texas and the nation. The Port contributes over one million jobs throughout Texas which helped generate more than \$264.9 billion in statewide economic impact. The Port also supports over 2.1 million nationwide jobs and generates over \$499 billion in nationwide economic activity. Additionally, more than \$5 billion in state and local tax revenues are generated by business activities related to the Port, as presented in Figure 5.

Figure 5: Summary of 2014 Economic Impact of the Port of Houston



Source: <http://www.tgscedarport.com/>.

Regional Employment and Population Growth

Based on the H-GAC's 2035 forecast data, the population in Montgomery, Harris, Liberty, and Chambers counties is expected to increase by 46 percent from 4.7 million in 2011 to 6.8 million by 2035. These projections represent projected growth within the region that will benefit from Segment I-2. Job growth within the same area is expected to increase by 39 percent from 2.5 million in 2011 to 3.4 million in 2035. Table 2 illustrates the H-GAC 2035 Forecast Data for population and employment growth. Much of the job growth is expected to be in industries that rely on safe and efficient freight transportation, including construction, manufacturing, wholesale trade and transportation and warehousing (see Figure 6).

⁴ Panama Canal Expansion Study, Phase I Report: Developments in Trade and National and Global Economics, U.S. Department of Transportation Maritime Division, November 2013.

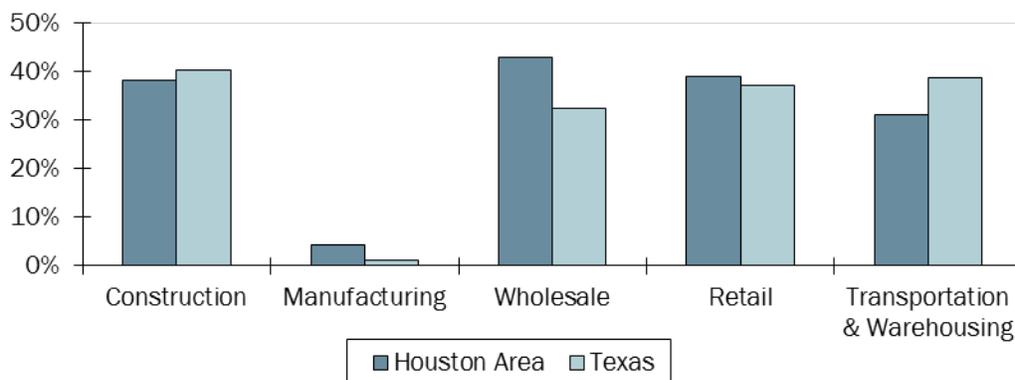
Table 2: H-GAC 2035 Population and Employment Growth by County⁹

County	Total Population			Number of Jobs		
	2011	2035	Percentage Increase	2011	2035	Percentage Increase
Chambers	35,000	53,000	51	9,000	13,000	44
Harris	4,088,000	5,769,000	41	2,296,000	3,136,000	37
Liberty	83,000	120,000	45	24,000	36,000	50
Montgomery	455,000	858,000	89	133,000	239,000	80
Area Total	4,661,000	6,800,000	46	2,462,000	3,424,000	39

Source: H-GAC, 2035 Forecast Data, 2012.

Figure 6: Projected Job Growth in the Houston Region, by Industry, 2014-2040

Growth Rate



Mobility

With the estimated increase in population in the Houston region and the increase in truck volume associated with projected increase in freight volumes from the Port of Houston, Cedar Port, and other marine and rail terminals, additional capacity is necessary to facilitate the efficient movement of people and goods. The Texas Statewide Analysis model was used in order to forecast traffic volumes and delays in the project area in years 2025 and 2040 for a build and a no-build scenario. The model reveals that **delay per mile would decline by 57 percent** on Segment I-2B in spite of a traffic flow increase of 34 percent, comparing the build and no-build scenarios in 2040, which is a result of the added road capacity. Shorter travel times on Segment I-2B are expected to attract vehicle trips from other routes, which also leads to an overall reduction in congestion within the area impacted by the new roadway segment. Accordingly, the project will benefit travelers more broadly than those that would otherwise use Segment I-2B. In the impacted area, a **benefit of 2 million hours of delay saved** per year is expected to be accrued by year 2040. The highest percentage of delay reduction (-32 percent) with respect to the no-build scenario will be accrued by truck trips.

Freight from the Port of Houston and Cedar Port through is primarily transported by trucks through the Houston region to the major industrial complexes, as well as to U.S. 59 (N)/I-69, I-10, and I-45 for national distribution. Trucks currently use the existing two-lane, two-way local roadways in the project area for long trips which present traffic operation and safety issues, enhancing ladders of opportunity. These local roadways were not structurally and geometrically designed to accommodate high volumes of commercial truck traffic. These FM roads have several sharp turns which cause the operating speed of the road to be slower and possibly hazardous for trucks to negotiate, increasing safety issues for all users.

Safety

Road safety would be significantly improved in the project area. Crash rates in two-lane, two-way urban roadways, such as the existing SH 99, are historically higher than crash rates in four-lane roads divided by a shoulder, such as the proposed implementation of Segment I-2B. This is due to the design of the highways, fewer access points, fewer driver distractions, and less stop- and-go conditions. Moreover, crash rates and crash severity involving trucks on local roads are historically higher. Total crashes are also expected to decrease with the lower total VMT, reducing traffic exposure.

Overall, the project is expected to reduce crashes in the area by about 35 crashes per year. Over the full life cycle of the project (30 years), the project expect to prevent 1,050 traffic accidents, 8 fatalities, and 39 incapacitating injuries.

Emergency Evacuation and Emergency Response

Grand Parkway Segment I-2 would also serve as an emergency evacuation route during hurricane events. **During Hurricane Rita in 2005, hurricane evacuation was impeded by the lack of circumferential highways in this region. An estimated 2.5 to 3.5 million people evacuated between Wednesday, September 21, 2005 and Friday, September 23, 2005 for Hurricane Rita. The total average evacuation time was estimated to be approximately 31 hours.**

Residents living in the southern Houston region that were trying to evacuate to the north had limited choices on available roadways. The Grand Parkway Segments I-2A and I-2B would provide additional evacuation capacity and a direct route to U.S. 59/I-69(N), which would be under contraflow, as well as connectivity to I-45 via connection to Segment G. (see Attachment 1: Hurricane Evacuation Route for Houston Region). The new facility is expected to improve emergency response time by providing faster, more direct access within the region area, and also by reducing congestion on existing arterials. Local public safety officials have noted improved emergency response times after the initial opening of other segments of the Grand Parkway.

State-of-Good-Repair

Segment I-2A opened to traffic in March 2008 so the condition of the infrastructure is acceptable. Segment I-2B will include the construction of four new toll lanes where there are currently only frontage roads, resulting in overall improvement to the average pavement conditions for the system as a whole. Further, moving heavy truck traffic to the limited access facility and off of arterials will reduce the rate of deterioration of those facilities.

Economic Benefits

All of the benefits described above are expected to result in positive economic impacts to the region. **The project is also expected to directly generate 2,213 construction job-years and an average of 9 permanent jobs operations and maintenance.** This figure does not include indirect and induced jobs nor the economic impact of released income from truck and auto business travel time and vehicle operating cost savings. **Improved freight connectivity will benefit all segments of the business community, consumers, and the general population through the benefits supported by the project.**

Environmental Sustainability

The reduction in truck and auto delay achieved as a result of the project will result in less idling and more eco-friendly driving conditions. This will lead to reduced emissions, a significant goal of the Houston region which is a non-attainment area. In addition, the project will divert truck traffic away from local streets, leading to a reduction in noise levels and overall improvement in the quality of life of local residents.

Expedite Project Delivery

This segment of the Grand Parkway will be significantly delayed without the FASTLANE grant, leading to increased delayed and costs, potentially impeding future economic growth in the region. The grant is needed to close the gap in funding and meet current transportation needs in this significant freight hub.

Partnership and Innovation

This FASTLANE application applies a well-studied, comprehensive approach to highway design, freight movement, and population impacts in a regionally significant area, utilizing a multi-agency methodology to improve mobility and access while supporting economic development throughout the region. **This application demonstrates strong collaboration across a broad set of stakeholders.** Further, it integrates transportation with other public service efforts and projects in the area that are part of a robust planning process. *Grand Parkway* has the support of a broad range of participants, public agencies, private business,

and local community groups. Strong collaboration among partners, in conjunction with studies focused on improving freight and automobile movement in the area, has resulted in a history of support for the proposed project elements across jurisdictions and disciplines. The list of highly-supportive elected officials, organizations, and agencies in the **Project Parties** section demonstrative of the breadth of stakeholder involvement and support.

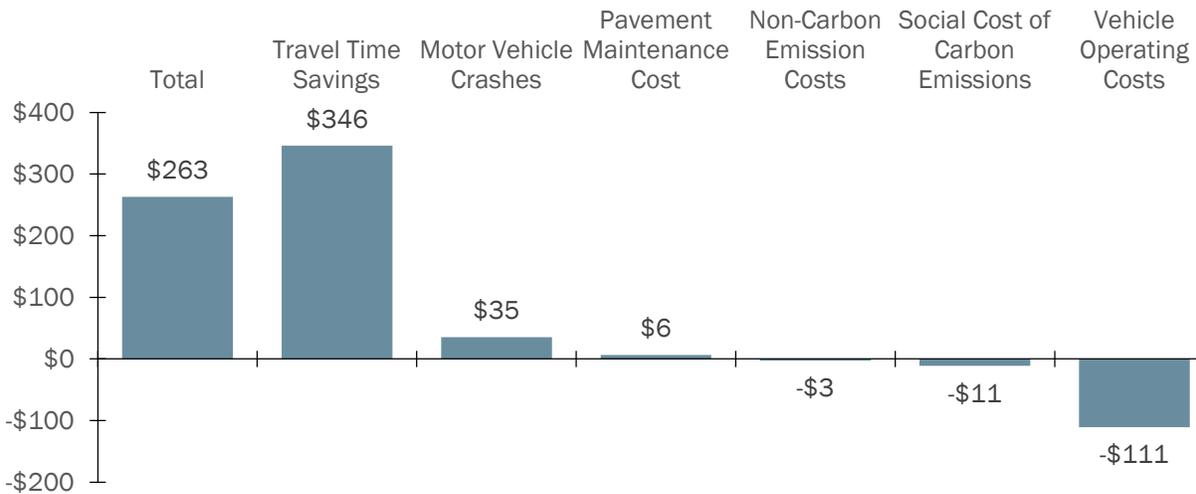
Cost Effectiveness Analysis

A Benefit-Cost Analysis (BCA) was conducted in conformance with U.S. DOT guidance to assess the impacts of the Grand Parkway project. A summary of the BCA results is provided in this section and more detail regarding the inputs, sources, analysis, and results is provided in the attachment Grand Parkway BCA Details.

All Federal guidance regarding evaluation criteria, discount and monetization rates, and evaluation methods prescribed in the 2016 TIGER and FASTLANE Guidance and supporting documents was adhered to the benefits of the project, similar to the costs, are calculated in 2015 dollars (based on the Consumer Price Index). The BCA considers that the project opens to traffic in 2022. A horizon year of 2050 was applied to estimate impacts before and after project construction. A three- and a seven-percent discount rates were used to compute net present values of benefits and costs.

The BCA includes changes in the value of travel time, vehicle crashes, vehicle operating cost, emissions, and in the state of good repair maintenance costs. Note that there are other potential benefits resulting from the project which have not been included in the analysis summarized below. Some of these additional benefit classes are more qualitative, as illustrated in Table 1 above. Figure 7 illustrates how the \$2.96 billion in benefits are distributed between these three categories.

Figure 7: Itemized Benefits, Net Present Value with 7 Percent Discount Rate (2015 Million Dollars)



The largest share of benefits are travel time savings due to reduced delay in the project area. Faster travel times will attract trips from other routes in the network, which will in turn increase the miles traveled for some of the users that seek to reap the benefits of the significant delay reduction in segment I-2B. This has an effect on the average mileage per trip, which will also lead to an increase in vehicle operating costs and emissions. These disbenefits, however, are small compared with the large gains from travel time savings.

Project costs include Design/Construction, Utilities, Right-of-Way (ROW), Tolling/ITS, and Operations & Maintenance. The initial design and construction costs for the Grand Parkway Segment I-2 project are approximately \$170.2 million. Operations and Maintenance costs are approximately \$20.1 million from 2022 to year 2050. Rehabilitation costs were derived from the FEIS replacement cost estimates and adjusted. The total project costs are \$169.4 million in present value with a 3% discount rate, and \$150.7 million in present value with a 7-percent discount rate. Figure 8 illustrates how the \$170.2 million in project costs are distributed between the various cost categories.

Figure 8: Project Costs, Net Present Value (2015 Dollars)

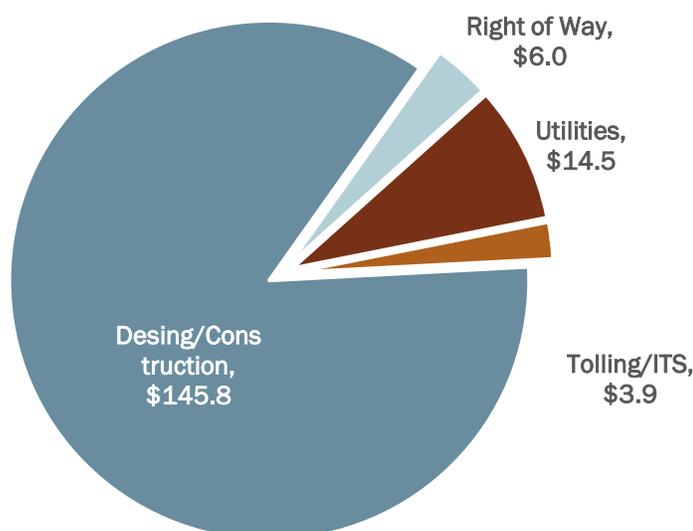


Table 3 summarizes the results of the analysis. Grand Parkway Segment I-2 yields a benefit/cost ratio of 3.14 with a 3-percent discount rate and 1.75 with a 7-percent discount rate.

Table 3: Benefit Cost Analysis Summary

	3% Discount Rate	7% Discount Rate
Life-Cycle Costs (Billions of Dollars)	\$169.4	\$150.7
Life-Cycle Benefits (Billions of Dollars)	\$532.6	\$263.0
Benefit / Cost Ratio	3.14	1.75

Note: 2015\$, life cycle (2022-2050).

Grant Funds, Sources, and Uses of Project Funds

The Grand Parkway Segment I-2 represents a significant surface transportation infrastructure investment to improve freight and general mobility across the Houston region, with national impacts. Accordingly, multiple revenue sources are utilized throughout construction to balance project needs against the broader fiscal constraints of the statewide construction program as a whole.

The future eligible cost of this project, \$170.2 million, comprises design, construction, right-of-way, utilities, and tolling/ITS components, all of which are eligible costs under this funding program. Table 4 provides details on the funding and uses.

Table 4: Detailed Project Funding and Uses

Funding	Project Component	Segment I-2
FASTLANE	Highway and Bridge Design/Construction	\$45,000,000
	ROW	\$0
	Utilities	\$0
	Tolling/ITS	\$0
<i>Subtotal</i>		\$45,000,000
Federal (TIFIA)	Design/Construction	\$44,500,000
	ROW	\$2,700,000
	Utilities	\$6,400,000
	Tolling/ITS	\$1,700,000
<i>Subtotal</i>		\$55,300,000
State (Bonds)	Design/Construction	\$56,300,000
	ROW	\$3,300,000
	Utilities	\$8,100,000
	Tolling/ITS	\$2,200,000
<i>Subtotal</i>		\$69,900,000
Total		\$170,200,200

The Grand Parkway Segment I-2 is included in the approved 2013-2016 State Transportation Improvement Plan (STIP). The project is also a fiscally constrained project identified in H-GAC's 2040 Regional Transportation Plan (RTP). The Federal funds identified are TIFIA funds. Approximately 32 percent of the total initial project cost or \$55.3 million (excluding costs of financing and internal agency costs) are from TIFIA funds. All of the state matching funds are from bond sales disbursed by the Grand Parkway Transportation Corporation (GPTC) and toll road revenue bonds.

TxDOT's funding commitments are stable and reliable. Traditionally, TxDOT annually oversees approximately \$7.5 billion in the state highway fund (35 percent); \$3.4 billion in state bond proceeds (16 percent); \$1.8 billion in other funding mechanisms (tolls, mobility fund, concession fees); and over \$8.6 billion in Federal funds (40 percent) to construct, maintain, and operate approximately 197,100 miles of state highway system. As an agency of the state government, TxDOT is able to access capital markets by selling general obligation debt backed by the full faith and credit of the government. This debt is rated triple-A by all three national rating agencies.⁵

⁵ 13 TxDOT Semi-Annual Issuer Report prepared for February 29, 2016. http://ftp.dot.state.tx.us/pub/txdot-info/fin/investor/brb_semiannual_excerpts.pdf

The financial strength of TxDOT goes hand in hand with past success in managing several Federal grants and hundreds of Federal contracts, both as a recipient and a pass-through agency for sub-recipients. TxDOT complies with all Federal government expenditure and reporting requirements including the general requirements of the U.S. Office of Management and Budget's "Super Circular"⁶ and the transportation specific guidance outlined in the Stewardship and Oversight Agreement⁷ between the Department and FHWA.

Despite the strong funding plan that is in place, TxDOT recognizes the need for contingency funding in the event of potential funding interruptions. The possibility of Federal or state transportation dollars being unavailable for project expenditures is remote. Historically, periodic short term interruptions in Federal reimbursements have been successfully managed through cash management practices. In the unlikely event that Federal and state dollars are both unavailable, Texas has a variety of contingency solutions available depending upon the duration of the unavailability of funds ranging from short term cash management techniques to longer term access to credit and capital markets.

Project Readiness

Technical Feasibility

This project is ready to be let and begin construction within one year of receipt of the FASTLANE grant. TxDOT has completed schematic drawings with final design and construction activities to be performed by a design-build developer chosen through a request for proposals. All required environmental permits will be obtained prior to construction activities beginning as shown in the project schedule. Project design criteria follows the TxDOT Roadway Design Manual, TxDOT Bridge Design Manual, Texas Manual on Uniform Traffic Control Devices (TMUTCD), and other state- and Federally-approved design standards as applicable. The basis for the estimated project cost is a detailed construction estimate utilizing unit bid items based on prior projects, as well as management and consultant costs, ROW and toll equipment expenditures, and a project contingency of 6.6 percent.

Grand Parkway Segment I-2 is ready to be let and begin construction within one year of receipt of the FASTLANE grant.

⁶ <https://www.Federalregister.gov/articles/2013/12/26/2013-30465/uniform-administrative-requirements-cost-principles-and-audit-requirements-for-Federal-awards>.

⁷ <http://www.fhwa.dot.gov/Federalaid/stewardship/agreements/ga.pdf>.

Project Schedule

A project implementation schedule is provided in Figure 8. The schedule details anticipated timeframes for major milestones such as the conditional project award, contract execution, contractor notice to proceed for construction activities, and substantial project completion/open to traffic. The project meets all identified schedule requirements. The construction of Segment I-2B and associated use of FASTLANE grant funds would be within the anticipated overall project schedule.

All segments within the project have a Record of Decision (ROD) and subsequent re-evaluations have been approved for environmental clearance, including Segment I-2B. TxDOT is currently receiving design-build proposals from contractors for project letting. Conditional project award is anticipated in spring 2017. Construction is intended to start in summer 2017. Project construction should be substantially complete within 4.5 years in 2021.

Figure 8: Project Schedule

Task/Month	2016		2017				2018				2019				2020				2021				
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Best-and-Final Offer (BAFO)	●	●	●																				
Conditional Project Award				●																			
Contract Execution					●																		
Contractor NTP					●	●																	
Right-of-Way						●	●	●	●	●	●	●	●	●	●	●	●						
Utilities						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Design/Construction						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tolling/ITS															●	●	●	●	●	●	●	●	●
Construction Complete																							●

The proposed project would be constructed primarily within existing ROW. It would require the acquisition of approximately 46 acres of land in 14 parcels, as described in the 2012 Revaluation of the Final Environmental Impact Statement. From the 46 acres required, 99 percent are undeveloped and 1 percent is oil and gas production areas. There would be no residential displacements, nor does the project bisect established neighborhoods or isolate communities.

Required Approvals

Record of Decision

The ROD resulting from the EIS for Segments I-2A and I-2B was issued on August 13, 1998. Several reevaluations were subsequently required. The first reevaluation was required for the redesign of the U-turn at Cedar Bayou and was approved in May 2002. The second reevaluation was completed to evaluate the proposed implementation of tolling from I-10E to Fisher Road and was approved in October 2007. The most recent reevaluation, which addressed design modifications, received approval on October 9, 2012. The 1998 ROD was determined to remain valid as a result of the reevaluations.

Waters of the U.S./U.S. Army Corps of Engineers

In adherence with Section 404 of the Clean Water Act, a jurisdictional determination and delineation study was completed for potentially jurisdictional waters of the U.S. and special aquatic sites, including wetlands. A total of 51 aquatic resources were evaluated for jurisdictional status.

Segments I-2A and I-2B require a Clean Water Act Section 404 Nationwide Permit 14 with a Preconstruction Notification (PCN) to the USACE due to impacts to waters of the U.S., including wetlands.

The USACE has granted approval of the PCN on December 1, 2014. Due to the low acreage of impacts to waters of the U.S., compensatory mitigation is not required.

Cultural Resources

TxDOT conducted two internal reviews for archeological resources potential in accordance with the Programmatic Agreement for Transportation Undertakings (PA-TU) authorized among FHWA, the ACHP, the SHPO, and TxDOT. The first internal review, covering Segment I-2A, was approved on August 22, 2007, with the determination of no potential to effect intact, significant archeological materials and no further archeological investigations warranted. Consultation with SHPO was determined not to be necessary. TxDOT subsequently conducted a second internal review for Segment I-2A to evaluate the Fisher Road grade separation. This second internal review was approved on March 22, 2011, with the determination of no potential to effect intact, archeological historic properties and no further archeological investigations warranted. Consultation with SHPO was determined not to be necessary. TxDOT conducted an internal review for historic properties resources potential in accordance with the Programmatic Agreement for Transportation Undertakings (PA-TU) authorized among FHWA, the ACHP, the SHPO, and TxDOT. This review covered Segment I-2B and was approved on November 30, 2009 with the determination of no

historic properties present. Individual project coordination with SHPO was determined not to be required.

U.S. Coast Guard

A Rivers and Harbors Act Section 9 Permit with the USCG is required due to the proposed construction of the SH 146 Bridge over Cedar Bayou, which is considered a navigable waterway. The USCG approved the permit on August 10, 2015.

Alabama-Coushatta Tribe of Texas

The Alabama-Coushatta Tribe of Texas issued concurrence with the determination of no historic properties effected for Segment I-2B on March 14, 2011.

Chambers County Historical Commission

Chambers County Historical Commission issued concurrence on the determination of the project area containing no historical or archeological resources for Segment I-2B on August 10, 2009.

National Marine Fisheries Service

The National Marine Fisheries Service issued concurrence on TxDOT's determination of no adverse effect to essential fish habitat for Segment I-2B on October 26, 2006, and again on January 14, 2008 in relation to Goose Creek at SH 146E.

Hazardous Materials

During development of the EIS, a Phase II Environmental Site Assessment was conducted to assess the potential of an active oil well site to impact the proposed project right-of-way. The proposed right-of-way was revised to avoid the area containing the oil well.

State and Local Approval

The Grand Parkway, including Segment I-1 and I-2 is included in the H-GAC's 2040 RTP. H-GAC serves as the transportation planning organization for the greater Houston region, which is comprised 13 counties. The funds for Grand Parkway Segments H, I-1, and I-2 are identified in the 2040 RTP and their 2015-2018 Transportation Improvement Program (TIP), adopted on May 23, 2014. State funds identified in the RTP and TIP are from toll revenues. Additional Federal funding has been procured from a TIFIA loan. In total, the overall Grand Parkway has received \$840 million from TIFIA loans. All of the matching state funds are from bond sales and toll revenue. Segments H, I-1, and I-2 of the Grand Parkway have received the necessary state and local approvals to move forward. Support from the State of Texas

was validated with the April 2003 Texas Transportation Commission Minute Order 109226 that states, “The completion of the Grand Parkway is essential and urgent, as construction of the projects would alleviate congestion and improve traffic flow in the greater Houston metropolitan area and the surrounding region,” and “The commission has determined that constructing and operating the Grand Parkway as a toll facility is the most efficient and expeditious means of ensuring its development, and encourages the development of partnerships and the employment of innovative methods for its financing and construction.” The Grand Parkway has been developed and built in phases. The Segments H, I-1, and I-2 project is included in TxDOT’s 2016 Unified Transportation Program (UTP) and is identified as one of six *Designated Major Transportation Projects* in the State of Texas.

The Grand Parkway, including Segments H, I-1, and I-2, have been identified as “proposed thoroughfare” in the *2012 Chamber County Regional Thoroughfare Plan Update*. Additionally, the Grand Parkway, including Segments H, I-1, and I-2, have been identified in the *Thoroughfare Amendment Study: Unincorporated and Non- Extraterritorial jurisdiction (ETJ) Areas, Harris County, Texas* (December 2014).

Finally, during the EIS planning process, seven public meetings and a public hearing were held, starting in March 1992 and ending at the public hearing in January 1995. A public meeting was conducted on October 20, 2005 for the reevaluation. An additional public meeting using the open house format was conducted on July 27, 2010.

Project Risks and Mitigation Strategies

The Grand Parkway Segment I-2 project has several risks that are typical of any project of this type and magnitude. TxDOT has been very successful in the delivery this type of project, in part because of its policy of implementing a risk management process that identifies potential risks to the project at a very early stage and identifies mitigation strategies to manage each risk element. The process tracks each risk element as the project moves along its development. Segment I-2 is intended to be implemented through a Design-Build delivery method, where several risk elements of a project are typically transferred from the “owner” (i.e., TxDOT) to the design- build developer in order to manage risk.

Specific risk elements to this project are summarized below:

- **ROW.** Acquisition of all needed right-of-way has not been initiated. However, coordination with affected property owners has occurred throughout the planning process. Once the design-build developed has been selected the ROW mapping process will be initiated. This is considered a medium risk as the eminent domain process can be lengthy.
- **NEPA.** The corridor has received NEPA clearance, which is a major milestone.

- **Section 404 Permit.** Although the needed permit for Segments H and I-1 has not been issued yet, it is anticipated that the USACE will approve the application by summer 2016 given that it is in the public comment phase.
- **Section 106 Consultation.** For Segments H and I-1, the Design-Build developer will be required to conduct archaeological surveys and complete Section 106 consultation with the SHPO. This is considered a medium risk because it has not been initiated.
- **Coordination with the UPRR.** Discussions with UPRR have begun; TxDOT has submitted letters of authority to the railroad which has initiated the UPRR project coordination and review processes. The design-build developer will continue coordination with the UPRR. This is considered a medium risk; although communication has been initiated, the authorization process may extend longer than anticipated.
- **Hazardous Materials.** Although a Phase I ESA has been completed, there are numerous pipelines in the Segment H and I-1 project area. The design-build developer will be responsible for the conducting the Phase II assessments once the ROW has been acquired. This risk is considered medium since a Phase I ESA has been completed.

Federal Wage Rate Certification

The Federal Wage Rate Certification is included as an attachment to the application.