ANALYSIS OF ROADWAY SAFETY UNDER ALTERNATIVE PROJECT DELIVERY SYSTEMS

FINAL PROJECT REPORT

by

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In cooperation with US Department of Transportation-Research and Innovative Technology Administration (RITA)

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Technical Report Documentation Page

1. Report No.	**2. Government Accession No.**	**3. Recipient's Catalog No.**	
4. Title and Subtitle Analysis of Roadway Safety under Alternative Project Delivery Systems		**5. Report Date**	
		6. Performing Organization Code	
7. Author(s) Ahmed Abdel Aziz and Giovanni Migliaccio		**8. Performing Organization Report No.**	
9. Performing Organization Name and Address PacTrans Pacific Northwest Transportation Consortium University Transportation Center for Region 10 University of Washington More Hall 112 Seattle, WA 98195-2700		**10. Work Unit No. (TRAIS)**	
		11. Contract or Grant No. DTRT	
12. Sponsoring Organization Name and Address United States of America Department of Transportation Research and Innovative Technology Administration		**13. Type of Report and Period Covered**	
		14. Sponsoring Agency Code	
15. Supplementary Notes Report uploaded at www.pacTrans.org			

16. Abstract

In the United States, most highway projects have been with using the traditional design-bid-build delivery system. Moving on to regular conditions assessment, maintenance of a road is then performed on the basis of the availability of funds and the priorities established for road maintenance. When maintenance funds are scarce, serviceability of roads is impacted, which affects road safety. The alternative project delivery systems, such as design-build-operate-maintain, design-build-finance-operate-maintain, and other public-private partnership (PPP) models, provide for more consideration of the life cycle of highways. Particularly under performance-based long-term contracts, which are the norm for PPP systems, road maintenance and performance become controlling parameters in compensating contractors for their work. With serviceable, well maintained roads, it is expected that road safety records will improve.

Through content analysis of PPP procurement documents and agreements, this research investigated PPP projects for their contractual safety terms, such as the design of safety payments, measurements, and safety specifications. Through statistical analysis, the research surveyed PPP projects' roadway safety records and compared them with the safety records of states, localities/cities, and public non-PPP highways. The findings showed that safety rates for PPPs are better than those of traditionally delivered highways, but not on all dimensions. This was represented by better (lower) injury and accident/crash rates on PPP projects than those rates for state, locality, and public non-PPP projects. However, the fatality rates on PPP projects experienced instability or fluctuation, as they did not remain lower in all years and/or on all projects in comparison to public non-PPP projects (PPP fatality rates were better in comparison those of states and localities). Additionally, this study found that PPP projects did not provide more consideration for safety beyond that normally available from traditional delivery. Safety was an objective in most (76 percent) of the projects; however, without proactive mechanisms to implement that objective. Around half of the projects mentioned safety as part of the proposal evaluation, but only two projects assigned points or weights in the evaluation. None of the projects provided ways tolink the contractors' compensation to achievement of better accident/fatality/injury rates of the projects.

17. Key Words		**18. Distribution Statement** No restrictions.	
19. Security Classification (of this report) Unclassified.	**20. Security Classification (of this page)** Unclassified.	**21. No. of Pages**	**22. Price** NA

Form DOT F 1700.7 (8-72) **Reproduction of completed page authorized**

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List of Abbreviations

AADT; Average annual daily traffic
AAR: Actual accident rate
BAB: Build America Bonds
BCMOT: British Columbia Ministry of Transportation
CBA: cost-benefit analysis
DBB: Design-bid-build
DBFOM: Design-build-finance-operate-maintain
DBOM: Design-build-operate-maintain
FARS: Fatality Analysis Reporting System
GARVEEs: Grant Anticipation Revenue Bonds
GEB: Golden Ears Bridge
GHSA: Governors Highway Safety Association
HSIP: Highway Safety Improvement Program
MVMT: Million vehicle miles traveled
NCHRP: National Cooperative Highway Research Program
NCSL: National Conference of State Legislatures
NHTSA: National Highway Traffic Safety Administration
OLB: Okanagan Lake Bridge
PAB: Private Activity Bonds
PacTrans: Pacific Northwest Transportation Consortium
PPP: Public-private partnership
RFP: Request for proposal
RI: Risk index
RFQ: REques for quotation
SIB: State Infrastructure Banks
STRR: Surface Transportation Reauthorization and Reform Act
STS: Sea to Sky Highway
TIFIA: Transportation Infrastructure Finance and Innovation Act
VMT: Vehicle miles traveled
WSDOT: Washington State Department of Transportation
SHSO: State Highway Safety Offices

Acknowledgments

The authors would like to thank PacTrans for the initial review of the research proposal and for facilitating the funding and the final review of the research. The authors would also like to thank the Department of Construction Management at the University of Washington for matching funds and for the extra funds that supported the development of this research.

Executive Summary

Roadway safety is an important aspect of reliable and safe transportation systems. Poor roadway design and poor pavement conditions are among the factors that can render a highway unsafe, increasing the numbers of accidents, injuries, and fatalities. Successes in achieving safety goals have been reached through advancement in engineering dimensions (e.g., better structural design). However, little attention has been given to investigate other ways to improve roadway safety performance. While several studies have shown the potential of public-private partnerships (PPP) for improving cost efficiency and expediting delivery time, research on the relationship between roadway safety and PPP has not looked at contractual terms and safety performance. To fill the gap between PPP and roadway safety performance in the U.S., the objectives of this research were twofold. One was to identify whether there are any differences in traffic safety performance between PPP roads and traditional, publicly operated roads. That is, this project investigated the roadway safety status (e.g., the number of accidents, fatalities, and injuries) of projects that were delivered using PPPs by looking at the average roadway safety of the localities (e.g., city, county, or state) of the projects and comparing them to a comparable set of roads, in the locality of the PPP projects, that were delivered by traditional means (e.g., design-bid-build). Another research goal was to investigate the contractual terms related to roadway safety of transportation PPP projects in the U.S. and to develop recommendations for public agencies to articulate operation-related contractual terms for safety improvement.

For the first goal of this research, safety data (e.g., number of fatalities) were analyzed to determine the safety performance differences between PPP projects and state roads. Safety data from 2011 to 2015 were collected, including fatality, injury, and crash rates, and the traffic data were aggregated into four groups: PPP highways (11 operational PPP projects), the

localities/cities (11 counties/cities of the selected PPP projects), comparable public non-PPP projects group (17 highways in the same localities as the PPP projects), and states (five states with the selected PPP projects). Four-level statistical analysis was consulted to check the difference of means, analogies, correlations, and the statistical significance of the results. These included the following:

- a broad group comparison of the annual means/averages of the safety rates (fatality, injury, and crash rates) of each group over the study period,
- individual project comparisons in which the annual safety rates of each PPP project were compared to comparable rates from local non-PPP highway projects, those of its locality/city, and those of its state,
- individual project comparisons in which the average over the available years from 2011 to 2015 was compared to the averages of local non-PPP highway projects, those of its locality/city, and that of its state, and
- testing of the hypothesis that the PPP group safety performance was better than that of the state level group, locality/city-level group, and the non-PPP project-level group.

The findings showed that safety rates for PPPs were better than those of traditionally delivered highways, but not on all dimensions. This was represented by the better (lower) injury and accident/crash rates on PPP projects than those of state, locality, and non-PPP projects. However, the fatality rates for PPP projects experienced instability or fluctuation, as they did not remain lower in all years and/or for all projects in comparison to the public, non-PPP projects (PPP fatality rates were better in comparison to those of states and localities).

For the second goal of the research, content analysis of PPP procurement and contractual documents was the major method used to investigate how safety is managed in current U.S. transportation PPP projects. The work included analysis of 17 target projects in eight states, including three in Florida, two in California, four in Texas, four in Virginia, and one each in Indiana, Puerto Rico, Colorado, and Illinois. The study found that PPP contracts in the United States did not provide expanded consideration of safety beyond what was normally available in traditional project. Safety was an objective in most (76 percent) of the projects; however, the project did not have proactive mechanisms to implement this objective. Around half of the projects mentioned safety as part of the proposal evaluation, but only two projects had assigned points or weights for evaluation. None of the projects provided ways to link the contractors' compensation to achievement of better accident/ fatality/injury rates; there were no core safety payments and no safety incentives. Case studies of safety-related contractual terms in Canadian projects were also evaluated. This report provides recommendations to achieve safety goals through PPP contractual terms that would link contractors' compensation to the achievement of roadway safety improvements.

Improvement in road safety is an important objective for all highway agencies. There are multiple ways to address safety improvement, and this research addressed a dimension that had not been addressed before. When a safety objective is ranked high for a highway, it is important for decision makers to determine the delivery systems that could be used to improve the safety record. This research recommends PPP contractual safety measures to use in managing safety in the long term. State/city/county managers or other stakeholders should find the outcome useful in obtaining more information about the relationship between safety, maintenance, and delivery systems. This will help them in setting priorities for road maintenance and in choosing delivery

systems. This research should be considered as an initial step toward a more substantial analysis that would segregate the states' safety data into groups, e.g., in clustered analysis, which would recognize the design-bid-build system and other traditional systems, along with the historical maintenance records for the highways.

Chapter 1 Introduction

1.1 General Background

Roadway safety is an important aspect of reliable and safe transportation systems. There are several factors that render a highway unreliable or unsafe in terms of the number of injuries and fatalities, including driving behavior, roadway design or engineering, and poor pavement conditions. To reduce injuries and fatalities, state and federal agencies have continuously worked to improve roadway safety. For example, the Federal Highway Safety Improvement Program (HSIP – http://safety.fhwa.dot.gov/hsip/) was developed in 2005 following to The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). HSIP was continued as a core federal-aid program following the Moving Ahead for Progress in the 21st Century Act (MAP-21). HSIP provided funds for safety improvement projects to reduce traffic fatalities and injuries on all public roads.

From an engineering dimension, research focused on the engineering aspects of highway safety is abundant. For example, Persaud (2001), in a study for the National Cooperative Highway Research Program (NCHRP), tried to establish a relationship between crashes and associated factors, identifying locations for treatments and evaluating the safety effects of engineering improvements. Persaud studied the statistical tools used in safety analysis and surveyed states for their highway safety analysis practices. Other safety engineering work has included, for example, the FHWA 2010 Highway Safety Manual and the FHWA's Interactive Highway Safety Design Model. Jo et al. (2011) developed a decision support system framework to help highway agencies in developing cost-effective safety improvement projects.

In addition to engineering facors, roadway safety can be related to how well roads are maintained. Roads with pavement cracks, rutting, potholes, and the other pavement distresses

and deficiencies can lead to highway traffic accidents. It is fair to assume that safe roads with fewer collisions/accidents have received sufficient funding for road maintenance. Funding for maintenance is available through state tax revenues. Following MAP-21 and the HSIP program, federal funds for safety projects were also allocated to the states, and through HSIP reporting requirements, states had to show that the allocated funds contributed to improving safety and reducing fatalities and injuries. In Washington state, the HSIP report showed that HSIP program funds were divided into 70 percent for local safety projects and 30 percent for state highway safety projects (Washington State 2014). With shortages of state funds, and based on road conditions, roads and highways in any state may have to compete against other projects to obtain sufficient and timely funding for maintenance.

Alternatively, road maintenance and financing may be provided as part of a contractual delivery system in which certain delivery routes are selected. For instance, some of the available public-private partnerships (PPP) models, such as design-build-operate-maintain (DBOM) and design-build-finance-operate-maintain (DBFO), provide for both financing and maintenance (FHWA 2015; Abdel Aziz 2007a, 2007b). In the United States, the use of such PPP procurement models has been on the rise, and around 33 states have authorized the use of PPPs. Furthermore, the federal government has provided for several credit facilities to encourage states to use PPPs, including TIFIA loans (Transportation Infrastructure Finance and Innovation Act), GARVEEs (Grant Anticipation Revenue Bonds), Build America Bonds (BABs), Private Activity Bonds (PABs), State Infrastructure Banks (SIBs), and Section 129 loans. The 2012 federal authorization, Moving Ahead for Progress in the 21st Century Act (MAP-21) strongly encouraged states to use PPPs by allowing tolls on interstate highways, which had been forbidden previously. Furthermore, the newest 2015 federal authorization, the Surface

Transportation Reauthorization and Reform Act (STRR), pushed for a strong relationship between all levels of government and the private sector and provided for the establishment of the National Surface Transportation and Innovative Finance Bureau to help state, local, and private sector partners move transportation projects forward. STRR promoted private investment in our surface transportation systems.

Several of the DBFOM projects in British Columbia have adopted PPP contractual agreements that emphasized roadway safety in their contracts. Examples include the Sea-To-Sky (STS) highway, the Okanagan Lake Bridge (OLB), and the Golden Ears Bridge (GEB) (Abdel Aziz 2007a). The agreement for the STS provided part of the contractor compensation/incentive to be tied to improvements in the highway safety index. For the OLB and GEB projects, safety payments were part of the compensation for the contractor (the other payments included availability payments, traffic volume payments, and user satisfaction payments). Similar provisions can be used in U.S. PPP projects, and this research investigated these issues.

While there several studies have showed the potential of PPPs for improving cost efficiency and expediting the delivery time, studies on the relationship between roadway safety and PPP are missing with regard to contractual terms and safety performance. This research tried to fill this gap. Establishing that safety would improve if particular project delivery systems were used would provide decision makers with possible systems to choose from when safety was of major concern or when safety was one of the main objectives of a project. The outcome of this research will benefit highway agencies by providing officials and decision makers with a comprehensive account of how safety can be managed through contract terms that link contractors' compensation to improvements in the safety records of the projects.

1.2 Research Objective

Roadway safety performance of highway projects developed under alternative delivery systems with regard to contractual safety terms has been scarcely analyzed. The implementation of PPP projects is expected to affect the safety performance of roads, but the strength of the relationship between delivery method and safety performance is unknown, which makes it difficult to evaluate PPP beyond cost and time performance. The need to ensure long-term safety performance on a highway may require decision makers to use an alternative delivery system rather than a traditional one.

The objectives of this research included the following:

1) Identify whether there is a relationship between roadway safety and the project delivery system. That is, investigate the roadway safety status (*e.g.*, collisions, fatalities, injuries) of projects that were delivered with PPP delivery systems (*e.g.*, DBOM, DBFO-Real Toll, DBFO-Availability, *etc*.) and compare it to that of normal or average roadway safety in the localities/cities of the projects.
2) Investigate the contractual terms related to roadway safety of PPP projects and develop best practices or lessons. For example, investigate the contractual terms related to the following:
    a. Safety measures or specification
    b. The design of safety payments or compensation for safety improvement
    c. Penalties/deduction systems.

1.3 Key Research Methodology

To achieve the research objectives, a number of research tasks were designed and followed. These tasks are summarized as follows:

- Task 1 – Identification of Target States: This task identified a set of target states for study purposes on the basis of a number of selection criteria. According to the selected target states, a number of representative PPP transportation projects were identified as the target projects.
- Task 2 – State Roadway Safety Data Collection: General safety data (*e.g.*, total crashes, fatalities, injuries, *etc.*) were collected from the target states identified in Task 1. These data were used to establish the norm or average safety performance indexes or collision/accident statistics, which were used to represent the benchmarks for measuring and comparing the safety statistics of the PPP projects.
- Task 3 – PPP Safety Contractual Terms and PPP Roadway Safety Data Collection: Data at two levels were collected in this task. First, contractual safety provisions and safety payment/incentives were collected from the major PPP projects in the target states and the leading PPP countries, such as Canada and the United Kingdom. PPP project-level roadway safety data were collected, including safety records, collisions/crash records, and statistics from the target PPP projects selected in the target states.
- Task 4 – Analysis of Roadway Safety Data: Data collected in tasks 2 and 3 were analyzed to determine whether PPP projects would provide better safety performance than the average or benchmark.
- Task 5 – Analysis of Contractual Safety Terms: Contractual safety data collected in Task 3 were analyzed to investigate how safety was managed and accounted for, *e.g.*, safety measures, specifications, and safety payments and incentives.

Chapter 2 Literature Review

2.1 Public Private Partnership

Public-private partnership (PPP), originated in the United Kingdom, is an innovative procurement model for public sector infrastructures, facilities, and services (Yescombe 2011). It can be broadly defined as a long-term agreement, usually over 20 years, between public and private sector entities for mutual benefit (Treasury 2012). As defined by the World Bank (2016), "Public-private partnerships (PPPs) are a mechanism for government to procure and implement public infrastructure and/or services using the resources and expertise of the private sector. Where governments are facing aging or lack of infrastructure and require more efficient services, a partnership with the private sector can help foster new solutions and bring finance. PPPs combine the skills and resources of both the public and private sectors through sharing of risks and responsibilities. This enables governments to benefit from the expertise of the private sector, and allows them to focus instead on policy, planning and regulation by delegating day-to-day operations." The US Department of Transportation (USDOT 2013) had a similar definition, stating: "Public-Private Partnerships (P3s) are contractual agreements formed between a public agency and a private entity that allow for greater private sector participation in the delivery and financing of transportation projects. Typically, this participation involves the private sector taking on additional project risks, such as design, finance, long-term operation, maintenance, or traffic revenue. P3s are undertaken for a variety of purposes, including monetizing the value of existing assets, developing new transportation facilities, or rehabilitating or expanding existing facilities."

One major benefit of this alternative system is that PPP allows risks and financial pressures to be shared by seeking to involve the private sector in nontraditional areas of a project

(Yescombe 2011). Through PPP, government services can be provided by private investment instead of being funded by government taxes or other public resource (Abdel Aziz 2007b). Thus, the financial and operation risks can be allocated to the private sector. The benefits of adopting PPP were summarized by Braddon and Foster (1999), including the following: 1) reducing the role and scope of the government while inviting private sector involvement in the gap that is left; 2) creating new opportunities for private expansion into traditional areas of the public sector; 3) attracting new capital resources and investments from the private sector; and 4) spurring competition by increasing market pressures on services remaining within the government.

One of the most common ways of implementing PPPs for managing infrastructure is through a concession approach. This basically consists of transferring the final design, construction, and maintenance and operations of the infrastructure to a private consortium in exchange for the right of the private entity to receive profitable compensation by charging fees to the user or to the government on behalf of the user, which is usually regarded as a shadow toll, for a period of time contractually agreed in advance (Vassallo and Gallego, 2005). In recent projects, some states have started to use availability payments over the term of agreement to compensate the private partner regardless of whether or not tolls have been charged. The key consideration in such PPP concessions is to motivate the private sector to manage and operate the infrastructure in a proactive way (Vassallo et al. 2009). In this respect, PPP has been evolving from the traditional demand-based contract to a performance-based contract that refers to different factors such as availability of lanes, traffic congestion, state of the pavement, and safety. Under a performance based contract, the private sector receives periodic payments from the public authority during the operation and maintenance (O&M) phase, as long as the asset or facility is available for use in accordance with detailed requirements and performance standards

set out in the PPP contract (FWHA 2016). For roadway safety, in a performance-based PPP concession, the public sector commonly includes incentives or assigns a specific safety payment tied to roadway safety indicators, which are used to evaluate safety performance (*e.g.*, total collisions, injuries, and fatalities per 100 VMT).

2.2 PPP Payment Mechanisms and Safety Payments

A payment mechanism is a compensation approach used to pay for the services and other efforts provided by the PPP concessionaire (Abdel Aziz 2007a). In traditional project delivery systems, such as design-bid-build (DBB), payment mechanisms provide compensation to the contractor through a construction capital payment, which is usually calculated on the basis of quantities of work, material costs, and labor and equipment hours. In a PPP performance-based contract, however, different types of payments may be implemented to achieve the different objectives of the government for a project and to motivate the contractor to offer its best performance. Common types of payments used in current PPP projects include traditional capital payment, usage/capacity payment, availability payment, operation and maintenance payment, safety payment, user satisfaction payment, quality payment, and end of term payment (Abdel Aziz 2007a). According to Abdel Aziz and Abdelhalim (2015), a payment mechanism generally includes the following: 1) a structure of different payment types (*e.g.*, a combination of availability payment, traditional capital payment, and safety payment); 2) percentage/ shar / weight of each payment in the overall mechanism; 3) a set of performance measures or indexes tied to the specific payments; 4) a deduction or penalty structure for unsatisfactory performance.

The design of the payment mechanism in the PPP should reflect the government's particular objectives in developing the project (Treasury 2003). In the other words, a payment mechanism can be regarded as the government vehicle of achieving the project goals, such as

transferring risks and certain operational responsibilities to the private sector. Different payment types in a payment mechanism will reflect the transfer of specific risks or responsibilities from the public sector to the private sector.

Safety payment is an appropriate tool when roadway safety is regarded as a significant goal for the project. A safety payment is used to compensate the concessionaire's efforts and inputs toward improving roadway safety (*e.g.,* reducing the accident rate). Such payments should be tied to safety performance and should be paid to the concessionaire only if performance meets or exceeds the required level. Safety performance can be measured with certain safety indexes (*e.g.,* deaths per 100 million vehicle miles traveled). According to Abdel Aziz (2007a), a safety payment can be implemented in several ways, such as 1) explicit payment adjusted by a comparison of actual accident statistics to those of comparable roads or to an average local rate; 2) payment deductions for unsatisfactory safety performance; 3) payment deductions for the remedial works needed to rectify safety problems. A safety payment can be used as an incentive or as a pure bonus. For example, in the Sea-To-Sky highway project in British Columbia, the contract stated, "the Concessionaire will be entitled to a safety performance payment in contract year *n* if the safety performance of the concession highway exceeds the provincial safety performance record for comparable highways on a three-year rolling average basis." Safety payments can also be regarded as a core payment in some projects. Such safety payments commonly contain a monetary punishment or deduction mechanisms. For example, in the Golden Ears Bridge project in British Columbia, the safety initiative payment is included in the payment mechanism to compensate the concessionaire's inputs to improve roadway safety. The safety payments for these projects are detailed later in this research report.

2.3 Safety Performance Measures / Indicators

Research similar to this study has been completed on the European PPP market. Some European countries, such as Spain, Finland, Hungary, Norway, Portugal, and the United Kingdom, already include a set of roadway safety incentives tied to performance indicators in PPP concession contracts (Villar and Vassallo 2014). In their analysis of PPP contracts in Europe, Villar and Vassallo (2014) observed that the indicators used to evaluate roadway safety performance were heterogeneous. The differences came from the various formulas used to transfer the initial accident data to the comparable safety indicators. The types of initial accident data commonly were total crashes, injury crashes, fatal crashes, injuries, fatalities, and combinations of the numbers of light accidents, serious accidents, and fatal accidents. Most of the PPP contracts in Europe were based on only one type of these initial data to develop the indicator. To reduce distortions in road safety results, the exposure to traffic (risk) needs to be taken into consideration when initial data are transferred to comparable indicators. Although the initial data would be selected in the same way because of various ways of introducing the exposure to traffic (risk), final indictors could be quite different. In most existing European projects, the initial accident data were divided by the volume of annual traffic, where average annual daily traffic (AADT) was an important factor for representing exposure to traffic (Vassallo et al., 2009). The two most representative safety indicators used in European PPP projects are summarized in table 2.1, including the Risk Index (RI) in comparison to similar roads and the actual accident rate (AAR) in comparison to similar roads. The first indicator measures the proportional difference between the risk index (*e.g.*, injuries related to traffic) of the road and the same risk index of similar roads or a benchmark. The second indicator uses the AAR instead of RI. AAR is calculated on the basis of different accident levels, including light

accidents, serious accidents, fatal accidents, and other accidents. As such, the second indicator can assess the existence of accidents and their severity.

A set of recommendations for developing safety indicators were also proposed by Vassallo et al. (2009), including the following:

- the database used for measuring the indicator should be accessible and reliable;
- for the sake of a more comprehensive assessment, the accident severity (e.g., fatal accidents, serious injury accidents, and light accidents) should be taken into account in an indicator;
- the exposure to the traffic (risk) must be contained in the indicator;
- an appropriate period for the safety analysis should be longer than one year;
- the indicator must be simple and easily understandable.

Table 2.1 Two representative road safety indicators in European PPP contracts (Vassallo et al., 2009)

Road Safety Indicator	Risk Index (RI) in comparison to similar roads
Formula	

$$RI = \frac{num.of\ total\ injury\ crashes\ along\ one\ year \times 10^6}{length\ of\ the\ road \times AADT \times 365} \quad (2.1)$$

$$RI_{sr} = \frac{\sum_r^1 num.of\ total\ injury\ crashes\ in\ the\ current\ year\ in\ the\ similar\ road\ 'r' \times 10^6}{\sum_r^1 length\ of\ the\ similar\ road\ 'r' \times AADT\ in\ the\ road\ 'r' \times 365} \quad (2.2)$$

$$RSI = \frac{RI_{sr} - RI}{RI_{sr}} \quad (2.3)$$

where:

- RSI: road safety indicator
- RI_{sr}: road safety index of similar roads (injury crashes / volume of traffic; both for the year of assessment in all similar roads of the region)

Road Safety Indicator	Actual Accident Rate (AAR) in comparison to similar roads
Formula	

$$AAR = \frac{(FA \times 130 + SA \times 70 + LA \times 5 + OA)}{length\ of\ the\ road \times AADT \times 365} \times 10^6 \quad (2.4)$$

$$RSI = AAR_{sr} - AAR \quad (2.5)$$

where:

- FA = number of fatal accidents
- SA = number of serious accidents
- LA = number of light accidents
- OA = number of other accidents
- RSI: road safety indicator
- AARsr: The AAR of similar roads

2.3.1 Introduction of Traffic Safety Performance Measures in the U.S.

In the United States, a number of similar safety performance measures have been widely used by public agencies to assess state traffic performance. For example, Federal Law 23CFR 1200.10 (a)(1) requires each state to develop the following annually:

"(a) A performance plan, containing the following elements: (1) A list of objective and measurable highway safety goals, within the National Priority Program Areas and other program areas, based on highway safety problems identified by the State during the processes under paragraph (a)(2) of this section. Each goal must be accompanied by at least one performance measure that enables the State to track progress, from a specific baseline, toward meeting the goal (e.g., a goal to "increase safety belt use from __ percent in Year __ to __ percent in Year __," using a performance measure of 'percent of restrained occupants in front outboard seating positions in passage motor vehicles')."

In order to 1) set project safety goals, 2) connect goals to specific actions, 3) allocate public resources, 4) monitor and evaluate progress, and 5) communicate the priorities, results and value to society of various traffic program areas and activities, in 2008, the National Highway Traffic Safety Administration (NHTSA) and the Governors Highway Safety Association (GHSA) agreed on a minimum set of 14 performance measures to be used by states and federal agencies in the development and implementation of behavioral highway safety plans and programs (Hedlund 2008). The 14 performance measures are summarized in table 2.2. This minimum set of performance measures is developed by an expert panel consisting of NHTSA, state highway safety offices (SHSOs), academic and research organizations, and other key groups, with staff assistance from the GHSA and the Preusser Research Group (PRG).

Table 2.2 Safety performance measures

Type of Measure	Performance Measures	Data Source
Outcome	Number of traffic fatalities	FARS
Outcome	Number of serous injuries	State crash data set
Outcome	Fatalities/VMT	FARS, FHWA
Outcome	Number of unrestrained passenger vehicle occupant, all seat positions	FARS
Outcome	Number of fatalities in crashes involving a driver or motorcycle operator with a blood alcohol concentration of .08 g/dL or higher	FARS
Outcome	Number of speeding-related fatalities	FARS
Outcome	Number of motorcyclist fatalities	FARS
Outcome	Number of unhelmeted motorcyclist fatalities	FARS
Outcome	Number of drivers age 20 or younger involved in fatal crashes	FARS
Outcome	Number of pedestrian fatalities	FARS
Behavioral	Observed seat belt use for passenger vehicles, front seat outboard occupants	Survey
Activity	Number of seat belt citations issued during grant-funded enforcement activities	Grant activity reporting
Activity	Number of impaired-driving arrests made during grant-funded enforcement activities	Grant activity reporting
Activity	Number of speed citations issued during grant-funded activities	Grant activity reporting

According to the NHTSA report (Hedlund 2008), the proposed safety performance measures could be divided into three distinct subjects: outcomes, behaviors, and activities. Outcome measures, based on traffic crash data, are used to set national and state safety goals, allocate funding and other public resources, and assess performance both overall and in key areas. The data used for outcome measures should be accurate. For national use, the data should be uniform and consistent across states and over time; for state use, the data do not need to be uniform or consistent with other states, but they should be consistent over time. However, the data may not be especially timely. The most common outcome measures used at the federal,

state, and local levels are annual traffic fatality and annual traffic fatalities rates (fatalities per vehicle miles traveled).

Behavior measures use data either from direct observations (*e.g.,* belt use or vehicle speed) or from some method of self-reporting (*e.g.,* surveys). Behavior measures provide a link between specific activities and outcomes by assessing whether such activities have influenced behaviors. Behavior measures help states assess the effectiveness of their specific activities in a timely manner, which in turn allows the state to allocate limited resources efficiently.

Activity measures cover a wide range of specific actions taken in an attempt to affect outcome measures (e.g., reducing crashes). They document how specific programs and activities are implemented. Examples include (1) counts of activities (*e.g.,* checkpoints conducted, public service announcements (PSAs) aired, motorcycle operators' training courses held); (2) funds or hours used to conduct the activities (e.g., law enforcement hours used for checkpoints, cost of PSAs, costs or instructor hours for motorcycle operator training); and (3) counts of persons affected (e.g., drivers passing through checkpoints, number of viewers for PSAs, number of motorcycle operators trained). Activity measures may not be consistent across states or over time because different states may use different activities at different times to advance their highway safety programs. However, activity measures should still be timely (Hedlund 2008).

The three types of measures work together to document overall performance. Activity measures document what was done; behavior measures document whether the activities changed behaviors; and outcome measures document whether the change of behaviors actually improved safety performance (*e.g,.* reducing crashes, injuries or fatalities).

2.3.2 Safety Performance Measures Currently Used by States

The GHSA supports 10 performance measures for use by all states, which are listed in the GHSA guidelines for developing Highway Safety Plans, including traffic fatalities, fatalities per MVMT, injuries by population, observed belt use rate, alcohol related fatalities, alcohol related fatalities per VMT, and percentage of all fatalities that involve alcohol (GHSA 2004). Nine of the ten measures are outcome measures obtained from the Fatality Analysis Reporting System (FARS) and state crash data files. Observed belt use is the only behavior measure, and there are no activity measures. According to NHTSA (Hedlund 2008), all states use performance measures, at least implicitly, in their annual highway safety (Sec. 402) plans. But not a single measure is used by all states. While the ten GHSA-supported measures are used most frequently, only four states include all of them in their safety reports. The outcome measures used to evaluate safety performance are quite different for each state. Such differences are based on two major factors: what to count (*e.g.*, crashes, injuries crashes, serious injury crashes, fatal crashes, injuries, serious injuries, fatalities) and how to incorporate the exposure of traffic (normalization) (*e.g.*, rates per VMT, per population, per registered driver). A total 45 states have an overall performance goal of reducing traffic fatalities, fatalities/MVMT, or both (Hedlund 2008).

2.4 PPP on Improving Roadway Safety Performance

2.4.1 Similar Research Based on PPP Projects in Mexico

Cornell University conducted research led by Geddes (2014) regarding the effects of PPP on traffic safety. In that research, the data set was constructed on the basis of Mexico's federal toll roads. According to the management approaches, the Mexico federal toll roads, as a categorical independent variable, were divided into three types: toll roads managed by the

federal government, toll roads managed by the state, and toll roads managed by the private sector. The dependent variables used for observation consisted of a variety of traffic incidents, such as accidents/crashes, fatal accidents, car collisions, and fixed object collisions. By employing a number of statistical techniques, such as locality-fixed effects, time-fixed effects, and robust standard errors, the research produced results that indicated that private management of federal roads in Mexico did not have a statistically significant effect on any safety measures.

2.4.2 Similar Research Based on the PPP Projects in Spain

Other similar research was completed on the basis of European PPP projects (Vassallo et al. 2009). In that research, PPP projects in Spain were used as the specific research population, since most Spanish PPP highway projects contained safety incentives within their concession contracts. The database in that research covered the year 2006, since that was the most recent year for a complete database at the time. The data consisted of two parts: police-reported accident data (*e.g.,* crashes, injuries, and fatalities) and traffic data (*e.g.,* AADT and number of intersections). The major independent variables selected in the research included AADT, percentage of heavy goods vehicles (%HGV), number of intersections for each stretch (INT), road operation (RO), and incentives (INC). Among them, the first three variables had potential influence on roadway safety and did not depend on a concessionaire's ability to manage the road, and the last two variables could indicate the differences between PPP projects and traditional projects (Rangel, Vassallo, and Arenas 2012). As with the Cornell research, the RO variable here was also a categorical variable and used to identify the types of roads, including two levels of public highways and toll highways / PPP highways. The dependent variables used in the research were fatal rate, injury rate, and accident rate. Table 2.3 presents part of the database used in the research. Poisson and Negative Binomial (NB) regressions were to determine the relationship

between independent variables and dependent variables. The NB model indicated that the INC variable was statistically significant with the dependent variables. This result can be interpreted to mean that the roads with incentives had fewer fatalities, injuries, and accidents than roads without incentives. Rangel, Vassallo, and Arenas (2012) concluded that PPP contracts with a safety payment or incentives were effective at encouraging concessionaires to implement safety approaches and could improve safety performance. Villar and Vassallo (2014) conducted another project to analyze the relationship between the size of monetary incentives in PPP contracts and the ultimate improvement of safety performance. In that follow-up research, a methodology was developed to identify the optimal safety incentives in PPP contracts through a cost-benefit analysis (CBA).

Table 2.3 Descriptive statistics by road operation and total in year 2006 (Rangel, Vassallo, and Arenas 2012)

Variable	RO	Mean	S.D.	Range	Minimum	Maximum
AADT	AV	23,686.04	21,875.96	139,040.00	1,270.00	140,310.00
	1AV	35,735.05	34,262.09	186,365.00	5,135.00	191,500.00
	TH	16,508.43	12,950.00	58,093.00	1,094.00	59,187.00
	Total	26,080.92	26,046.31	190,406.00	1,094.00	191,500.00
%HGV	AV	18.53	10.12	72.40	2.80	75.20
	1AV	23.37	8.95	48.10	4.60	52.70
	TH	10.35	5.39	32.60	1.50	34.10
	Total	18.63	10.08	73.70	1.50	75.20
INT	AV	2.08	1.21	8.00	0.00	8.00
	1AV	2.38	1.59	12.00	0.00	12.00
	TH	1.54	0.70	3.00	0.00	3.00
	Total	2.08	1.29	12.00	0.00	12.00
Millions of vehiclekilometers	AV	52.28	56.22	451.28	0.42	451.70
	1AV	79.25	70.65	355.89	3.13	359.02
	TH	42.51	42.91	250.19	0.48	250.67
	Total	58.68	60.60	451.28	0.42	451.70

Chapter 3 Study Data

3.1 Study Target States and Target Projects (Task 1)

3.1.1 The Selection of Target States

As the first step of this research, a set of target states needed to be identified. According to the National Conference of State Legislatures (NCSL) (2016), enabling statutes that grant an existing or new executive agency thet authority to enter into one or more PPP agreements for transportation projects – and define the limits of that authority – are a necessary precursor to PPP implementation. These statutes set conditions that promote or prevent PPPs, guide development of state PPP programs, provide foundations for PPP contracts, and affect the risks involved for each party. PPP legislation was first enacted more than 20 years ago in California (Assembly Bill 680, 1989). A few years later, in 1995, Virginia adopted its comprehensive Public-Private Transportation Act. The number of states with PPP enabling statutes continues to grow. On the basis of a recent report provided by the NCSL (Rall, Reed, and Farber 2014), 33 states and Puerto Rico have legislation allowing PPPs for highway and bridge projects. Some of the legislation is broad, allowing PPPs for a variety of projects across multiple sectors without further approvals, while other legislation is more limited and may require additional legislative approval of PPPs or limit the number or type of PPPs that state agencies may undertake. Table 3.1 shows the states with PPP enabling legislation, provided by the NCSL (updated in 2014). The information can be categorized as states with broad legislation, states with limited or project-specific legislation, and states with no legislation to enable PPPs.

Table 3.1 NCSL list of states with PPP enabling legislation
(Updated in February 2014)

NCSL LIST OF STATES WITH PPP ENABLING LEGISLATION			
States with Broad Legislation	1. Arizona	9. Louisiana	17. Puerto Rico
	2. Alabama	10. Maine	18. South Carolina
	3. California	11. Maryland	19. Utah
	4. Colorado	12. Massachusetts	20. Washington
	5. Delaware	13. Mississippi	21. West Virginia
	6. Georgia	14. North Dakota	22. Wisconsin
	7. Florida	15. Ohio	23. Virginia
	8. Illinois	16. Oregon	17. Texas
States with Limited or Project-Specific Legislation	1. Alaska	5. Minnesota	9. Pennsylvania
	2. Arkansas	6. Missouri	10. Tennessee
	3. Connecticut	7. Nevada	
	4. Indiana	8. North Carolina	
States with No Legislation Enabling PPPs	1. Hawaii	7. Montana	13. Oklahoma
	2. Idaho	8. Nebraska	14. Rhode Island
	3. Iowa	9. New Hampshire	15. South Dakota
	4. Kansas	10. New Jersey	16. Vermont
	5. Kentucky	11. New Mexico	17. Wyoming
	6. Michigan	12. New York	

Even though over half of the states have legislation enabling PPPs, a much smaller number of states has completed a satisfactory number of PPP projects that was helpful for research purposes, and Oregon is the only PacTrans consortia state with some PPP experience. Therefore, this study identified appropriate states that have

- PPP enabling legislation;
- An availability of sufficient roadway safety data (i.e., traffic crash reports, traffic volume reports, etc.);
- a wealth of experience and history with using PPPs.

On the basis of the above selection principles and the research goal for PacTrans, the target states were divided into two groups. The main feature of the first group was that the selected states had a wealth of experience with PPPs (i.e., were early adopters and industry leaders) and higher PPP completion (i.e., projects with abundant searchable documents). On the basis of the review profiles of the existing PPP projects in each state provided by the FHWA, Public Works Financing (PWF), and the author's database, the target states selected in the first group included California, Florida, Indiana, Texas, Virginia, and Puerto Rico. The second group of states included all states affiliated with the PacTrans consortium. They were Alaska, Idaho, Oregon, and Washington. Although this second group of states could not be considered as experienced PPP adopters, collecting their safety data would serve to develop a pre-PPP baseline that could be used to evaluate potentially obtainable improvements if PPP were employed more in future Northwest projects.

3.1.2 PPP Enabling Status in the Selected States

In July 2014, President Obama announced the launch of the "Build America Investment Initiative," a government-wide initiative that aimed, among other things, to increase infrastructure investment by engaging with state and local governments as well as private-sector investors, to encourage collaboration, expand the market for PPPs, and get more out of existing federal financing programs. This initiative included the establishment of the Build America Transportation Investment Center (BATIC), housed with the US Department of Transportation (USDOT). According to a report on U.S. PPP, provided by Squire Patton Boggs, LLP in 2015, the PPP enabling situation in each selected state was as follows:

3.1.2.1 Group 1

California. California continues to be a leader in the PPP sector, with some of the most innovative projects. On February 20, 2009, the California legislature approved Senate Bill Second Extraordinary Session 4 (SBX2 4) Chapter 2, Statutes of 2009, which established legislative authority until January 1, 2017, for regional transportation agencies and Caltrans to enter into an unlimited number of PPPs, and it removed restrictions on the number and type of projects that could be undertaken (Caltrans Website http://www.dot.ca.gov/hq/innovfinance/public-privatepartnerships/PPP_main.html). So far California PPP statutes have authorized the following:

- The California Department of Transportation (Caltrans) and regional transportation agencies to enter into PPP agreements
- Local government agencies to use private sector capital to develop specified projects if certain conditions are met
- The state judiciaries to plan, construct, acquire, and operate its court facilities through the use of PPPs.

Florida. Florida has been a leader in the PPP sector, with some of the most significant P3 transactions in the U.S., including the Port of Miami Tunnel and the I-595 Corridor projects. Florida's initial P3 legislation was limited to transportation projects. But on May 3, 2013, the Florida legislature passed House Bill 85 (HB85), expanding Florida's PPP statute to allow PPPs to be used in other sectors. The new law, which became effective July 1, 2013, allows any responsible public entity (including counties, municipalities, school boards, regional entities, and other state subdivisions) to use the PPP structure to develop any project that serves a public purpose.

Indiana. Indiana is becoming a leader in the P3 sector. Nowadays, Indianan has in place broad P3 legislation that authorizes the Indiana Finance Authority (IFA) to enter into P3 agreements with private entities (*Ind. Code Ann. # 8-15.5-1-1 to 8-15.5-13-8*). Under this legislation, the IFA can enter into agreements with a private sector party to, among other things, plan, design, acquire, construct, improve, expand, lease, operate, repair, manage, maintain, or finance toll road projects. The Indiana Department of Transportation (IDOT) is also authorized to enter into PPP agreements to develop, finance, or operate transportation projects, including toll ways, roads, bridges, and some rail projects (*Ind. Code Ann. # 8-15.7-1-1 to 8-15.7-16-8*). Cities and other local jurisdictions are also allowed to enter into P3 agreements (*Ind. Code Ann. # 5-23-1-3*).

Texas. Texas has in place P3 legislation, the Texas Public Private Infrastructure Act. As a leader in the PPP sector, Texas has implemented several P3 projects, including the North Tarrant Express Segments 3A&3B project, which reached financial closure in September 2013. Texas remains very active, with several projects in the pipeline despite the cancellation or postponement of several PPP procurements in recent years and the financial difficulties faced by certain projects in the state, such as the SH 130 toll road. In 2011, the Texas legislature enacted the Public and Private Facilities and Infrastructure Act to encourage private investment in public use facilities and infrastructures. The law authorized PPPs for a wide range of social infrastructure projects, including facilities for mass transit, water supply and power generation, and oil and gas pipelines. Currently, Legislation passed by the Texas legislature may catalyze more private investment. House Bill 2475 signed into law on June 19, 2015, established a new "center for alternative finance and procurement" that will assist government entities in selecting PPP projects for nearly any type of public infrastructure

(http://water.velaw.com/TexasLegislatureAuthorizesNewPublic-PrivatePartnershipCenter.aspx).

Virginia. Virginia is a leader in the U.S. PPP sector and has completed some of the most significant P3 projects in recent years, including the Midtown Tunnel Project. Virginia has broad P3 legislation in place:

- The Public-Private Education Facilities and Infrastructure Act of 2002 that allows private entities to acquire, design, construct, improve, renovate, expand, equip, maintain, or operate qualifying projects, including schools, wastewater treatment plants and telecommunications infrastructure (Va. Code Ann. # 56-575.1 to 56-575.18).
- The Public-Private Transportation Act of 1995 (PPTA) applies to transportation projects, including roads, rail, transit and aviation (Va. Code Ann. #56-556 to 56-575).
- On November 12, 2014, the Commonwealth Transportation Board (CTB) approved new PPP guidelines that aim to increase transparency and competition and to better evaluate the public's risk under PPP transportation projects. The new guidelines followed a six-month long public outreach program by the CTB.

Puerto Rico. On June 8, 2009, the Commonwealth of Puerto Rico enacted legislation that authorizes PPPs for projects across multiple classes of infrastructure. Commonly known as the "PublicPrivate Partnership Act," the legislation of SB469 creates the PPP Authority as a public corporation and affiliate of the Government Development Bank for Puerto Rico and designates the Authority as the sole government entity responsible for determining the functions, services, or facilities for which PPPs are to be established (Puerto Rico DOT website).

3.1.2.2 Group 2

Alaska. In 2003, the Alaska legislature authorized the Knik Arm Bridge and Toll authority to enter into PPPs in any form to finance, design, construct, maintain, improve, or operate the Knik Arm Bridge (*See Alaska Statute. #19.75.111 to 990*). Knik Arm Bridge has been the only PPP trial in Alaska.

Idaho. Idaho has not yet employed PPP, and there has been no legislation enabling PPP yet.

Oregon. In January 2006, the Oregon Department of Transportation (ODOT), under the OregonInnovative Partnerships Program (OIPP), signed a PPP agreement with the Oregon Transportation Improvement Group (OTIG) to deliver new transportation infrastructure projects to the state.

Washington. The Transportation Innovative Partnerships Act was enacted in 2005 (codified as Chapter 47.29 RCW). This law phased out the previous PPIT Act (RCW 47.46) and created a new public-private partnership law in Washington. The new law allows transportation-related projects and programs of all modes to be eligible for development as a public-private partnership under the Transportation Innovative Partnership Program (TIPP). The TIPP program is administered by WSDOT but overseen by the Washington State Transportation Commission. The Commission has final approval authority for any TIPP agreement negotiated between WSDOT and a private partner. The Commission was directed to enact administrative rules to carry out the TIPP program. In 2006, the Washington State Transportation Commission formally adopted administrative rules to implement the TIPP. The new program rules can be found at WAC 468-600 (WSDOT http://www.wsdot.wa.gov/Funding/Partners/History.htm).

3.1.3 The Selection of Target PPP Projects

As the second step in Task 1, target PPP projects were identified within the selected states. Because of the insufficient experience within the second group of states in employing PPP and the limited nature of the PPP projects in those states, the target PPP projects were selected only from the first group of states, which were more representative and appropriate for research purposes. Among the states in Group 1, four had more PPP completions and more searchable PPP documents, including California, Florida, Texas, and Virginia. Table 3.2 to table 3.5 list all current transportation PPP projects in these four states. The main sources for project information were compilations from the Federal Highway Administration's (FHWA) Public Works Financing (PWF).

Table 3.2 includes all existing projects or projects in active procurement related to transportation PPPs in Florida. To date, 17 transportation PPP projects have been conducted in Florida. Two of them were issued in 2014 and were in the procurement stage (under consideration); seven of them were under construction; three of them were open the public for use (in operation); and five of them had completed contracts.

Table 3.3 includes all existing projects or projects in active procurement related to transportation PPPs in California. To date, six PPP projects related to roadways have been conducted in California. Two of them were newly issued in 2014 and were in the procurement stage (under consideration); one was under construction; and three were open for public use (in operation).

Table 3.2 Transportation PPP projects in Florida

Selected States	PPP Projects	Status	PPP Types	Project Sizes ($)
Florida	I-395	Under Consideration		
	Tampa Bay Express	Under Consideration	DBOM	
	I-4 Ultimate in Orange & Seminole Counties	Under Construction	DBFOM	2.3 B
	SR 79	Under Construction	DBF	98 M
	I-75 North of SR 80 to South of SR 78	Under Construction	DBF	72 M
	SR 9B	Under Construction	DBF	95 M
	I-95 from South of SR 406 to North of SR 44	Under Construction	DBF	130 M
	Palmetto Section 5 - SR 826/836 Interchange	Under Construction	DBF	566 M
	US 19	Under Construction	BF	124 M
	PortMiami Tunnel (1st availability payment procurement in US)	In Operations	DBFOM	1.113 B
	I-595 Improvements	In Operations	DBFOM	1.2 B
	I-4 Connector	In Operations	BF	434 M
	I-75 in Lee and Collier Counties	Contract Complete	DBF	458 M
	Palmetto Expressway Widening and Interchange Improvements Section 2	Contract Complete	DBF	190 M
	I-95 Widening/Pineda Causeway Interchange	Contract Complete	DBF	199 M
	I-95 Express Lanes Phase I	Contract Complete	DBF	139 M
	US 1 Improvements in the "18-mile Stretch"	Contract Complete	DBF	114 M

Table 3.3 Transportation PPP projects in California

Selected States	PPP Projects	Status	PPP Types	Project Sizes ($)
California	Highway 156 West Corridor	Under Consideration	DBFOM	270 M
	High Desert Corridor (SR14 in LA to SR18 In San Bernardino)	Under Consideration		3.6 B
	SR 91 Corridor Improvement Project	Under Construction	DB	1,311.7 M
	SR 125 (South Bay Expressway)	In Operations	DBFOM	658 M
	The Presidio Parkway	In Operations	DBFOM	1.1 B
	Foothill/Eastern and San Joaquin Toll Roads	In Operations	DB	3.264 B

Table 3.4 Transportation PPP projects in Texas

Selected States	PPP Projects	Status	PPP Types	Project Sizes ($)
Texas	SH 360	Under Consideration	DBM	
	SH 288 Toll Concession	Under Consideration	DBFOM	320 M
	SH 183 Managed Lanes	Under Construction	DBFOM	1.586 B
	SH 71 Toll Lanes Project	Under Construction	DB	
	Loop 375 Border Highway West Extension	Under Construction	DB	448 M
	Energy Sector Roadway Repair Project	Under Construction	DB	
	Loop 1604 Western Extension Project	Under Construction	DB	126 M
	IH 35E Managed Lanes	Under Construction	DB	4.8 B
	SH99/Grand Parkway	Under Construction	DB	2.9 B
	Horseshoe Project	Under Construction	DB	818 M
	DFW Connector	Under Construction	DB	1.1 B
	LBJ 635 / IH 635 managed lanes	Under Construction	DBFOM	3.1 B
	North Tarrant Express (Seg 1,2, 3A, 3B)	In Operations	DBFOM	3.83 B
	SH 130	In Operations	DBFOM	1.3 B
	183-A Turnpike	In Operations	DB	304.7 M

Table 3.4 includes all existing projects or projects in active procurement related to transportation PPPs in Texas. To date, 15 transportation PPP projects had been conducted in Texas. Two of them were issued in 2014 and in the procurement stage (under consideration); ten of them were under construction; and three of them were open for public use (in operation).

Table 3.5 includes all existing projects or projects in active procurement related to transportation PPPs in Virginia. To date, 12 transportation PPP projects had been conducted in Virginia. One was current in the procurement stage (under consideration); three were under construction; and eight were open for public use (in operation).

Table 3.5 Transportation PPP Projects in Virginia

Selected States	**PPP Projects**	**Status**	**PPP Types**	**Project Sizes ($)**
Virginia	New Thimble Shoal Channel Tunnel Project	Under Consideration	DBFOM	644 to 883 M
	Elizabeth River Tunnels	Under Construction	DBFOM	2.1 B
	US Route 121 (Coafields Expressway)	Under Construction	DB	5.1 B
	Downtown Tunnel/Midtown Tunnel/ MLK Extension	Under Construction	DBFOM	2,089 M
	Route 58	In Operations	DB	222.75 M
	Route 28	In Operations	DB	349 M
	I-495 Express Lanes	In Operations	DBFOM	2.068 B
	I-95 Express Lanes	In Operations	DBFOM	925 M
	Route 199	In Operations	DB	32 M
	Route 288	In Operations	DB	236 M
	Pocahontas Parkway (Route 895)	In Operations	(99 year Concession)	611 M
	Dulles Greenway	In Operations	DBFOM	350 M

The target PPP projects in this research were identified on the basis of the following criteria:

1. The procurement model – projects with design-build-finance-operatio-maintenance (DBFOM), design -build –operation-maintenance (DBOM), or a long-term concession (i.e., over 50 years) were preferred.
2. The availability of procurement documents (i.e., RFQ, RFP, a comprehensive agreement / general contract, technical requirements, etc.)
3. The availability of sufficient roadway safety data (*e.g.*, traffic crash reports) and traffic volume data (*e.g.*, AADT or VMT).

The 17 projects that had the most research value were identified and are summarized in table 3.6. Because California, Florida, Texas, and Virginia had more searchable PPP projects than the other two targets, Indiana and Puerto Rico, 13 projects were selected from those four states. Of those 13 projects, three of them were in Florida, including the port of Miami Tunnel, the I-595 Improvement, and the I-4 Connector; two of them were in California, including the SR125 (South Bay Expressway) and the Presidio Parkway; four of them were in Texas, including LBJ 635 (IH 635 Managed Lanes), the North Tarrant Express (Seg. 1, 2, 3A, & 3B), SH 183 Managed Lanes, and SH 130; and four of them were in Virginia, including the Elizabeth River Tunnels, I-495, I-95, and the Pocahontas Parkway (Route 895). For the sake of involving more long-term leasing projects in this research, four projects with longer than 45 years of leasing concessions were selected. Of those four long-term lease projects, two were from the other two target states /U.S. territory in Group 1, including the Indiana Toll Road in Indiana and the PR-22 and PR-5 Toll Road in Puerto Rico. The data were supplemented by data from the Northwest Parkway in Colorado and the Chicago Skyway in Illinois to provide more long-term

lease projects. Finally, to enrich the analysis and provide more PPP projects in the sample, two highway projects from British Columbia, Canada—the Seat-To-Sky Highway (STS) and the William R. Bennett Bridge—were detailed as case studies.

Table 3.6 Information on target PPP projects

Project	State	Project Delivery/Contract method	Year of Financial Closure	Status
The Port of Miami Tunnel	Florida	DBFOM	2009	In Operation
I-595 Improvement	Florida	DBFOM	2009	In Operation
I-4 Ultimate	Florida	DBFOM	2014	Under Construction
SR125 (South Bay Expressway)	California	DBFOM	2003	In Operation
The Presidio Parkway	California	DBFOM	2012	In Operation
LBJ 635 (IH 635 Managed Lanes)	Texas	DBFOM	2008	In Operation
North Tarrant Express (Seg. 1, 2, 3A, & 3B)	Texas	DBFOM	2009	In Operation
SH 183 Managed Lanes	Texas	DBFOM	2014	Under Construction
SH 130 Seg. 5 & 6	Texas	DBFOM	2007	In Operation
Elizabeth River Tunnels	Virginia	DBFOM	2012	Under Construction
I-495	Virginia	DBFOM	2008	In Operation
I-95	Virginia	DBFOM	2012	In Operation
Pocahontas Parkway	Virginia	Lease-Develop-Operate	2007	In Operation
Indiana Toll Road	Indiana	75-year long-term lease	2006	In Operation
PR-22 and PR-5 Toll Road	Puerto Rico	40-year long-term lease	2011	In Operation
Northwest Parkway	Colorado	Long-term lease	2007	In Operation
Chicago Skyway	Illinois	99-year long-term lease	2005	In Operation

3.2 Data Collection for Roadway Safety Performance

The data collection was divided into two parts, benchmark safety data and PPP project safety data. The types of collected data were identified on the basis of the availability of a database. According to a search, traffic crashes (total crashes), injuries, and fatalities are commonly used in state annual crash facts/reports. These three types of data then were treated as the initial data collected in this study. In the literature, we found that exposure to traffic (risk) should be taken into consideration in order to reduce distortions in roadway safety results. Therefore, this study used traffic flow to represent exposure to traffic. Traffic flow can be determined on the basis of annual average daily traffic (AADT) or vehicle miles traveled (VMT), which is calculated as AADT multiplied by the road length.

3.2.1 Benchmark Safety Data Collection (Task 2)

A comprehensive search for Annual Crash Facts feports or other traffic crash statistics in the target states was conducted to collect state-level and local-level (city/county) roadway safety data. These data were used to establish the norm or average safety performance measures or accident statistics, which represented the benchmarks by which to compare and evaluate the safety performance of the PPP projects. Because the target PPP projects selected in California were still under construction and the traffic safety data were unavailable during the research period, California was not included in the data collection. The benchmark safety data collection for the other target states are summarized as follows.

3.2.1.1 Florida

The Florida Department of Highway Safety and Motor Vehicles (DHSMV) collects data and conducts research in order to provide lawmakers, partners, stakeholders, the media, and citizens with important facts and valuable information related to public safety and motor services. The DHSMV has a center for Crash and Citation Reports and Statistics (http://www.flhsmv.gov/resource-center/crash-citation-reports/), which is available for the public to get state-level, county-level, and city-level traffic safety data in the previous 10 years. Additionally, the Florida Department of Transportation (FDOT) generates an Annual Crash Facts report to compile and analyze traffic and safety data and emerging trends in order to support public safety improvements and policy decision-making. Table 3.7 summarizes the data collection at the state level, and table 3.8 summarizes the data collection at the local level, which was based on project location.

Table 3.7 Florida state-level benchmark data collection

Florida Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	374003	243229	2898	NA
2014	344261	225678	2495	201,040,404,585
2013	317192	211082	2404	192,701,815,700
2012	283365	198484	2420	190,850,891,575
2011	229210	182007	2398	195,755,149,806

Table 3.8 Florida locality-level benchmark data collection

Florida City/County Level Data				
PPP Project		The Port of Miami	I-595 Improvements	I-4 Ultimate
Locality		Miami-Dade County	Broward County	Orlando City
Total Crashes	2015	63,245	38,370	25,952
	2014	60,175	34,839	23,026
	2013	53,033	32,747	21,421
	2012	51,605	31,306	20,225
	2011	51,125	32,104	20,467
Injuries	2015	32,686	23,468	19,886
	2014	31,758	22,157	17,563
	2013	28,716	21,694	16,554
	2012	29,819	21,340	16,144
	2011	32,184	22,312	17,521
Fatalities	2015	324	197	194
	2014	281	173	158
	2013	224	180	171
	2012	226	187	178
	2011	302	178	159
Annual Vehicle Miles Traveled (AVMT)	2015	NA	NA	NA
	2014	19,440,049,650	16,408,256,355	13,282,182,100
	2013	18,651,946,760	16,052,928,125	12,740,271,710
	2012	18,653,870,310	16,052,374,785	12,446,484,670
	2011	19,479,229,480	15,802,992,550	12,163,739,975

3.2.1.2 Texas

The Texas Department of Transportation (TxDOT) is the custodian of crash records for the state. Texas Transportation Code §550.062 requires any law enforcement officer who, in the regular course of duty, investigates a motor vehicle crash that results in injury or the death of a person or damage to the property of any one person to the apparent extent of $1,000 or more to submit a written report of that crash to TxDOT no later than the 10th day after the date of the

crash. TxDOT collects crash reports from every law enforcement agency in Texas and for crashes that occur on any public roadway in Texas, not just crashes occurring on the state highway system. The state retention schedule for crash reports and data is five years plus the current year. Information outside this retention schedule is not available. A crash reporting system is available online that for consultation at http://www.txdot.gov/inside-txdot/formspublications/drivers-vehicles/publications/ annualsummary.html. Table 3.9 and table 3.10 summarize the status of data collection at the state level and local level, respectively.

Table 3.9 Texas state-level benchmark data collection

Texas Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	NA	NA	NA	NA
2014	476875	175752	3534	248,824 M
2013	445829	170163	3408	244,536 M
2012	417707	166991	3417	237,821 M
2011	452347	168271	3016	237,443 M

Table 3.10 Texas locality-level benchmark data collection

Texas City/County Level Data					
PPP Project		IH 635 Managed Lanes	North Tarrant Express	SH 183 Managed Lanes	SH 130
Locality		Dallas-Fort Worth County	Dallas-Fort Worth County	Dallas-Fort Worth County	Travis County
Total Crashes	2015	NA	NA	NA	NA
	2014	43,052	43,052	43,052	15,415
	2013	40,896	40,896	40,896	16,106
	2012	36,491	36,491	36,491	16,177
	2011	35,315	35,315	35,315	15,532
Injuries	2015	NA	NA	NA	NA
	2014	34,672	34,672	34,672	12,884
	2013	33,786	33,786	33,786	13,644
	2012	31,747	31,747	31,747	14,501
	2011	31,297	31,297	31,297	13,140
Fatalities	2015	NA	NA	NA	NA
	2014	238	238	238	95
	2013	227	227	227	112
	2012	211	211	211	105
	2011	179	179	179	84
Annual Vehicle Miles Traveled (AVMT)	2015	27,502,553,114	27,502,553,114	27,502,553,114	NA
	2014	27,103,855,113	27,103,855,113	27,103,855,113	9,281,029,525
	2013	26,706,264,124	26,706,264,124	26,706,264,124	9,401,992,200
	2012	26,312,972,116	26,312,972,116	26,312,972,116	9,341,624,341
	2011	25,917,222,839	25,917,222,839	25,917,222,839	9,022,820,718

Additionally, Texas has a comprehensive safety database that is accessible to the public. The authors further selected some comparable public highways or public toll roads to collect safety data. Such data were used to establish a public, non-PPP project-level benchmark and to compare that with PPP project safety performance. Table 3.11 summarizes the collection of non-PPP project-level safety benchmark data.

Table 3.11 Texas non-PPP project-level benchmark data collection

Public Project Level Data					
Project		IH 35W from SH 183 to IH 820	I30 from I35E to SH 12	SH 45 Toll from I 35 to SH 130	I 35 from SH 183 to SH 290
Type		Public Highway	Public Highway	Public Toll Road	Public Highway
Total Crashes	2015	232	294	17	351
	2014	165	275	17	354
	2013	137	286	11	364
	2012	145	277	16	379
	2011	91	264	9	332
Injuries	2015	81	74	5	97
	2014	45	79	4	105
	2013	49	85	2	112
	2012	56	89	3	124
	2011	35	77	3	109
Fatalities	2015	0	1	0	11
	2014	4	2	1	7
	2013	1	4	0	8
	2012	1	5	1	6
	2011	2	4	0	9
Annual Vehicle Miles Traveled (AVMT)	2015	NA	NA	NA	NA
	2014	361,128,080	541,112,318	30,059,502	805,185,036
	2013	361,782,160	604,225,928	25,194,782	814,752,270
	2012	359,160,000	629,625,000	25,068,200	843,588,000
	2011	315,360,000	570,860,000	20,600,600	772,632,000

3.2.1.3 Virginia

The Traffic Records Management, Reporting and Analysis Division, of the Virginia Highway Safety Office (VAHSO) manages the state's highway safety traffic records information system, which houses millions of traffic crash records. Data that are collected, stored, and analyzed by this division are used for problem identification and resolution by local, state, and

federal entities across the Commonwealth. These data aer housed in the Traffic Records Electronic Data System (TREDS). TREDS, the first of its kind in Virginia, is a state-of-the-art traffic crash data system that automates and centralizes crash information from across the state.

The Traffic Records Management, Reporting and Analysis Division engages in strategic planning to ensure the effective use of its existing Virginia traffic records information system to support and highlight the Commonwealth's safety programs and grant funding initiatives (Virginia Department of Motor Vehicle website). The Virginia Traffic Crash Facts publication is the result of the cooperative efforts of the Virginia Department of Motor Vehicles, the Virginia Department of State Police, and the Virginia Department of Transportation. It provides a comprehensive statistical overview of traffic crashes occurring in Virginia. The following website provides Annual Traffic Crash Reports from 2011 to 2014: http://www. dmv.state. va.us/safety/#crash_data/crash_facts/index.asp. Additionally, an accident data center is available online at http://accidentdatacenter.com/us/virginia. Table 3.12 and table 3.13 summarize the status of data collection for Virginia at the state level and local level, respectively. As with Texas, the authors were also able to establish a non-PPP project-level benchmark by collecting data from a set of comparable public highways in Virginia. The non-PPP project-level benchmark data are shown in table 3.14.

Table 3.12 Virginia state-level benchmark data collection

Virginia Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	NA	NA	NA	NA
2014	120282	63384	700	81,009 M
2013	121763	65114	741	80,767 M
2012	123579	67004	775	80,737 M
2011	124721	64421	764	80,974 M

Table 3.13 Virginia PPP locality-level benchmark data collection

Virginia City/County Level Data						
PPP Project		Elizabeth River Tunnel	I-495	I-95	Pocahontas Pkwy	Dulles Greenway
Locality		Portsmouth city	Fairfax city	Stafford county	Richmond city	Loudon County
Total Crashes	2015	NA	NA	NA	NA	NA
	2014	1,162	700	2,036	4,835	4,281
	2013	1,220	615	2,048	4,970	4,186
	2012	1,421	648	1,924	4,835	4,164
	2011	1,321	650	1,978	4,598	4,066
Injuries	2015	NA	NA	NA	NA	NA
	2014	809	440	875	2,799	2,123
	2013	847	227	819	2,804	1,917
	2012	929	243	958	2,799	1,837
	2011	870	205	898	2,723	1,869
Fatalities	2015	NA	NA	NA	NA	NA
	2014	5	0	12	16	12
	2013	3	2	8	12	13
	2012	3	5	15	16	18
	2011	2	2	9	17	11
Annual Vehicle Miles Traveled (AVMT)	2015	NA	NA	NA	NA	NA
	2014	563,452,690	174,614,175	1,548,879,690	1,781,219,345	2,587,912,780
	2013	594,251,025	178,817,150	1,553,785,290	1,727,773,855	2,535,825,820
	2012	613,773,780	182,721,555	1,567,950,210	1,793,661,830	2,492,055,385
	2011	613,307,675	182,988,370	1,494,622,805	1,781,426,300	2,489,965,395

Table 3.14 Virginia non-PPP project-level benchmark data collection

Public Project Level Data						
Project		I-66 (From Exit 55 to Exit 73)	I-395 (From Exit 1C to Exit 10A)	DullesAccessRoad (From Exit 9B to Exit 18)	I-95 Part I (From Same location to PPP project)	I-95 Part II (From Exit 81A to 128A)
Total Crashes	2015	620	662	44	1737	741
	2014	617	561	51	2067	642
	2013	576	599	38	1877	684
	2012	532	533	39	1403	584
	2011	518	532	58	1432	649
Injuries	2015	253	228	28	610	260
	2014	274	181	26	778	238
	2013	260	211	16	706	266
	2012	274	227	32	620	260
	2011	219	222	41	679	321
Fatalities	2015	1	0	0	1	4
	2014	0	0	1	7	3
	2013	2	0	0	3	5
	2012	0	2	0	4	2
	2011	1	2	1	4	10
Annual Vehicle Miles Traveled (AVMT)	2015	611,010,000	571,590,000	558,450,000	565,020,000	578,160,000
	2014	286,160,000	257,544,000	279,006,000	282,583,000	279,006,000
	2013	371,533,500	397,156,500	405,697,500	273,312,000	397,156,500
	2012	656,270,000	709,195,000	698,610,000	709,195,000	751,535,000
	2011	1,140,260,000	1,076,020,000	1,092,080,000	1,140,260,000	1,092,080,000

3.2.1.4 Indiana, Colorado, Illinois, and Puerto Rico

The Indiana Officer's Standard Crash Report, completed by local and state law enforcement officers, requires over 200 data items for each collision reported. The safety statistics are available from the state Annual Crash Facts books and are used to inform the public as well as state and national policy-makers on matters of roadway safety and to serve as the analytical foundation of traffic safety program planning and design in Indiana. Table 3.15 summarizes the status of data collection at the state level.

Table 3.15 Indiana state-level benchmark data collection

Indiana Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	NA	NA	NA	NA
2014	205532	48441	743	81,406.32M
2013	193013	46077	777	79,362.68M
2012	188841	47937	779	78,646 M
2011	188126	45993	750	77,456 M

The Colorado State Patrol evaluates the safety of Colorado roads by monitoring the fatality rate in the state. The traffic statistics are available at https://www.colorado.gov/pacific/csp/traffic-safety-statistics and https://www.codot.gov/library/traffic/safety-crash-data/fatal-crash-data-city-county. The state-level safety data are presented in table 3.16.

Table 3.16 Colorado state-level benchmark data collection

Colorado Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	NA	NA	548	NA
2014	100936	9785	488	46,855,000,000
2013	101011	9657	482	46,968,000,000
2012	100881	9965	474	46,769,000,000
2011	101107	9581	447	46,606,000,000

Illinois DOT offers a wide variety of data summaries and reports about motor vehicle crashes. The website (http://www.idot.illinois.gov/transportation-system/safety/IllinoisRoadway-Crash-Data) provides access to crash data summary reports, fact sheets, and interactive tools based on topics. Table 3.17 summarizes the status of data collection at the state level.

Table 3.17 Illinois state-level benchmark data collection

Illinois Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	NA	NA	NA	NA
2014	296049	84652	924	105.03 B
2013	285477	85031	991	105.48 B
2012	274111	83768	956	104.46 B
2011	281788	84172	918	103.37 B

The National Highway Traffic Safety Administration website (http://wwwnrd.nhtsa.dot.gov/departments/nrd-30/ncsa/STSI/43_PR/2014/43_PR_2014.htm) summarizes traffic safety performance measures for Puerto Rico. The data are shown in table 3.18.

Table 3.18 Puerto Rico data collection

Puerto Rico Statewide Data				
Year	Total Crashes	Injuries	Fatalities	Annual Vehicle Miles Traveled (AVMT)
2015	NA	NA		
2014	4,835	2,799	304	14,564,000,000
2013	4,970	2,804	344	18,588,000,000
2012	4,835	2,799	366	18,588,000,000
2011	4,598	2,723	361	18,588,000,000

The local-level safety data for Indiana, Colorado, Illinois, and Puerto Rico are presented in table 3.19.

Table 3.19 PPP locality-level benchmark data collection for Indiana, Colorado, Illinois and Puerto Rico

City/County Level Data					
PPP Project		Indiana Toll Road	Northwest Pkwy	Chicago Skyway	PR-5 & PR-22
Locality		North Indiana, IN	Broomfield county, CO	Chicago city, IL	Puerto Rico
Total Crashes	2015	NA	NA	NA	NA
	2014	NA	1,037	82,744	4,835
	2013	NA	1,104	79,384	4,970
	2012	NA	1,187	77,537	4,835
	2011	NA	1,097	77,926	4,598
Injuries	2015	NA	NA	NA	NA
	2014	NA	107	19,765	2,799
	2013	NA	124	20,199	2,804
	2012	NA	115	20,440	2,799
	2011	NA	111	20,422	2,723
Fatalities	2015	NA	NA	NA	NA
	2014	20	1	118	304
	2013	21	2	130	344
	2012	27	4	145	366
	2011	34	4	119	361
Daily Vehicle Miles Traveled (DVMT)	2015		NA	NA	NA
	2014	2,206,607,500	426,363,800	NA	14,564,000,000
	2013	1,926,470,000	406,376,035	7,178,589,000	18,588,000,000
	2012	1,984,140,000	397,103,575	7,127,674,000	18,588,000,000
	2011	1,833,030,000	391,498,635	7,208,792,000	18,588,000,000

As with Texas and Virginia, the authors established a non-PPP project-level benchmark by collecting data from a set of comparable public highways in Colorado on the basis of a survey. The non-PPP project-level benchmark data are shown in table 3.20.

Table 3.20 Colorado non-PPP project-level benchmark data collection

Public Project Level Data							
Project		SH470A I70	SH470B I-25	SH470W I-70	SH025A (194-228)	SH070A (259-289)	SH036 (45-57)
Total Crashes	2015	NA	NA	NA	NA	NA	NA
	2014	612	267	13	4034	2108	890
	2013	695	238	10	3472	1799	709
	2012	717	212	7	3143	1698	606
	2011	673	167	3	3093	1539	605
Injuries	2015	NA	NA	NA	NA	NA	NA
	2014	241	112	3	1027	648	259
	2013	234	89	2	947	625	207
	2012	46	32	0	222	141	47
	2011	49	23	0	223	159	41
Fatalities	2015	NA	NA	NA	NA	NA	NA
	2014	0	4	0	6	8	0
	2013	1	0	0	4	16	2
	2012	6	2	0	5	3	2
	2011	0	2	0	8	6	0
Daily Vehicle Miles Traveled (DVMT)	2015	NA	NA	NA	NA	NA	NA
	2014	775,560,278	498,255,251	11,223,750	2,417,090,605	1,228,165,052	437,929,044
	2013	739,361,702	371,932,868	10,774,800	2,309,754,821	1,180,891,508	418,921,129
	2012	702,941,176	365,517,241	10,020,000	2,179,330,000	1,123,830,000	446,130,000
	2011	701,041,667	371,111,111	9,990,050	2,230,510,000	1,121,420,000	444,830,000

Among the 17 target projects, the analysis at the state-level benchmark included five states that had data at the different state, locality, and project levels. These five states were Florida, Texas, Virginia, Colorado, and Illinois. For the locality-level benchmark, eleven counties/cities were included from the five states, including one in Florida, four in Texas, three in Virginia, two in Colorado, and one in Illinois. These localities were where the PPP projects were built. for the public non-PPP highways benchmark, 17 highways were included: four in Texas, seven in Colorado, and six in Virginia. These public, non-PPP highways were also in the same localities of the PPP projects. Finally, there were nine PPP projects, including one in Florida, three in Texas, three in Virginia, one in Colorado, and one in Illinois. These nine PPP projects were the ones that had a reasonable amount of data to conduct the analysis described

below. Note that the PPP projects considered for the analysis included elven projects that included the Indiana Toll Road and the PR-22/PR-5 in Puerto Rico, but those two projects and their corresponding cities and states had to be removed because no data were available from the corresponding offices.

3.2.2 PPP Roadway Safety Data (Second Part of Task 3)

Unlike the benchmark safety data, no similar online database was available related to PPP project safety data. Therefore, this research took the initiative to contact state departments of transportations (DOTs) and PPP private contractors, and we also administered surveys to request and collect PPP project safety data.

Although the uses of PPP are on the rise, PPP has not been widely implemented in the U.S. transportation sector. According to the FHWA Innovative Project Delivery Program (2016), there are only 26 roadway PPP projects either under construction or in operation in the U.S. Therefore, even though our sample size included only 17 PPP projects, the sample, to some extent, could still represent the PPP population in the U.S. However, some of the 17 target projects had not opened to the public during the research period and therefore the traffic safety data were unavailable. For example, construction on the I-4 Ultimate, in Florida, started in 2015 and will finish in 2019; the SH 183 Managed Lanes, in Texas, will be completed in 2018; the Presidio Parkway finished construction in October 2015; and the Elizabeth River Tunnel was expected to be completed in 2017. On the other hand, some projects were bought back by the public agency because of financial issues and were no longer PPP projects, such as SR 125, in California. Such projects, therefore, were excluded from the PPP roadway data collection.

Of the selected 17 projects, 11 projects were in the operation phase and maintained by the private sector. A survey was administered to collect safety and traffic flow (AADT or VMT)

data for these projects. In addition, for the sake of gaining more PPP project-level safety data, the authors also sent surveys to some other PPP projects that had been in operation for a certain time but were not included in the target project group, including the Dulles Greenway in Virginia and the Sea-To-Sky Highway and William R Bennett Bridge in British Columbia, Canada. In all, 13 data requests were sent out, and just one replied and provided the requested data. Table 3.21 summarizes the PPP project-level safety data collection.

Table 3.21 PPP project safety data collection

PPP Project Level Data												
PPP Project		LBJ635	North Tarrant Express	SH130	I-495	I-95	Dulles Greenway	I-595	Chicago Skyway	Northwest Pkwy	STS	William Bridge
State		TX	TX	TX	VA	VA	VA	FL	IL	CO	BC	BC
Total Crashes	2015	27	14	94	1,179	26	129	NA	NA	34	143	14
	2014	NA	3	56	1,079	NA	127	16	68	26	136	13
	2013	NA	NA	71	873	NA	84	NA	83	26	137	13
	2012	NA	NA	37	1,099	NA	121	NA	78	19	143	16
	2011	NA	NA	15	1,314	NA	109	NA	77	26	112	18
Injuries	2015	12	5	39	323	12	10	NA	NA	2	70	4
	2014	NA	2	35	328	NA	13	16	25	1	66	8
	2013	NA	NA	23	274	NA	13	NA	28	2	63	2
	2012	NA	NA	3	351	NA	11	NA	21	2	62	11
	2011	NA	NA	11	428	NA	13	NA	15	1	62	12
Fatalities	2015	0	0	5	0	0	0	NA	NA	0	1	0
	2014	NA	0	1	2	NA	0	0	0	0	2	0
	2013	NA	NA	4	0	NA	2	NA	1	0	2	0
	2012	NA	NA	0	1	NA	0	NA	0	1	2	0
	2011	NA	NA	0	0	NA	0	NA	0	0	3	0
Daily Vehicle Miles Traveled (DVMT)	2015	934,765,000	616,850,000	NA	754,379,080	445,336,500	260,891,050	NA	NA	48,775,680	479,798,669	1,529,304,375
	2014		97,025,760	124,129,930			247,543,730	41,007,750	301,674,690	43,397,040	506,293,727	1,452,791,250
	2013			136,973,550			240,440,830	NA	292,911,770	38,365,880	486,055,754	1,423,527,375
	2012			133,073,525			236,817,840	NA	294,917,445	34,958,240	469,950,056	1,384,873,875
	2011			NA			237,241,970	NA	281,824,895	33,048,560	445,788,297	1,381,150,875

A number of obstacles were encountered during the data collection:

1. As mentioned previously, a number of projects had recently started operation in 2015, which gave little time to collect and process safety data, and other projects had not opened to the public.
2. A number of projects, such as the I-495 Managed Lanes and I-95 Express lanes, had agreements for managed lanes only, not a whole toll road. In some states, however, data collection for AADT or VMT did not separate the data between the free lanes and the managed lanes.
3. It was difficult to collect data from either the private sector or the highway agency. For example, the Chicago Skyway and Puerto Rico DOT did not respond to requests for data.

These factors limited the collection of data to the number of projects and to a limited number of years, the most usable of which tended to be 2014.

3.3 Data Collection for PPP Safety Contractual Terms (the First Part of Task 3)

This study adopted a comprehensive search to collect relevant PPP procurement documents from the target PPP projects. Such procurement documents included but were not limited to Requests for Qualification (RFQ), Requests for Proposal (RFP), Technical Requirements / Provisions, Comprehensive Agreements, and other supplementary documents. The main sources of the PPP procurement documents were FHWA's PPP project files, target state DOTs' websites, target projects' websites, and the author's own database. Table 3.22 summarizes the contractual data collection status of the 17 target projects selected in Task 1.

Table 3.22 Project document collection status

Project	Document			
	RFQ	RFP or Technical Requirement	Comprehensive Agreement	Others
I-4 Ultimate	✓	✓	✓	
Port of Miami Tunnel	✓	✓	✓	
I-595 Improvements	✓	✓	✓	
SR 125		✓	✓	
The Presidio Parkway	✓	✓	✓	
SH 183 Managed Lanes	✓	✓	✓	
LBJ 635		✓	✓	Compensation term; Performance and Measurement table baseline
North Tarrant Express	✓	✓	✓	Compensation term
SH 130		✓	✓	Compensation term
Elizabeth River Tunnels		✓	✓	
I-495 Express Lanes		✓	✓	Guaranty of Performance
I-95 Express Lanes		✓	✓	Form of O&M Agreements; Performance Requirements; Security requirements for critical infrastructure facilities
Pocahontas Parkway		✓	✓	
Chicago Skyway		✓	✓	
Indiana Toll Road	✓	✓	✓	
PR-22 and PR-5	✓	✓	✓	Desirability & Convenience study
Northwest Parkway	✓		✓	

Chapter 4 Research Method

4.1 Introduction

For the first goal of the research, the safety data collected in tasks 2 and 3 were analyzed to determine whether there was a relationship between the safety performance, indices, and collision or crash averages of state roads and PPP projects. Using the safety information collected in Task 2, the averages or benchmarks were established at the state level, local level, and non-PPP project level. Using the PPP safety information collected in Task 3, data were analyzed at the PPP project level. Statistical tools were consulted in this regard in order to check the differences, analogies, and the statistical significances of the results. Note that this research should be considered an initial step toward future analysis that would cover more PPP projects than the number available to the current research. In addition, future research would perhaps segregate the state safety data into groups, *e.g.*, in clustered analysis, which would recognize the design-bid-build system, design-build system, and other traditional systems, along with the historical maintenance records for the highways. Well-maintained roads under the traditional systems would play a role in a comparison to PPP safety data.

To address the second goal, contractual safety data collected in Task 3 were analyzed for how safety was managed and accounted for, *e.g*, safety measures, specifications, and safety payments and incentives. A content and comparative analysis was done, and lessons learned were also established for contractual safety practices in PPP projects.

4.2 Analysis of Roadway Safety Data (Task 4)

Task 4 aimed to identify whether PPP roads demonstrate better safety performance than publicly operated roads. The analysis was tailored to address the objective while dealing with the limitations of the database. The collected safety data, including fatalities, injuries, and total

crashes were regarded as initial data. As mentioned earlier, to reduce distortions in the roadway safety results, exposure to traffic was taken into consideration. Therefore, traffic flow in terms of AADT and VMT was factored in to generate safety indicators/rates, including fatality rates (fatalities per 100 million VMT), injury rates (injuries per million VMT), and accident rates (total crashes per million VMT). The three safety indicators/rates were then categorized into four groups:

1. PPP highways (nine operational PPP projects),
2. localities/cities (11 counties/cities of the selected PPP projects),
3. comparable non-PPP public projects (17 highways in the same localities as the PPP projects in Texas, Colorado, and Virginia; the states with more accessible data), and
4. states (five states with the selected PPP projects).

Statistical analysis was performed on the data to check the differences, analogies, and statistical significances of the groups. The analysis was done in four phases:

1. a broad group comparison of the annual means/averages of the safety rates (fatality, injury, and crash rates) of each group for 2011 to 2014.
2. individual project comparisons in which the annual safety rates of each PPP project were compared to those of local, non-PPP highway projects, each project's locality/city, and its state,
3. individual project comparisons in which the average over the available years from 2011 to 2015 was compared to that of non-PPP highway projects, each project's locality/city, and its state, and
4. tests of the hypothesis that the PPP group safety performance would be better than that of the state-level group, locality/city-level group, and the non-PPP project-level group.

Three hypotheses were tested, and the R statistical application was used for this purpose.

4.3 Analysis of Contractual Safety Terms (Task 5)

A content analysis of the collected procurement and contract document was conducted to investigate how safety was managed and accounted for in current U.S. PPP projects. The relevant contractual terms, including but not limited to safety-related payments, roadway safety performance measurements, and safety specifications in the selected PPP projects, were identified and analyzed in this task.

A set of steps was implemented for the analysis. First, the introduction chapter in the Concession Agreement of each PPP project was reviewed. Almost all of the selected projects contained a section named "contract document." This section listed all the documents related to the contract. Therefore, by referring to the list, this study could ensure that all the necessary documents related to the selected project were collected. By checking this document list, this study ensured that the collected documents were complete and enough for analysis. For example, for the I-4 Ultimate project, a new PPP roadway project in Florida, this study first checked Chapter 1.4 – Contract Document (p.18) in the Concession Agreement. The completed document package of the I-4 Ultimate project consisted of Concession Agreement Volume I, Supplemental Agreements with Respect to Volume I, Alternative Technical Concepts, Amendments with Respect to Project Commitments, Project Commitments, Amendments with Tespect to Volume II (Technical Requirements), Volume II (Technical Requirements), Amendments with Respect to Volume III (Additional Mandatory Standards), Volume III (Mandatory Standards), Appendix 2 (Concessionaire's Proposal Commitments), Special Provisions, Technical Special Provisions,

Revisions to the Plans, Plans, Design Standards and Governing Regulations, and Standard Specifications.

Second, the collected document package of each project was divided into four categories, including the bidding document (Appendix A), contract document – Part I Design and Operation (Appendix B), contract document – Part II Safety Incentives and Payments (Appendix C), and contract document – Part III Safety Incidents or Accidents (Appendix D) . The analysis was based on these four categories, and a set of questions was designed for each category to fully understand the usage of contractual safety terms for roadway safety management in PPP projects. These questions have been summarized as follows:

In bidding documents:

1) Is roadway safety one of the project's significant objectives?
2) Is safety one criterion to evaluate PPP proposals?
3) Will the project assign any evaluation points or other measuring system to roadway safety in the bidding documents?

In Contract Document – Part I Design and Operation

1) Are there any contractual terms containing special structural design or extra roadway elements to improve roadway safety?
2) Are there any contractual terms containing extra or special operational requirements to improve roadway safety?
3) Are there any contractual terms containing a request for installation of any devices to collect roadway safety data?

In Contract Document – Part II Safety Incentives and Payments

1) Does the project contract contain incentive payments to improve safety?

2) Does the project contract contain safety payments?
3) Does the project contract include traditional sections for general roadway safety precautions?
4) Have the contract documents provided historical safety records/data of the project or the locality of the project?
5) Have the contract documents provided any compensations / reimbursements for safety improvement?
6) Have the contract documents included any deductions for unsatisfactory safety performance?

In Contract Document – Part III Safety incidents or accidents:

1) Do the contract documents require the project concessionaire to collect (record and manage) roadway safety data?
2) Do the contract documents require the project concessionaire to report the collected roadway safety data?
3) Do the contract documents require the highway agency to record and report roadway safety incidents or accidents?
4) Do the contract documents require an independent agency or third party to record and report roadway safety incidents or accidents?
5) Do the contract documents require the project concessionaire to manage the roadway incidents or accidents?
6) Do the contract documents require the project concessionaire to carry out roadway emergency maintenance after accidents?

7) Do the contract documents require the project concessionaire to carry out capital work in response to repeated accidents?

Finally, a comprehensive search of all the contract documents of each target project was carried out. The search keywords included but were not limited to "safety," "traffic management," "data collection," "payment," "incentive/reward," "deduction," and "crash/accident." In this step, all contractual terms with one or more of these specific keywords were considered to meet the requirements of this study, and a careful look at the marked contents was conducted. As an example, the search findings of the I-4 Ultimate project are summarized as follows:

- In its RFQ, the project adopted an availability payment mechanism, described as follows: "The periodic payments made by FDOT to the Concessionaire upon opening of the Project to traffic in its final configuration. Entitlement to the Availability Payment will generally be based on the availability of the project to vehicular traffic and Concessionaire's conformance with other operation and maintenance criteria established in the Concession Agreement" (p.7).
- In the Concession Agreement, the contents related to the keywords were as follows::
  1) Article 6.2.1 General Obligation, one of concessionaire's general obligations was to carry out the O&M works within the applicable O&M limits in accordance with any safety compliance order and the safety plan (p.50).
  2) Article 6.8.2.3 required that the concessionaire should perform and comply with the provisions of Technical Volumes concerning Emergencies, Incident Response, Safety and Security, including implementing all procedures, plans, protocols and requirements set forth in Section 4 of the Technical Requirements and the Emergency management plan.

3) Article 7.4 Monetary Deductions assessed for certain noncompliance mentioned, "Potential harm and detriment to Users, which may include additional wear and tear on vehicles and increased costs of congestion, travel time and accidents" (p.65).
4) Article 9, Safety Compliance stated, "Concessionaire shall implement all safety compliance as expeditiously as reasonably possible following issuance of the safety compliance order" (p.80).
5) Article 12 related to Payments to concessionaire (p.100), and Appendix 22 included Bonus Work Elements (BWE) and BWE payments. However, no traffic safety incentives were mentioned in the contract.
6) Article 19.2.3 described the remedies for failure to meet safety standards or performance safety compliance, but the "safety" refers to construction safety, not traffic safety.
7) Appendix 3 (Periodic Payment, final acceptance payments and final acceptance payment adjustments) and Appendix 6 (Payment Mechanism) summarized the formulas to calculate an availability payment (annually and quarterly) and unavailability adjustments. However, no safety aspect was considered.

- In the Technical Requirements, the contents related to the keywords were as follows:
  1) In the general project objectives, one term mentioned "timely facility management and capacity improvements to maintain adequate service levels," but there was no direct requirement for improving traffic safety performance.
  2) In the beginning description of the O&M, it mentioned that "the operations and maintenance criteria have stringent requirements with respect to safety, operation activities, and maintenance activities as required in order to provide a safe environment for the public's use of the facilities" (p.351).

3) In Section 4 (Operation and Maintenance Requirements), Chapter 1.8 Safety, stated, "Concessionaire shall follow all safety requirements of the Contract Documents, including those outlined in the National Electric Safety Code (NESC) and the Occupational Safety and Health Administration (OSHA). Concessionaire is solely responsible for the safety of all its personnel and shall be solely responsible for maintaining the safety required and providing safety equipment and procedures for the protection of employees and the public throughout the OM limits" (p.363).
4) In Section 4, Chapter 3.9 Traffic Operations stated, "FDOT will be responsible for monitoring safety and operations issues on the project. Concessionaire shall conduct awareness meetings with traffic operations staff every 3 months to review any safety or operations issues on the project. FDOT will conduct traffic safety studies, review crash data annually and identify crash patterns. Concessionaire should coordinate with FDOT and also shall request approval from FDOT for revisions and modifications to speed limits" (p.393).
5) In Section 4, Chapter of Operation Requirements (p.385) included, "concessionaire shall be responsible for operating the project with the main objectives of maximizing safety, reliability and roadway availability."
6) In Section 4, Table 4.1 to 4.4 provided the specific requirements for operation (p.410). However, there were no terms related to particular traffic safety performance.

- In Volume III, Additional Mandatory Standards, section 1.3.7 Safety included the collection of crash data. Crash data were analyzed to determine high crash roadway sections, the types of crashes that occurred, and the associated economic loss per year associated with those roadway sections on I-4 within the project study area. The crash summary included

information on location, the number of fatalities/injuries, crash rate, safety ratios, and economic loss. Safety ratio was defined as the ratio between the actual crash rate and the critical crash rate. The actual crash rate is a function of the roadway section length multiplied by the annual number of vehicles in relation to the number of crashes. The critical crash rate is a function of the roadway section length, the traffic volume, and the statewide average crash rate for similar roadway facilities. A safety ratio equal to or greater than one (1.00) indicates that the facility is experiencing more crashes than would be typically anticipated on this type of facility. The higher the safety ratio, the greater the hazard. However, this safety ratio was used only for identifying high hazard locations. There were no connections between the safety ratio and compensations paid to private contractors.

4.4 Case Study: Proactive Mechanisms for Safety Improvement

Public agencies should have a range of options or explore new ones to enforce operating or achieving higher standards, exemplified by lowering the number of crashes, fatalities, and injuries in PPP projects. A number of options are described below using real PPP project examples or international PPP practices.

4.4.1 Sea To Sky (STS) Highway

4.4.1.1 Project Description

The Sea-to-Sky (STS) Highway is a 95-km section of Highway 99 between West Vancouver and Whistler, BC. In order to improve the safety, reliability, and capacity of the existing STS highway, in 2005, a 25-year design-build-finance-operate (DBFO) concession agreement was signed between the British Columbia Ministry of Transportation (BCMOT) and the S2S Transportation Group (S2S). The concessionaire S2S included a) Macquarie, the financial advisor; b) Peter Kiewit Sons Co., the project design/build contractor; c) JJM

Construction Limited, a British Columbia road builder; d) Hatch Mott MacDonald (HMM), a transportation consultant; e) Miller Paving, the highway operator; and f) Capilano Highway Services, a provider of maintenance and operations. A maximum $600 million capital commitment was approved in 2003 for improving the STS highway, and the improvements were completed by 2009. The improvements were expected to achieve BCMOT's long-term roadway goals for accommodating population and economic growth, increasing traveling demand, and increased goods movement in the project communities. The major objective for the STS Improvement project consisted of 1) improving the safety of the highway, 2) improving its reliability (*e.g,*. travel time predictability), 3) enhancing the ability of the highway to satisfy increasing traveling demand, 4) following strict project completion time and budget control, and 5) actively managing traffic flows during construction phase (BCMOT 2005).

4.4.1.2 Payment Mechanism

The contract adopted a performance-based payment for the STS. No traditional capital payment (milestone payments during construction) were involved in the payment mechanism of the STS Project (Abdel Aziz 2015). According to the Schedule 10 – Payments, the payment mechanism used in STS comprised the following parts: 1) total performance payments, 2) availability payments and non-availability deductions, 3) operation and maintenance performance deduction, 4) vehicle usage payment, 5) performance incentive payments, and 6) end-of-term payments. Figure 4.1 is a snapshot of a summary table from the Value-for-Money Report of the STS Project, which shows the expected performance payment to the concessionaire S2S for each contract year.

PAYMENT COMPONENTS UNDER DBFO ($ Millions)

(Nominal dollars assuming two per cent inflation and Provincial Base Case Traffic Forecast)

Contract Year	Year Ended 31-March	DBFO Availability Payments	DBFO Volume Usage Payments	DBFO Performance Incentive Payments	DBFO End of Term Payment	MoT Design Build Contracts	MoT + DBFO Total Payments	Non-Risk Adjusted PSC
1	2006 and prior	6.6	0.0	0.7	0.0	56.4	63.7	87.8
2	2007	14.0	0.0	1.0	0.0	7.8	22.8	25.0
3	2008	18.7	0.0	1.3	0.0	10.9	30.9	45.0
4	2009	28.7	0.0	1.9	0.0	13.2	43.8	57.9
5	2010	49.5	5.2	1.1	0.0	15.0	70.8	60.4
6	2011	52.3	10.1	1.0	0.0	16.8	80.2	60.1
7	2012	52.7	9.9	1.0	0.0	16.8	80.4	60.1
8	2013	53.1	10.0	1.1	0.0	16.8	81.0	60.4
9	2014	53.5	10.1	1.1	0.0	16.8	81.5	60.8
10	2015	53.9	10.1	1.1	0.0	16.8	81.9	61.1
11	2016	54.4	10.2	1.1	0.0	16.8	82.5	61.5
12	2017	54.8	10.2	1.1	0.0	16.9	83.0	66.0
13	2018	55.2	10.3	1.1	0.0	16.9	83.5	62.2
14	2019	55.7	10.4	1.1	0.0	16.9	84.1	68.5
15	2020	56.1	10.4	1.1	0.0	16.9	84.5	69.4
16	2021	56.6	10.5	1.1	0.0	16.9	85.1	69.8
17	2022	57.1	10.6	1.1	0.0	16.9	85.7	70.4
18	2023	57.6	10.7	1.1	0.0	16.9	86.3	71.0
19	2024	58.1	10.7	1.1	0.0	16.9	86.8	71.7
20	2025	58.6	10.8	1.2	0.0	16.9	87.5	72.3
21	2026	59.1	10.9	1.2	0.0	16.9	88.1	75.1
22	2027	59.6	11.0	1.2	0.0	16.9	88.7	75.9
23	2028	60.2	11.1	1.2	0.0	16.9	89.4	76.9
24	2029	60.7	11.2	1.2	0.0	16.9	90.0	82.9
25	2030	61.3	11.3	1.2	50.0	16.9	140.7	98.5
Total		**1,248.1**	**215.7**	**28.4**	**50.0**	**440.7**	**1,982.9**	**1,670.7***

Figure 4.1 The Value for Money Report of the STS project

The total performance payment ("TPP_n") in contract year *n* would be determined by the following function:

$$Tpp_n = AP_n + VUP_n + PIP_n + IA_n - ACR_n + EOTP \quad \text{Eq. 4.1}$$

where:

TPP_n = Total performance payment for contract year *n*

AP_n = Availability payment for contract year *n* calculated in accordance with a non-availability deduction

VUP_n = Vehicle usage payment for contract year *n*

PIP_n = Performance incentive payments for contract year *n*

IA_n = Insurance adjustment

ACR_n = Asset condition retention for contract year *n* in accordance with paragraph 3 of Part 4 of the Schedule 10 of the STS Project

EOTP = The end-of-term payment

The vehicle usage payment accounted for 10 percent to 15 percent of the TPP_n, which aimed to incentivize the concessionaire to achieve the project objectives of improving highway reliability and capacity as well as increasing current traffic volume.

As the major payment type used in the STS Project, the share of the availability payment was over 80 percent of the TPP_n. A set of performance measures was established to evaluate the availability of the transportation facility and the performance of the O&M services (Abdel Aziz 2007a). Through an availability payment, the government aimed to maximize the project's lane availability, minimize traffic disruptions, and ensure a well-maintained condition of the facility. A non-availability deduction mechanism was also included in the availability payment. Three major deduction payments adopted in the STS Project were unavailability deduction for lane closures, the traffic delay deduction, and performance deductions for non-conformity with O&M standards.

To ensure that project assets would be in acceptable condition at contract expiration, the STS Project implemented an end -of-term payment in the TPP_n. The total amount of the end-of-term payments was $31.1 million, and the government adopted an inspection process on which a monthly retention would be assessed (Abdel Aziz 2007a).

The TPP_n in any contract year *n* could not exceed the annual affordability ceiling for that contract year *n*; however, the performance incentive payments, consistimg of a safety performance payment (SPP_n) and a traffic management payment (TMP_n), was not within the government maximum payment requirement. These performance incentive payments were regarded as a pure bonus for the STS highway to encourage the concessionaire to meet or exceed required standards.

The next section provides a detailed description of the implementation of safety performance payment in the performance incentive payments.

4.4.1.3 Safety Payment

The design of a payment mechanism for a PPP should reflect the government's specific objectives in the project (Treasury 2003). Traffic safety was an important objective and was paid significant attention during project planning. Therefore, a safety incentive payment was included as part of the performance incentive payments in the contract payment mechanism. The concessionaire was entitled to this incentive payment only if the highway safety performance exceeded the provincial safety performance record for comparable highways on a three-year rolling average basis. The contract also stated that for the first two contract years, when the three-year rolling average would be unavailable, the respective one- and two-year averages would be used for calculation. Since the safety performance would be measured and compared on an annual basis, the incentive payment would be paid annually rather than monthly as in some other

projects. Three categories of accidents were used to measure project safety performance, including fatalities, injuries, and property damage. For the STS highway, the safety incentive payment was a pure incentive payment, and it was not within the government annual affordability ceiling for the project (Abdel Aziz 2007a).

The total amount for the safety incentive payment in the base data was $1,000,000. An adjusted formula considering the actual safety performance was used to calculate the final payment compensating concessionaire. The safety performance payment (SPP_n) in contract year *n* was calculated as follows:

$$SPP_n = SPP_0 * \left[1 + F * \left(\frac{CPI_n}{CPI_o} - 1\right)\right] * SPPR_n \quad (4.2)$$

where:

$SPPn_0$ = The safety performance payment in contract year *n*

SPP_0 = The safety performance payment in based date prices, being $1,000,000

F = Indexation factor of 0.35

$SPPR_n$ = The safety performance payment reduction percentage in contract year *n*

CPI_n = The Consumer Price Index in contract year *n*

CPI_0 = The Consumer Price Index in the project's based date

The safety performance payment reduction percentage (SPPR*n*) in contract year *n* was calculated by reference to the actual safety performance compared to the relevant average number of accidents for comparable highways in accordance with the following formula:

$$SPPR_n = 3 - \frac{2*AAN_n}{PAN_n} \quad (4.3)$$

where:

AAN_n = The actual average number of accidents on the STS highway in contract year *n*

PAN_n = The provincial average number of accidents in contract year *n*

An $SPPR_n$ calculated with the above function that was less than or equal to zero would mean that the safety performance provided by the concessionaire failed to exceed the Provincial average. In that case, no safety performance payment would be paid to the concessionaire in that contract year. An $SPPR_n$ equal to or greater than 1.0 would mean that the safety performance was acceptable. In this case, the $SPPR_n$ would be deemed to be 1.0, and the full safety performance payment would be payable in that

contract year.

The Province provided the concessionaire with the relevant safety statistics for determining the provincial average number of accidents. The statistics were derived from independent sources, such as Highway Accident Statistics (HAS) and Royal Canadian Mounted Police (RCMP) records. The relevant provincial average number (PAN_n) was calculated as the benchmark to evaluate safety performance of the STS highway through the following formula:

$$PAN_n = \sum_{ac} AACRK_n * LK \tag{4.4}$$

where:

PAN_n = The provincial average number of accidents for contract year *n*

$AACRK_n$ = The average accident category rate per lane kilometer

LK = The number of lane kilometers for the STS Highway

Figure 4.2 presents the relationship between the ratio of AAN to PAN and the corresponding SPPR. The range of SPPR is from 0 to 3. If the highway's number of accidents

was 50 percent more than the provincial average (AAN/PAN=1.5), then the SPPR would equal 0, and the concessionaire would get no safety incentive. If the number of accidents was the same as the provincial average (AAN/PAN=1), then the concessionaire would get a full-base incentive payment ($1,000,000); if the highway's number of accidents was 10 percent less than the average, then the concessionaire would get 120 percent of the base incentive pay. This relationship would continue until the highway had zero accidents, and the concessionaire would get the maximum 300 percent of the base payment.

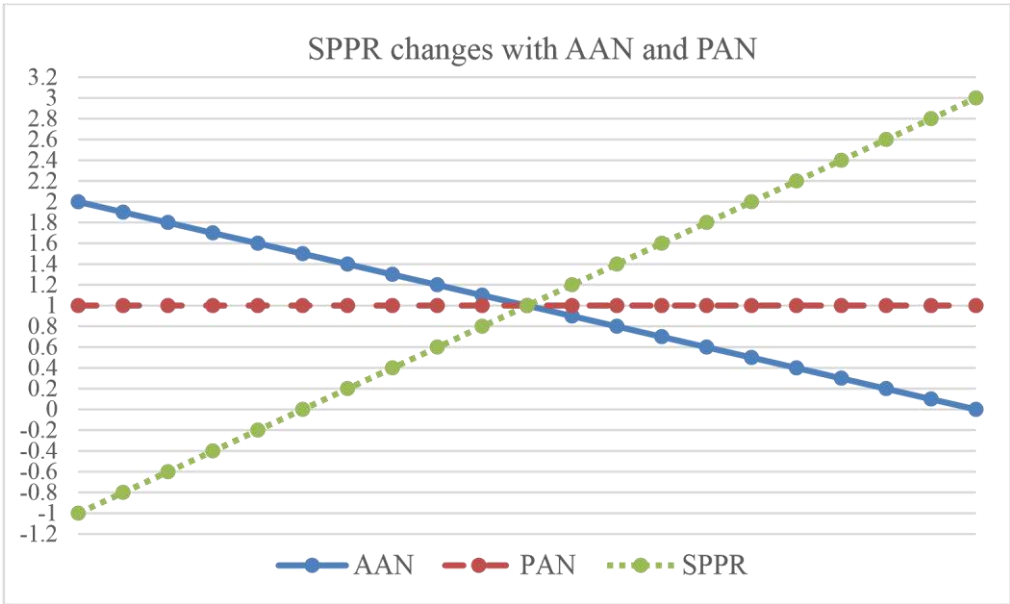


Figure 4.2 The mechanism of the SPPR formula

4.4.2 William R. Bennett Bridge in British Columbia

4.4.2.1 Project Description

The original Okanagan Lake Bridge, as part of Highway 97, linked the City of Kelowna on the east side of Okanagan Lake to the west side of the lake. The existing bridge, which crossed the 120-kilometer long lake, failed to satisfy increasing traffic demands from the communities and also had a high accident rate. A 30-year concession agreement was finalized in 2005 between

SNC-Lavalin and the Province for delivery and long-term operation of a new project, the William R. Bennett Bridge. The concessionaire, SNC-Lavalin, was responsible for designing, constructing, operating, maintaining, and rehabilitating the new bridge. Additionally, the concessionaire needed to decommission the existing Okanagan Lake Bridge as soon as the new bridge was open. The new bridge would form part of Highway 97, linking Okanagan Lake between Kelowna and Westbank, at a location immediately adjacent and parallel to the existing Okanagan Lake Bridge. A set of objectives was established by the British Columbia Ministry of Transportation, including 1) to meet immediate and mid-term traffic demand; 2) to reduce the total estimated capital cost by achieving PPP value for money; 3) to secure the usable 75-year design life of the bridge; and 4) to improve the long-term safety performance of the bridge (BCMOT 2005).

Figure 4.3 Map of the Okanagan Bridge area from the Value for Money report (BCMOT)

4.4.2.2 Payment Mechanism

The Province made annual payments to SNC-Lavalin based totally on performance. No minimum performance payments and no portion of the performance payments were guaranteed. The payment mechanism of the William R. Bennett Bridge consisted of a traffic volume payment

(usage payment), a lane availability payment, safety performance payment, users satisfaction payment, and a set of performance deductions. These payments were not started until the bridge was open to the public. Therefore, no traditional capital payments were included in this project. The total payment made to the concessionaire, called the enhanced service performance payment for the William R. Bennett Project, was calculated in accordance with the function below:

$$ESPP_n = TVP_n + LAP_n + SPP_n + USP_n - PD_n \quad (4.5)$$

where:

$ESPP_n$ = the enhanced service performance payment for contract year n

TVP_n = Traffic volume payment for contract year *n*

LAP_n = Lane availability payment for contract year *n*

SPP_n = Safety performance payment for contract year *n*

USP_n = Users satisfaction payment for contract year *n*

PD_n = Performance deductions for contract year *n*

For the enhanced service performance payment (total payment), the traffic volume payment (usage payment) accounted for about 25 percent to 30 percent, which was approximately double that of other similar projects (Abdel Aziz 2007a). Through a high traffic volume payment, the Province aimed to ensure that the concessionaire would optimize traffic capacity for the new bridge and ensure that the payment would cover the potential high O&M costs caused by the increasing traffic volumes. However, traffic bands and shadow toll used for calculating the traffic volume payment were allowed to be adjusted for the occurrence of a "traffic volume change event," which was defined in the contract as government-sponsored capital works (e.g.,

construction of a second crossing), construction or removal of interchanges and interchanges and intersections, or widening or narrowing of roads on the main bridge highway (Abdel Aziz 2007a).

The lane availability payment was another major payment used for the William R. Bennett Bridge Project and accounted for approximately 60 percent of the total payment. This payment was structured to maximize lane availability and to ensure the reliability of the new bridge. Lanes were identified as "unavailable" except for expected closures. The unavailability deductions were included in calculating the overall lane availability payment.

Unlike the STS Highway, for which where the safety performance payment was regarded as a pure bonus, the safety performance payment for the William R. Bennett Bridge was a core payment within the overall payment. Adjustments were made to the safety performance payment for the William R. Bennett Bridge project on the basis of a table of accident severity ratio and accident frequency. This payment is discussed in detail in the next section.

The users satisfaction payment was set to be within 1 percent of the total payment . The base payment was adjusted annually according to results of a user satisfaction survey.

4.4.2.3 Safety Payment

As with the STS Highway Project, the Province measured the project's safety performance on a three-year rolling average basis. For the first two contract years, for which the three-year average was not available, a respective one- and two-year average was used. The safety performance payment (SPP_n) was calculated as follows:

$$SPP_n = SPPB * SPPR_n * [1 + (IF_{SPP} * PPI_n)] \quad (4.6)$$

where:

SPPB = Safety performance payment base. If contract year *n* is less than one year, this amount will be reduced in proportion to the number of days in the relevant contract year relative to 365.25.

$SPPR_n$ = The applicable safety performance payment ratio is determined in accordance with severity ratios and accident frequencies (figure 4.4).

IF = Indexation factor

PPI = Performance price index in contract year *n*, which consists of the labor index, the fuel index, and the residual index.

		Accident Frequency				
		0-7	8-15	16-22	23-30	>30
Severity Ratio	0-20%	DEL.	DEL.	DEL.	DEL.	DEL.
	20.01-40%	DEL.	DEL.	DEL.	DEL.	DEL.
	40.01-60%	DEL.	DEL.	DEL.	DEL.	DEL.
	60.01-80%	DEL.	DEL.	DEL.	DEL.	DEL.
	80.01-100%	DEL.	DEL.	DEL.	DEL.	DEL.

Figure 4.4 The applicable safety performance payment ratio

The three categories of accidents used to measure project safety performance were similar to those for the STS Highway Project, including fatalities, injuries, and property damage. The severity Rratio used in figure 4.4 was calculated as "the sum of the number of fatal accidents and the number of injury accident divided by the total number of accidents." The severity ratio or the accident frequency or both set out in the table were to be re-calibrated every five years in accordance with changes of traffic volumes and overall safety performance on British Columbia highways. The benchmark would also be modified if police accident reporting standards

materially changed. In the recalibration, some other safety data sets, such as a reference group of highways located within the area of the Okanogan Lake Bridge and a group of highways within British Columbia that were considered similar to the Okanogan Lake Bridge, would be used to compare with the police reported crashes on the William R. Bennett Bridge to assess the accuracy of police reported crashes.

4.4.3 The International PPP Market

According to Vassallo et al. (2009), in some European countries, including in Spain, Hungary, Norway, Finland, Portugal, and the United Kingdom, positive incentives based on explicit road safety indicators have become normal practice and continue to be improved in the most recent PPP contracts. Generally, the incentives in the PPP contracts of these countries can be divided into two types: incentives related to the project period and incentives related to monetary compensation. The first type can be found in the latest PPP toll roads in Spain. In these PPP projects, the concessionaire can be granted one or two additional years of operation of the road if the safety performance is better than the average of a comparator set of roads. Incentives related to monetary compensation include linking the assessment of safety performance to bonuses and penalties, which is similar to the STS Highway and William Bennet Bridge in B.C. For example, the United Kingdom widely implemented an "active management payment mechanism" in its PPP projects. A safety performance adjustment, as one element of the payment mechanism, is made to the PPP concessionaire's compensation on the basis of the number of injuries, fatalities, or accidents that occur on the project in comparison to a benchmark determined from the safety performance of a comparator set of roads. Another way to provide incentives for improving safety in the UK is that the contractor is recompensed by receiving 2 percent of the economic cost of each traffic accident avoided in comparison to the previous project year

(https://wpqr4.adb.org/lotusquickr/copmfdr/PageLibrary482571AE005630C2.nsf/0/1F17A0493E8D6AC448257C12001FCA3F/$file/C ase%20Studies%20(combined))_Richard%20Foster.pdf).

Chapter 5 Results

5.1 Overview

The research results are presented separately on the basis of two major goals of the research. In Section 5.2, the results of an analysis of roadway safety data are discussed, and the findings helped us to generate conclusions about the relationship between roadway safety and the project delivery system. In Section 5.3, the results of a content analysis of the collected procurement and contract documents are discussed. The findings enabled the research team to explore the existence of, and the similarities and differences among, the safety-related contractual terms of the target projects and to establish an understanding of roadway safety management in current U.S. PPP market.

5.2 Roadway Safety Performance

5.2.1 Phase 1 – Broad Groups Comparison

As outlined in the research methodology, safety data were categorized into four groups: a state group, locality/city group, non-PPP projects group, and PPP projects group. Table 5.1(a) to table 5.1(c) show descriptive statistics for the fatality rate, the injury rate, and the accident rate indicators, respectively.

The injury rate for the PPP group was lower than that of the other three groups. The non-PPP comparable local highways showed a rate slightly higher than that of the PPP group. The range or gap increased significantly in comparison to those of the state and locality groups. This was true for all the statistics, including the minimum, the quartiles, the median, and the mean. It is also clear that the standard deviation of the PPP group was less than those of the other groups. On the basis of the descriptive analysis, it is fair to say that the injury and crash rates for the PPP

group were better than those of the other state, locality, and comparable public highway groups. The fatality rate followed a similar, but not exact, trend for most years, except 2013.

Table 5.1 Descriptive statistics of safety rates by data groups, years 2011-2014.

(a) Fatality rate

Year	Groups	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	S.D.
2014	State Level Benchmark	0.86	0.88	1.04	1.09	1.24	1.42	0.24
	Locality Level Benchmark	0.00	0.46	0.88	0.69	0.88	1.05	0.37
	Non-PPP Project Benchmark	0.00	0.00	0.25	0.54	0.80	3.33	0.81
	PPP	0.00	0.00	0.00	0.15	0.10	0.81	0.30
2013	State Level Benchmark	0.92	0.94	1.03	1.10	1.25	1.39	0.21
	Locality Level Benchmark	0.49	0.60	0.85	0.93	1.12	1.81	0.40
	Non-PPP Project Benchmark	0.00	0.00	0.28	0.36	0.48	1.35	0.40
	PPP	0.00	0.09	0.38	0.75	0.73	2.92	1.11
2012	State Level Benchmark	0.92	0.96	1.01	1.12	1.27	1.44	0.22
	Locality Level Benchmark	0.72	0.80	1.01	1.23	1.25	2.74	0.62
	Non-PPP Project Benchmark	0.00	0.23	0.45	0.76	0.71	3.99	1.09
	PPP	0.00	0.00	0.00	0.55	0.32	2.86	1.15
2011	State Level Benchmark	0.89	0.94	0.96	1.06	1.25	1.27	0.18
	Locality Level Benchmark	0.44	0.69	0.81	0.89	1.08	1.65	0.35
	Non-PPP Project Benchmark	0.00	0.00	0.36	0.38	0.63	1.16	0.37
	PPP	0.00	0.00	0.00	0.13	0.00	0.67	0.30

Table 5.1 continued. (b) Injury rate

Year	Groups	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	S.D.
2014	State Level Benchmark	0.21	0.71	0.78	0.73	0.81	1.12	0.33
	Locality Level Benchmark	0.25	0.82	1.28	1.19	1.35	2.52	0.64
	Non-PPP Project Benchmark	0.07	0.13	0.26	0.34	0.48	1.10	0.27
	PPP	0.01	0.02	0.07	0.12	0.17	0.39	0.14
2013	State Level Benchmark	0.21	0.70	0.81	0.72	0.81	1.10	0.32
	Locality Level Benchmark	0.31	0.88	1.27	1.23	1.33	2.81	0.68
	Non-PPP Project Benchmark	0.04	0.14	0.24	0.32	0.47	1.01	0.26
	PPP	0.00	0.05	0.07	0.08	0.12	0.17	0.06
2012	State Level Benchmark	0.21	0.70	0.80	0.72	0.83	1.04	0.31
	Locality Level Benchmark	0.29	0.72	1.21	1.19	1.33	2.87	0.68
	Non-PPP Project Benchmark	0.00	0.10	0.13	0.22	0.16	0.87	0.25
	PPP	0.01	0.03	0.05	0.06	0.07	0.13	0.04
2011	State Level Benchmark	0.21	0.71	0.80	0.69	0.81	0.95	0.29
	Locality Level Benchmark	0.28	0.84	1.21	1.21	1.36	2.83	0.68
	Non-PPP Project Benchmark	0.00	0.09	0.13	0.22	0.16	0.90	0.25
	PPP	0.01	0.03	0.05	0.06	0.05	0.14	0.05

Table 5.1 continued. (**c**) Accident rate

Year	Groups	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	S.D.
2014	State Level Benchmark	1.48	1.71	1.92	2.02	2.15	2.82	0.51
	Locality Level Benchmark	1.31	1.59	1.65	2.00	2.12	4.01	0.83
	Non-PPP Project Benchmark	0.13	0.51	0.79	1.05	1.67	2.91	0.79
	PPP	0.01	0.18	0.33	0.31	0.47	0.60	0.22
2013	State Level Benchmark	1.51	1.65	1.82	1.97	2.15	2.71	0.48
	Locality Level Benchmark	1.32	1.53	1.68	2.08	2.55	3.44	0.79
	Non-PPP Project Benchmark	0.09	0.45	0.88	0.99	1.50	2.69	0.71
	PPP	0.01	0.28	0.32	0.35	0.48	0.68	0.23
2012	State Level Benchmark	1.48	1.53	1.76	1.91	2.16	2.62	0.48
	Locality Level Benchmark	1.23	1.39	1.73	2.44	3.21	6.12	1.49
	Non-PPP Project Benchmark	0.14	0.45	0.64	0.87	1.36	1.98	0.57
	PPP	0.01	0.27	0.29	0.32	0.46	0.54	0.19
2011	State Level Benchmark	1.19	1.54	1.91	1.91	2.17	2.73	0.59
	Locality Level Benchmark	1.32	1.36	1.68	2.03	2.61	3.55	0.83
	Non-PPP Project Benchmark	0.15	0.43	0.52	0.80	1.36	1.91	0.58
	PPP	0.01	0.25	0.27	0.36	0.46	0.79	0.29

To further explain the behavior of the safety rates of the four groups over the years, figure 5.1 illustrates the mean for safety performance over the study period, 2011 to 2014. As presented in figure 5.1(a), the fatality rate of the PPP group was lower than the fatality rates of the state-level and locality-level benchmarks in each year from 2011 to 2014. Therefore, a hypothesis could be made that the safety performance of PPP projects would be better than the fatality rate benchmarks of the state and locality levels. In comparing the PPP group with the non-PPP project-level benchmark, however, it is hard to make a similar hypothesis. This is because in 2013, the PPP group had a higher fatality rate than the non-PPP project-level benchmark, and in the other years, the fatality rates of the PPP group were also close to the those of non-PPP project-level benchmark.

As shown in figure 5.1(b) and figure 5.1(c), the injury rates and crash rates of the PPP group were far lower than the state- and locality-level benchmarks in each year from 2011 to 2014. The PPP group also had a lower injury rate and crash rate than the non-PPP project-level benchmark in each year. Therefore, in terms of injury rate and crash rate, the hypothesis could be made that the safety performance of PPP would be better than the state-, locality-, and non-PPP project-level benchmarks.

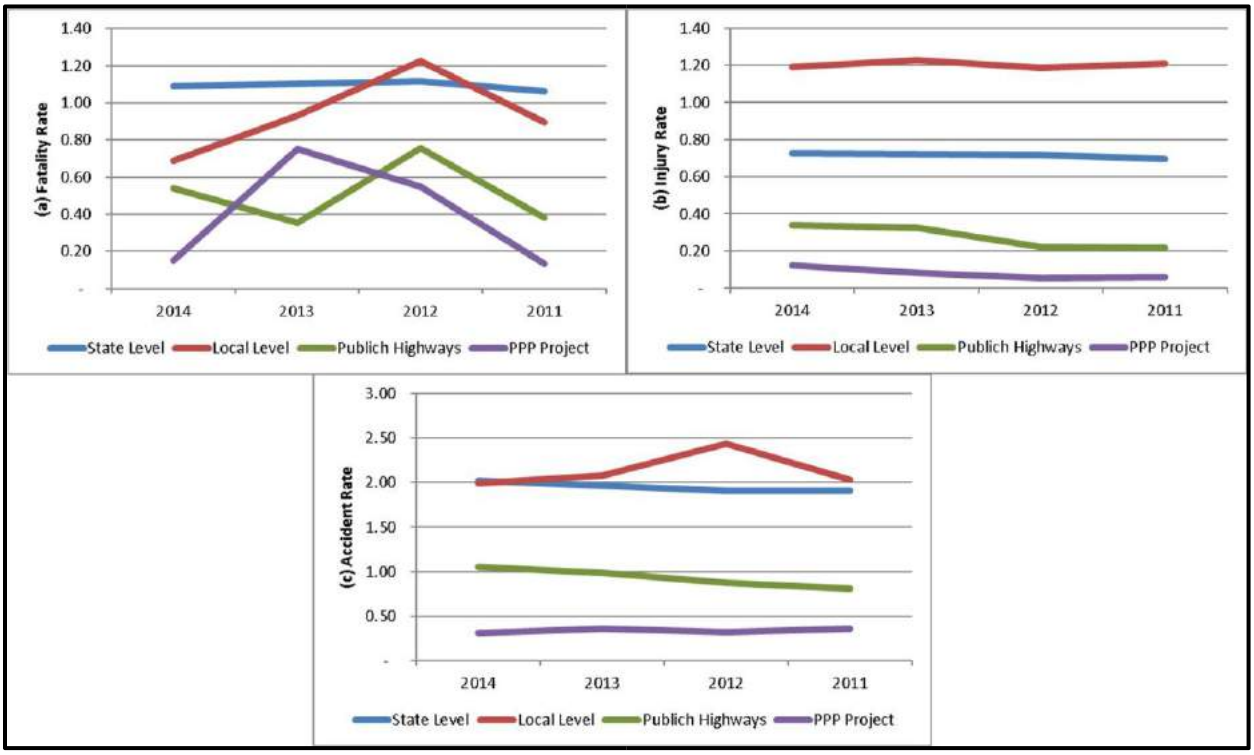


Figure 5.1 Fatality, injury, and accident rates for the state, locality, public highways, and PPP projects, mean performance over 2011 to 2014.

The main limitation in this research was the incomplete database. Of the PPP projects that responded to the data collection request, four of them were newly open to the public in 2014 or 2015, including LBJ 635, the North Tarrant Express, I-495, and I-95. Safety data before 2014 were unavailable for these four projects. In addition, many the state DOTs had not yet published their Annual Crash Facts reports or other kinds of roadway safety statistics for 2015. Thus, the 2015 benchmarks were missing for most of the PPP projects. Therefore, this analysis was tailored to address the research objective while dealing with the limitation of the database. For that reason, the other three phases of analysis were performed as explained below.

5.2.2 Phase 2 - Analysis of Individual PPP Projects to Their Benchmarks Year by Year

Unlike the broad group analysis shown in figure 5.1, which made overall group comparisons, in this phase, each PPP project was compared only with its local area benchmarks.

This was done for select projects that had reasonable/sufficient data for comparison. For example, the SH 130 PPP project was compared with the Texas state-level benchmarks, the Travis County locality-level benchmark, and the comparable non-PPP highways near this project. Within the same area, it was reasonable to assume that the unobserved factors that potentially impact roadway safety were similar, such as weather and driving behaviors. Therefore, the results would suffer less interference from unobserved factors. However, as mentioned above, because of the limitation of the database, only three PPP projects, including SH 130, the Dulles Greenway, and the Northwest Parkway, had relatively complete data from 2011 to 2014. Figure 5.2 to figure 5.4 present comparisons between each of the three PPP projects and their corresponding annual benchmarks.

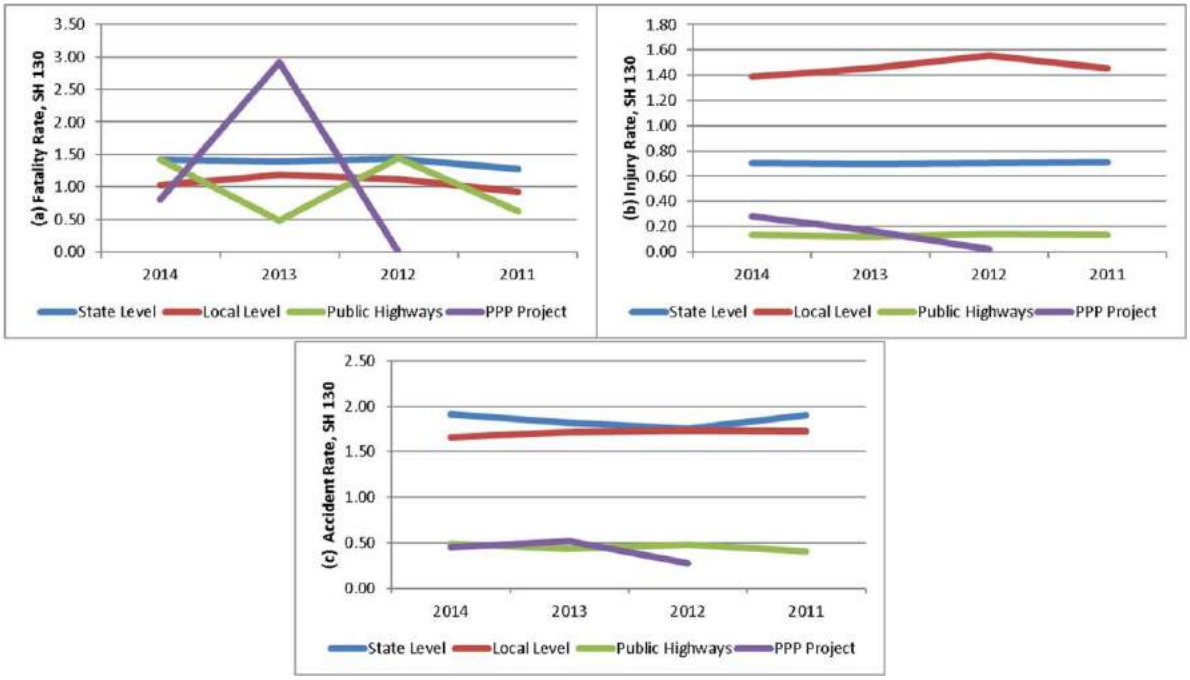


Figure 5.2 SH 130 project vs. the corresponding benchmarks from 2011 to 2014

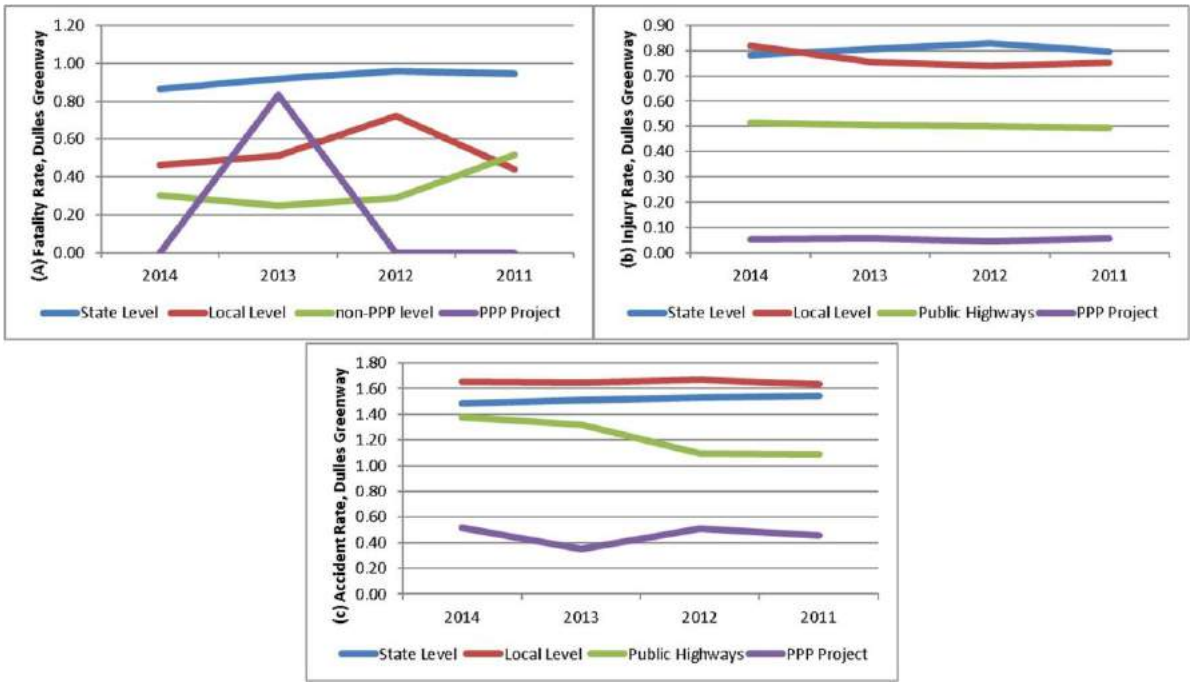


Figure 5.3 Dulles Greenway project vs. the corresponding benchmarks from 2011 to 2014

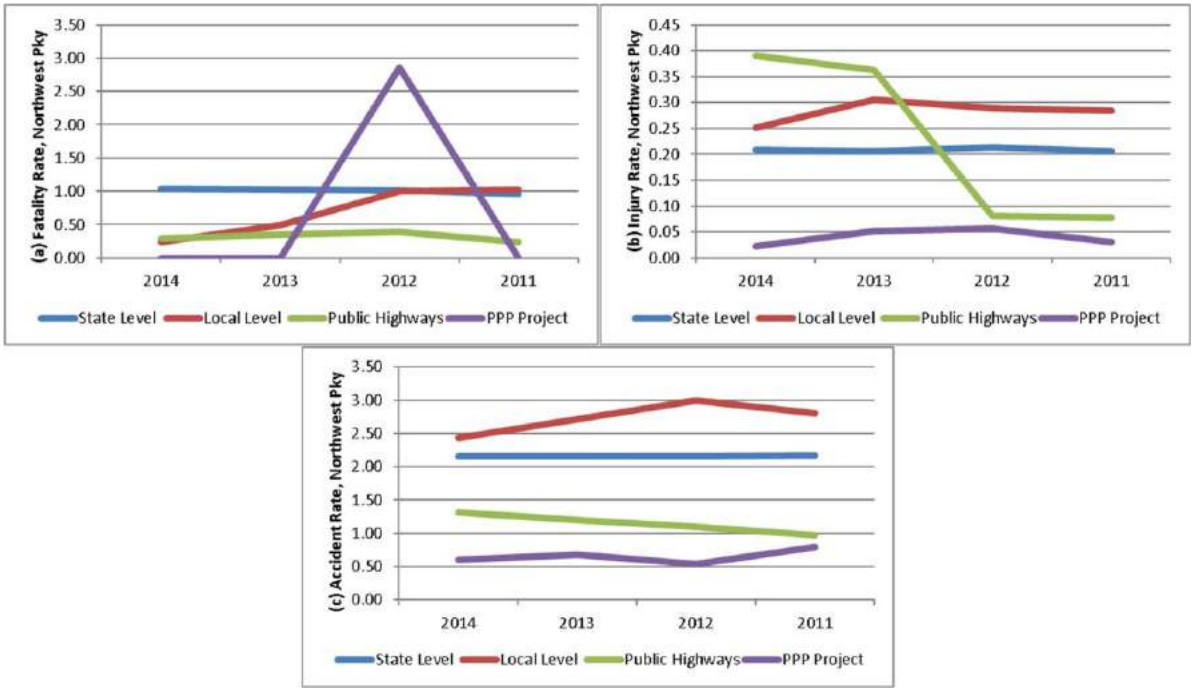


Figure 5.4 Northwest Parkway project vs. the corresponding benchmarks from 2011 to 2014

The analysis results, as presented in figure 5.2 to figure 5.4, can be described as follows. For the fatality rate, all of these three PPP projects showed an inconsistent performance. For instance, the fatality rates of Project SH 130 in 2012 and 2014 were lower than its benchmarks, but the project had a higher fatality rate in 2013. This was also the case for the Dulles Greenway and Northwest Parkway projects. For the Dulles Greenway, the fatality rate in 2013 was higher than the locality-level and non-PPP public highways benchmarks. For the Northwest Parkway, the fatality rate in 2012 was much higher than all the benchmarks of the three other levels. One possible reason for the inconsistent performance is that because the total number of fatalities was small, the change of a single unit (death) would have a very large effect on calculation of the final fatality rate.

For the injury rate and the accident rate, all three PPP projects had more consistent performance. For SH 130, both its injury rate and crash rate were much lower than the stat- and locality-level benchmarks but very close to the non-PPP public highways benchmark. For Dulles Greenway, its injury rate and crash rate were much lower than the benchmarks of the three other levels. Like the Dulles Greenway project, the injury rate and crash rate of the Northwest Parkway were also lower than the benchmarks of its three corresponding levels. Note that the injury rate of the non-PPP project-level benchmark for the Northwest Parkway project increased greatly after 2013. One explanation for the increase is that the Colorado public agency changed the reporting system in 2013, potentially making the data collection different than those in previous years.

5.2.3 Phase 3 - Analysis of Historical Means of Individual PPP Projects and the Benchmarks

In this phase, the research used the historical average safety performances from 2011 to 2015 to compare each PPP project with its corresponding average benchmarks. For those

projects for which data were only available for some particular years, this study then took the average of those certain years. For example, for SH 130, safety performance was only available from 2012 to 2014. A three-year average performance was then used to compare with the corresponding general benchmarks. By doing this, those new PPP projects that had only one or two years of data could also be compared with the historical average benchmarks (see figure 5.5).

Note that because of the limitation of the database, we could not establish a causal model to determine, from a statistical point of view, whether PPP had an impact on roadway safety performance. In this study, we only implemented statistics to observe whether safety performances differed between PPP projects and their locality averages. A content analysis was used to explore the potential reasons for any differences or similarities in the statistical analysis.

Figure 5.5 shows that for some new PPP projects, such as LBJ 635, North Tarrant Express, and I-95, the average fatality rates, the average injury rates, and the average crash rates were far below the corresponding state-level, locality-level and non-PPP public highways-level benchmarks. This means these new PPP projects had better safety performance than their localities. One reason may be that these projects were recently open to the public. With new facilities, good road conditions, high design and operational standards, and relatively low traffic flow, it is reasonable that these three projects had better safety performance than their benchmarks.

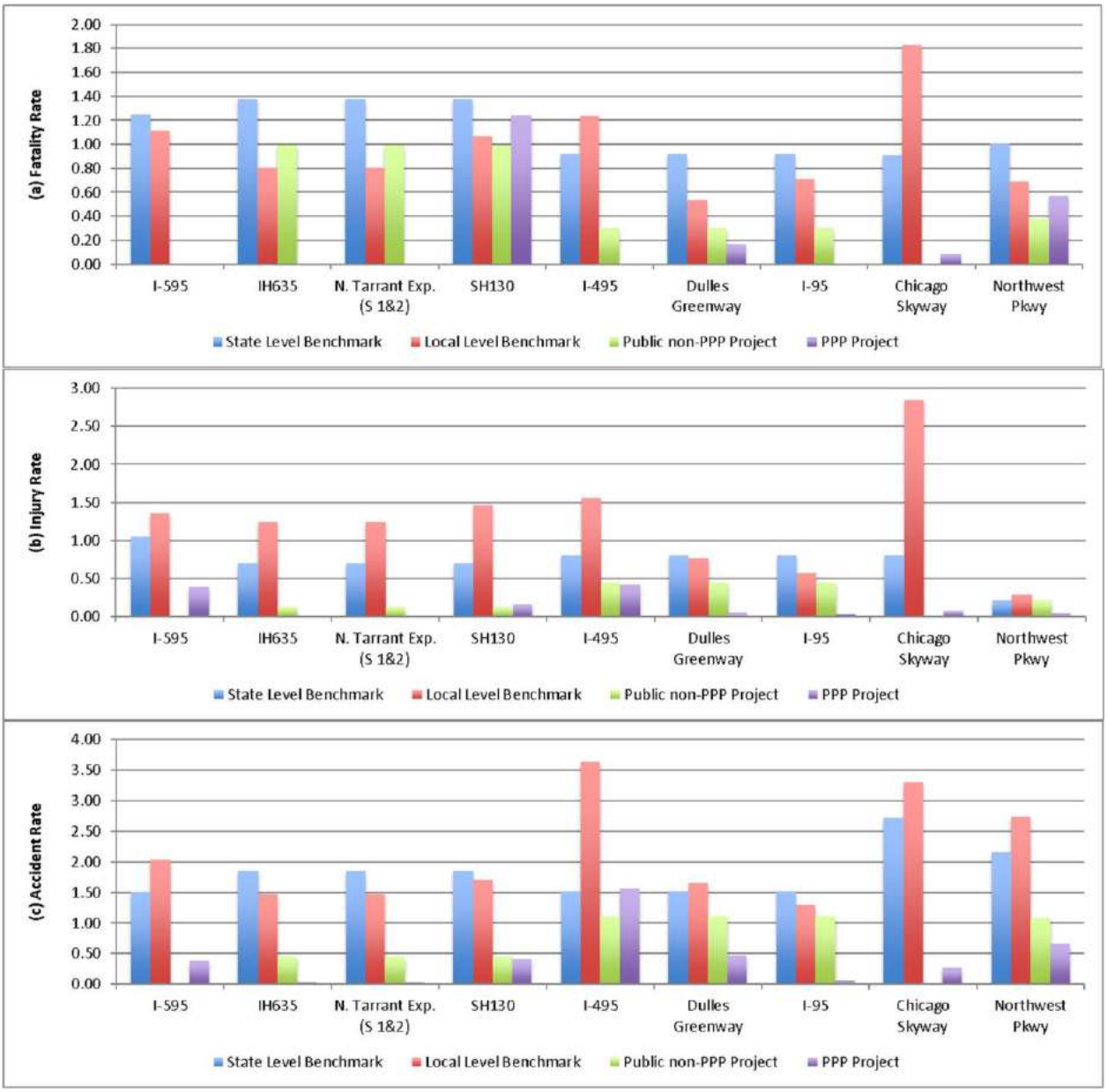


Figure 5.5 Single PPP project vs. the corresponding benchmarks: the historical average

For other PPP projects, generally, their safety performances were also much better than their state- or locality-level benchmarks. One reason is that some existing roads in the localities were old, and their design standards were below those of more recently built roads. Note that, for SH 130, this study found that its fatality rate was less than the state-level benchmark but slightly

higher than the locality benchmark and the comparable project-level benchmark. This was consistent with previous findings.

5.2.4 Phase 4 - Comparison between the PPP Group and the Benchmark Groups

This phase of the analysis aimed to test the hypothesis to identify whether there were any differences between the safety performance of the benchmarks and that of the PPP projects. This phase compared the PPP group with the state-level, the locality-level, and the non-PPP public highways project-level benchmark groups. More than the General Descriptive Analysis phase, this phase used more involved statistical methods to check the significance of the results. The three hypotheses are summarized below:

1. **Null Hypothesis:** The safety performance of PPP group is equal to the safety performance of the state-level benchmark.

   Alternative Hypothesis: The safety performance of PPP group is better than the safety performance of the state-level benchmark.
2. **Null Hypothesis:** The safety performance of PPP group is equal to the safety performance of the locality-level benchmark.

   Alternative Hypothesis: The safety performance of PPP group is better than the safety performance of the locality-level benchmark.
3. **Null Hypothesis:** The safety performance of PPP group is equal to the safety performance of the non-PPP project-level benchmark.

   Alternative Hypothesis: The safety performance of PPP group is better than the safety performance of the non-PPP project-level benchmark.

Because the sample sizes of all the four groups were less than 30, the central limit theorem could not be employed. Therefore, we could not directly assume that the safety performances of the four groups were subject to the normal distribution. In fact, a preliminary

test using the Chi-square goodness of fit showed that none of the four groups followed a normal distribution. Therefore, this study considered using the Mann-Whitney U Test to identify the difference of group means. This is a non-parametric test, and it does not necessarily require the population to follow a normal distribution. The analysis data covered the years from 2011 to 2014. The comparison results are presented in table 5.2 to table 5.4.

Table 5.2 M-W U Test for the difference of means - PPP roads and the state-level benchmark

(a) Fatal Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	40	25	25	25
P-value	0.001339	0.04107	0.03793	0.00485
(b) Injury Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	38	30	30	25
P-value	0.005155	0.003914	0.002165	0.005963
(c) Crash Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	40	30	30	25
P-value	0.000777	0.003985	0.002165	0.003968

Table 5.3 M-W U Test for the difference of means - PPP roads and the locality benchmark

(a) Fatal Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	63	47	55	48
P-value	0.004034	0.03601	0.01464	0.002629
(b) Injury Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	70	60	66	50
P-value	0.0006115	0.0006278	0.0005256	0.001289
(c) Crash Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	72	60	66	50
P-value	0.0003081	0.0006601	0.0005294	0.0013

In terms of the comparison between the PPP group and the state-level and locality-level benchmarks, this study found that, in each year from 2011 to 2014, the p values related to the fatality rates, injury rates, and crash rates were all less than the 0.05 significance level. In other words, we can say with 95 percent confidence that the fatality rate, injury rate, and crash rate of the PPP groups from 2011 to 2014 were lower than the state-level and locality-level benchmarks. Therefore, at the 0.05 significance level, the first two null hypotheses could be rejected, and it could be concluded that the PPP projects had better safety performance than their state- or locality-level benchmarks.

Table 5.4 M-W U Test for the difference of means - PPPs and the public highways benchmark

(a) Fatal Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	68	32	55	38
P-value	0.0539	0.6661	0.03999	0.1879
(b) Injury Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	75	65	59	47
P-value	0.02026	0.003631	0.01736	0.04043
(c) Crash Rate				
Wilcoxon rank sum test with continuity correction Alternative hypothesis: true location shift is not equal to 0				
	2014	2013	2012	2011
W value	81.5	60	61	45
P-value	0.005433	0.01383	0.009104	0.06297

In terms of the comparison between the PPP groups and the non-PPP public highways project-level benchmark, as shown in table 5.4, the p values of the fatality rate in years 2011, 2013, and 2014 were higher than the 0.05 significance level. In this case, it could not be concluded that the fatality rate of the PPP group was lower than the non-PPP project-level benchmark. However, most of the p values of injury rate and crash rate in each year were less than the 0.05 significance level, except for 2011. This means that we can say with 95 percent confidence that the injury and crash rates of the PPP group were lower than the non-PPP project-level benchmark. Therefore, for the fatality rate, the third null hypothesis could not be rejected, but for injury and crash rates, it could be concluded that at the 0.05 significance level, PPP projects would have better safety performance than the non-PPP projects.

5.3 Safety-Related Contractual Terms in the Target PPP Projects

For the content analysis, the procurement and contract documents of the 17 target PPP projects were carefully reviewed, and the results are summarized in table 5.5

Table 5.5 Content analysis: investigating questions

Document	Questions	YES(s)[1]	NO(s) or NM (s)[2]
Bidding Materials	a. Whether roadway safety is one project significant goal?	13	4
	b. Weather safety is one criteria to evaluate PPP proposals	9	8
	c. Will the project assign any evaluation points or other measuring systems to roadway safety?	6	11
	d. What the weight of roadway safety in proposal evaluation	2	15
Contract Document – Part I: Design & Operation	a. Are there any contractual terms containing special structural design or extra roadway elements to improve roadway safety?	7	10
	b. Are there any contractual terms containing extra or special operational requirements to improve roadway safety?	11	7
	c. Are there any contractual terms containing request of installation of any devices to collect roadway safety data?	4	13
Contract Document – Part II: Safety Incentives and Payments	a. Whether the project contract contains incentive payments to improve safety?	0	17
	b. Whether the project contract contains safety payments?	0	17
	c. Whether the project contract includes traditional sections for general roadway safety precautions?	17	0
	d. Have the contract documents provided historical safety records/data of the project or the locality of the project?	2	15
Contract Document – Part III: Safety Incident and Accidents	a. Whether the contract documents require the project concessionaire to collect (record and manage) roadway safety data?	4	13
	b. Whether the contract documents require the project concessionaire to report the collected roadway safety data?	1	16
	c. Whether the contract documents provide for the highway agency to record and report roadway safety incidents or accidents?	16	1
	d. Whether the contract documents provide for independent agency or third party to record and report roadway safety incidents or accidents?	1	16
	e. Whether the contract document require the project concessionaire to manage the roadway incidents or accidents?	17	0
	f. Whether the contract documents require the project concessionaire to carry out roadway emergency maintenance after accidents?	14	3
	g. Whether the contract documents require the project concessionaire to carry out capital work in response to repeated accidents?	11	6

[1] YES(s): Projects would be marked as "Yes" only if containing certain contractual provisions that can answer the proposed questions. [2] NO(s) or NM(s): If projects not containing any contractual provisions related to the proposed questions, this study would mark the answers for such projects as "No or Not Mentioned."

5.3.1 Bidding Documents

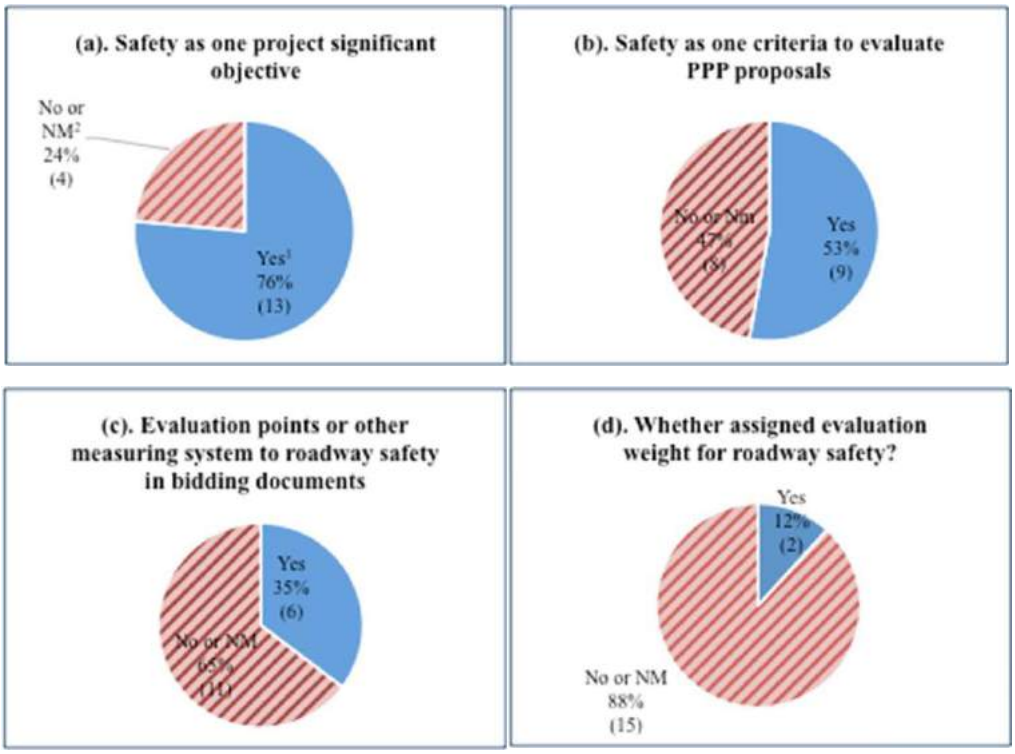
This section details the analysis of the bidding documents, including RFQs, RFPs, and parts of the concession agreements. The proposal evaluation criteria in the RFQ and RFP of each

project were given more attention during the review. Table 5.6 summarizes the review of bidding documents for all selected 17 target projects. On the basis of the proposed questions in the previous chapter, this phase aimed to investigate whether roadway safety was considered an explicit objective in current PPP projects and how these bidding evaluation criteria reflected safety considerations.

Table 5.6 Review of the bidding documents

Project	Safety as one project significant objective	Safety as one criteria to evaluate PPP proposals	Evaluation Points or other measuring system to roadway safety	What the weight of roadway safety in proposal evaluation
I-4 Ultimate	YES	NO	NO	NM
Port of Miami	YES	NO	NO	NM
I-595	YES	YES	NO	NM
SR 125	NM	NO	NO	NM
Presidio Parkway	YES	YES	YES	NM
SH 183 Managed Lanes	YES	YES	YES	10%
LBJ 635 Managed Lanes	NO	NO	NO	NM
North Tarrant Express	YES	YES	NO	NM
SH 130 (Seg. 5 & 6)	NO	NO	NO	NM
Elizabeth River Tunnel	YES	YES	YES	NM
I-495 Express Lanes	YES	YES	NO	NM
I-95 Express Lanes	YES	NO	NO	NM
Pocahontas Parkway	YES	YES	YES	10%
Chicago Skyway	NO	NO	NO	NM
Indiana Toll Road	YES	YES	YES	NM
PR-5 and PR-22	YES	YES	YES	NM
Northwest Parkway	YES	NO	NO	NM

The investigation of the procurement documents emphasized two parts: 1) whether roadway safety was considered to be a significant goal in the project, and 2) how well the safety considerations were reflected in the bidding evaluation criteria. The results are shown in figure 5.6.



1 Projects marked as "Yes" only if containing certain contractual provisions that can answer the proposed questions. 2 NO(s) or NM(s): If projects not containing any contractual provisions related to the proposed questions, this study would mark the answers for such projects as "No or Not Mentioned".

Figure 5.6 Safety considerations in the bidding documents

In terms of safety objectives, as shown in figure 5.6(a), most of the target projects explicitly included safety as an important goal. Note that all of the 17 target projects contained separate chapters on safety to ensure that the projects met the safety standards required by the federal government (National Highway Traffic Safety Administration, NHTSA). Therefore, when answering the proposed questions of "a. whether safety is one project significant objective," only those projects that explicitly included safety as one of the project objectives were marked as "Yes." A total of 13 projects (76 percent) included such terms in their project objectives. For example,

- In the I-595 Improvements project, Florida, the contract required in the RFP Volume II that "the primary objectives throughout the Term of The Project are: … Maintain a high level of quality and safety provisions in the engineering, construction, maintenance and operations services provided by the Concessionaire …"
- In the Presidio Parkway project, California, the contract required in the RFP that "Sponsors' goals for the Project are as follows: … B) Improve the operation or safety of the Presidio Parkway; … D) Improve the seismic, structural and traffic safety on Presidio Parkway…"
- In the SH 183 project, Texas, the contract required in the RFQ Section 2.1 – Description of the Project Objectives and Proposed Contracting Opportunity – that " … (v) Implementing safe construction, operation and maintenance…"
- For the Elizabeth River Tunnel, Virginia, the contract required in the Solicitation for Conceptual (SFC) that "A successful project will satisfy the following transportation objectives: Increase capacity, reduce congestion and provide safety and efficient operations …"
- For the I-495 HOT Lanes, Virginia, the contract required in the Concession Agreement that "… (a) There is a public need for timely development and/or operation of transportation facilities within the State to address the needs identified by the appropriate state, regional, or local transportation plan by improving safety, reducing congestion, increasing capacity, and/or enhancing economic efficiency and that such public need may not be wholly satisfied by existing methods of procurement in which qualifying transportation facilities are developed and/or operated; …"

- For the I-95 HOV/HOT Lanes, Virginia, the contract required in the Technical Requirement that "a. The Concessionaire's management approach shall provide all components of an effective and efficient management system, including communication and reporting; documentation of Work; supervision of Work personnel and activities; all tools, facilities, and materials; environmental protection and mitigation; safety of Work personnel; and any other management elements needed to produce and document a quality, safe, efficient, and operable Project that complies with Good Industry Practice. "
- In the Pocahontas Parkway (Route 895) project, Virginia, the contract required in the Concession Agreement that "… (c) Authorizing private entities to acquire, construct, improve, maintain, and/or operate one or more transportation facilities may result in the availability of such transportation facilities to the public in a more timely or less costly fashion, thereby servicing the public safety and welfare; …"
- For the Indiana Toll Road, the contract required in the RFP Introduction part that "… The State's primary objective is to maximize value the State, while maintaining the high safety standards and service levels of the Toll Road."
- In the PR-5 and PR-22 projects, Puerto Rico, the contract required in the RFQ that one of the primary objectives the Authority and the Puerto Rico Highways and Transportation Authority (PRHTA) should seek would be to achieve "improving the toll roads' safety standards, service levels and roadway quality."
- For the Port of Miami Tunnel, the contract required in the RFP that one of the primary objectives of the Project be "to improve traffic safety in downtown Miami by removing the Port of Miami traffic, trucks and buses, from the congested downtown street network."

Although some other projects did not explicitly mention safety in their project objective sections, the contracts still contained a set of provisions related to improving safety performance. For example:

- In the Northwest Parkway project, Colorado, roadway safety was not mentioned as one project goal to be achieved in the Project Objective section of its RFQ. However, the project developed detailed Operation Standards in Schedule 2 of the Concession Agreement, which required, "The Concessionaire must operate and maintain the Parkway in a safety and reliable manner during the Term of Agreement. The Concessionaire must adhere to a specific set of operating standards (the "Operating Standards") relating to the operation, maintenance and rehabilitation of the Parkway and must undertake certain capital improvements to the Parkway during the Term …" And the wholly "Operating Standards" can be found in the Northwest Parkway Concession Agreement Schedule 2.
- For the I-4 Ultimate project, Florida, there was no direct requirement for improving traffic safety performance in the general project objectives, but in Volume III Additional Mandatory Standards, the Purpose Section stated that the developer should upgrade the safety and mobility of the existing I-4 roadway.
- For the LBJ 635, and other Texas projects, although they did not have a clear objective for safety, there were lots of requirements for the concessionaire to improve and ensure project safety (e.g., a safety plan).

In terms of selection criteria, although 13 of the 17 selected projects explicitly considered safety as one of the project objectives, four of them did not specifically include safety in their evaluation criteria. As shown in figure 5.6(b), about half of the selected projects (9 out of 17) included safety as one of the project objectives and also contained safety in their evaluation

criteria. These projects included I-595 Improvements, the Presidio Parkway, SH 183, North Tarrant Express, the Elizabeth River Tunnel, I-495 Express Lanes, the Pocahontas Parkway, Indiana Toll Road, and PR-22 / PR-5. In these projects, a common method was to include safety management as an element to evaluate the technical capability of the bidding team. For example, for the Indiana Toll Road and PR-22 / PR-5, safety was treated as one subject under Technical Capability in the evaluation criteria. For the Indiana Toll Road, the document stated that the "Team must demonstrate their ability to address and resolve safety issues, specifically, the team should have a) knowledge of highway safety techniques and methodologies; b) experience in emergency response support; and c) background in relevant traffic engineering standards, specifications, policies, practices, and processes." In these projects, safety was categorized as part of technical capability. However, a fewer number of projects specifically assigned evaluation points or rating weights to safety; this is presented in figure 5.6(c) and figure 5.6(d). Usually, the evaluation weights were assigned only for a team's technical capability as a whole. In the 17 target projects, only two of them clearly assigned evaluation points for safety. These included the following:

- For the Pocahontas Parkway project, the evaluation criteria were primarily based on two sections: the Technical Proposal and the Price Proposal. The Technical Proposal had a weight of 30 percent, and the Price Proposal had a weight of 70 percent. Safety as one sub-section in the Technical Proposal had a 10 rating weight out of 100. Figure 5.7 is a snapshot of the Technical Proposal Evaluation Factors for the Pocahontas Parkway.
- For the SH 183 Managed Lanes project, Safety Qualification was considered to be a separate evaluation instead of a sub-section under technical capability. Safety Qualification was assigned a 10 percent rating weight in the Chapter of Evaluation

Process and Criteria in the RFQ. Additionally, the criteria explicitly required the proposers to provide previous safety records or other materials to demonstrate their safety qualifications. However, this qualification was primarily related to construction safety rather than the traffic operational safety. Figure 5.8 is a snapshot of the Qualifications Evaluation Criteria and Weighting for SH 183 Managed Lanes.

5.1 Technical Proposal Evaluation Factors

5.1.1 The Technical Proposal will be evaluated by Transurban based upon the proposal criteria listed under Sections 4.2 and 4.3 of this RFP, with the respective subsections being assigned the following weights:

Sub-Sections		Rating Weight
4.2	Qualifications and Experience	30
4.3.1 and 4.3.2	Design Factors and Utility Relocation Coordination	10
4.3.3 and 4.3.4	Geotechnical and Construction Factors	25
4.3.5	Schedule	25
4.3.6 and 4.3.7	Quality Assurance/ Quality Control and Safety	10
4.3.8	DBE/SWAM	Pass/Fail
TOTAL		**100 points**

Figure 5.7 Part of the Technical Proposal Evaluation Factors for the Pocahontas Parkway

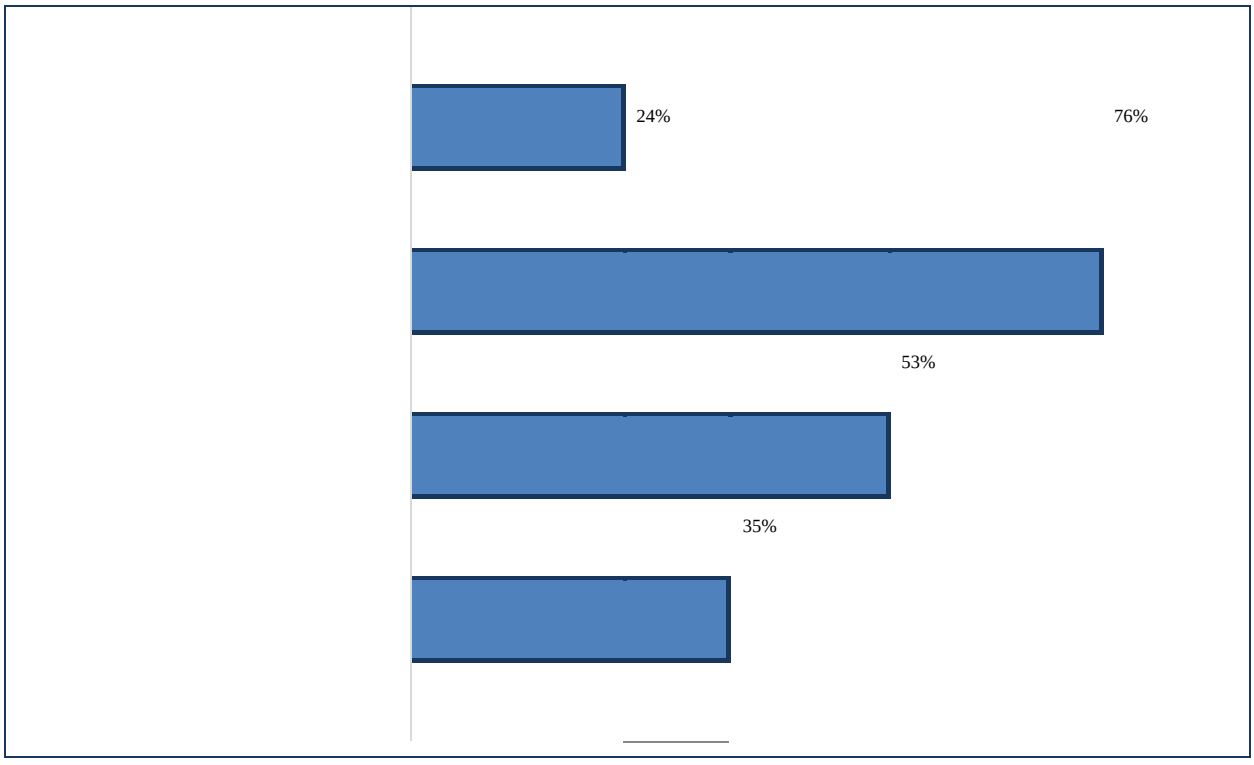
5.3 Qualifications Evaluation Criteria and Weighting

Each responsive QS passing all of the "pass/fail" qualification requirements set forth above in Part A, Section 5.2 will be evaluated and scored according to the criteria set forth below. TxDOT will evaluate responsive QSs according to the criteria in this Part A, Section 5.3. The relative weighting or importance of the evaluation criteria within each category is described in Part A, Sections 5.3.1 through 5.3.5 below and is summarized below;

- Technical Qualifications and Capability (35% Weighting)
- Statement of Technical Approach (10% Weighting)
- Project Finance Qualifications and Capability (35% Weighting)
- Conceptual Project Finance Discussion (10% Weighting)
- Safety Qualifications (10% Weighting).

Figure 5.8 Part of the Qualifications Evaluation Criteria and Weighting for SH 183 Managed Lanes

In summary, although most PPP transportation projects considered safety to be an important project goal, a much smaller proportion clearly reflected safety objectives in their selection criteria. This is clearly noted, as percentages decreased from 76 percent to 53 percent to 35 percent and finally to 12 percent (see figure 5.9). For instance, the I595 Improvements project, the Presidio Parkway, the Elizabeth River Tunnel, I-495 Express Lanes, Indiana Toll Road, and PR-22 and PR-5 projects had similar contracts to include safety as part of their evaluation criteria for the technical capacity, but none of them assigned any weighting points specifically for safety. Even if some projects, such as SH 183 Managed Lanes, considered safety qualifications to be a separate criterion and explicitly assigned weights for it, there was no clear definition to distinguish roadway safety, with an emphasis on operation and maintenance, from construction safety, with emphasis on construction.



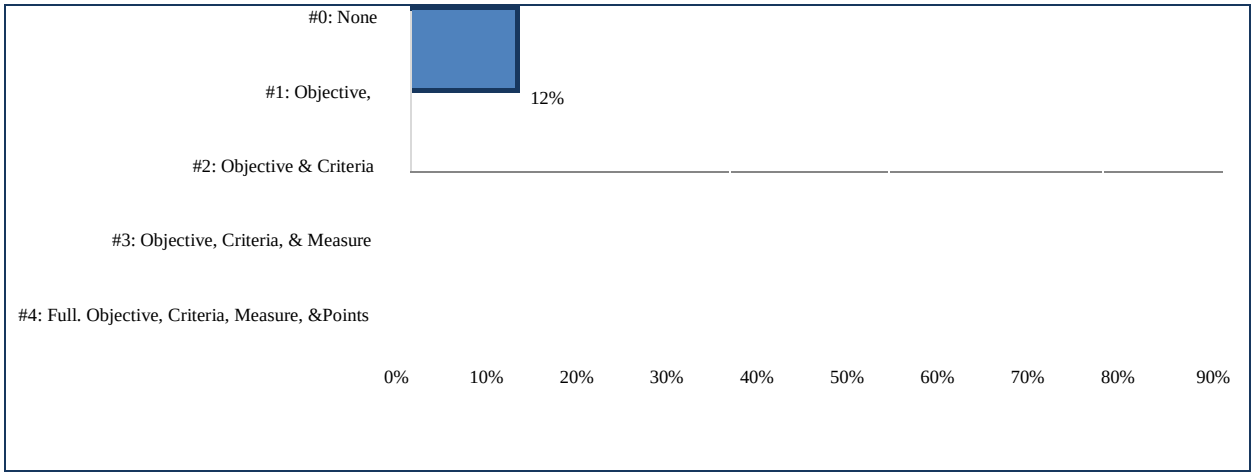


Figure 5.9 Relative safety considerations

5.3.2 Contractual Document Part I: Design and Operation

This analysis aimed to investigate whether PPP agreements included any special terms, beyond what are traditionally included in transportation contracts, in respect to structural design and operational requirements to improve roadway safety. The technical requirements of the PPP transportation projects commonly contained a set of safety-related contractual terms in the design stage, construction stage, and operation and maintenance stage, such as the road slope, lighting, and materials. Additionally, the concession agreements of all target projects required their concessionaires to provide a comprehensive safety plan. However, because the safety-related terms in the technical requirements and safety plans in comprehensive agreements were very similar among the target projects, they were considered to be traditional terms in this study. The results of the review for contractual documents related to the design and operation of all 17 target projects are summarized in table 5.7.

Table 5.7 Review of the contract documents part I: design and operation

Project	Special structural design or extra roadway elements to improve roadway safety	Extra or Special operational requirements to improve roadway safety	Request of installation of any devices to collect roadway safety data

I-4 Ultimate	NO	YES	NO
Port of Miami	YES	YES	NO
I-595	YES	NO	NO
SR 125	NM	NM	NM
Presidio Parkway	NO	YES	NO
SH 183	NO	YES	YES
LBJ 635	YES	YES	YES
North Tarrant Express	NO	NO	NO
SH 130 (Seg. 5 & 6)	YES	YES	NO
Elizabeth River Tunnel	NO	YES	YES
I-495	NO	NO	NO
I-95 Express Lanes	YES	YES	YES
Pocahontas Pkwy	NO	NO	NO
Chicago Skyway	YES	NM	NM
Indiana Toll Road	YES	YES	NO
PR-5 and PR-22	YES	YES	NO
Northwest Pkwy	NO	YES	NO

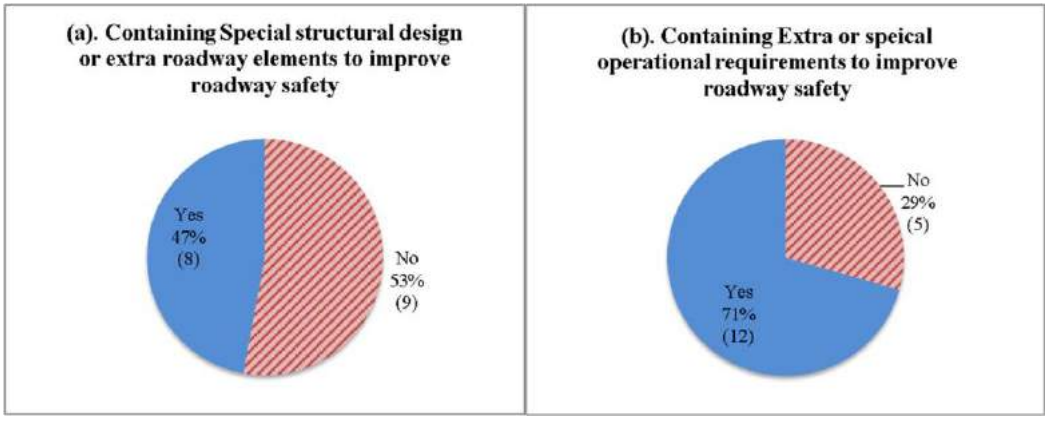


Figure 5.10 Special design and operation safety terms in the target projects

In terms of special design or extra roadway elements for safety improvement, as shown in figure 5.10 (a), 8 of the 17 (47 percent) target projects contained at least one contractual design term that differed from the traditional contractual template. These special design-related

provisions were heterogeneous and varied from project to project. For example, the I-595 Improvements project required that a custom design should meet or exceed all of the operational, aesthetic, safety, and access requirements for toll maintenance personnel provided by the standard signature gantry, which was a set of particular design requirements in the agreement. The LBJ 635 project adopted a geotechnical instrumentation program to monitor the safety and adequacy of the design and construction approach. The I-95 Express Lanes project required that a reliability assessment be made for safety purpose, and furthermore, the project required an operational analysis to demonstrate that the concessionaire's revised design did not have a significant adverse impact on the safety and operation of the existing facility. The Indiana Toll Road project developed a particular traffic plan, named Safety Initiative, for roadway safety improvements. The PR-5 / PR-22 project implemented a program called "the accelerated safety upgrades" to improve performance and safety conditions.

In terms of operation, as presented in figure 5.5(b), 12 of the 17 (71 percent) target projects included special or extra provisions to improve roadway safety. In comparison to the design-related provisions, these operation-related provisions had more similarities among projects and could be divided into two categories. One was to require concessionaires to conduct periodic safety inspection to monitor safety conditions. For example, the I-4 Ultimate project required that concessionaire conduct awareness meetings with traffic operation staff every three months to review any safety or operations issues. Some other projects also required concessionaires to assign particular safety staff to be responsible for safety management. For example, the SH 130 project required the concessionaire to set up a safety committee to hold quarterly meetings to review safety history and devise and implement new safety improvement measures. In addition to conducting a safety inspection, the category included a requirement for

the concessionaire to regularly update safety plans. Some projects also required concessionaires to remove and replace the existing signage, lights, or other safety equipment in a timely manner.

In terms of the installation of devices for safety data collection, in the 17 selected projects, four projects clearly required their concessionaires to collect safety data, which is summarized in the fourth column of table 5.7. These projects were SH 183, LBJ 635, the Elizabeth River Tunnel, and the I-95 Express Lanes. For example, in the I-95 Express Lanes documents, the Technical Requirement 4.4.2 Data Collection stated, "the Concessionaire shall store all data and make the data accessible to the Department in accordance with the Agreement." However, for most of other selected projects, although a data collection section was included in the technique requirement, no requirements or provisions for traffic or safety data were clearly made.

As a result of the review of contractual terms related to the design and operations phases, we found that all of the selected PPP projects contained many common contractual terms in the design phase and operations phase to ensure roadway safety, such as a set of minimum requirements in design (*e.g.*, soil cut and slope design), and snow removal or ice control in operation. Beyond these traditional contractual terms, we found that eight of the 17 selected projects contained some extra provisions for improving safety in the design phase. These projects with extra or special design adopted very different ways to protect roadway safety. However, the extra or special operational requirements adopted to improve roadway safety were relatively more common around many of the selected projects. These extra provisions can be divided into two major categories. One of them required the concessionaires to conduct periodic safety inspection, and also, some projects required that a particular safety manager be assigned to monitor safety performance. These projects included the I-4 Ultimate project, SH 183 Managed

Lanes, LBJ 635, the Elizabeth River Tunnel, the Northwest Parkway, and SH 130. Another type of provision required the concessionaire to update the safety plans on the basis of historic safety performance. This happened in the Presidio Parkway project, Indiana Toll Road, and PR-5 and PR-22 projects. Finally, we noticed that although only four projects clearly required their concessionaire to install necessary devices for data collection, most of the 17 selected projects mentioned in their emergency plans that the concessionaire should report traffic accidents in a timely manner. This is discussed more in the following section.

5.3.3 Contractual Document Part II: Safety Incentives and Payments

For this phase, we reviewed the provisions regarding payment mechanisms, rewards, and deductions in the concession agreements and other complementary documents. As suggested by the proposed questions described previously, this section is divided into three parts for discussion, including 1) whether the selected projects contained safety payments or safety incentives; 2) whether the selected projects contained traditional sections for general roadway safety precautions; and 3) whether the selected projects required the use of historical safety records/data of the project or of the locality for safety analysis.

Table 5.8 Review of the contract documents part II: safety incentives and payments

Project	Incentive payments to improve safety	Particular Safety Payment	Traditional roadway safety precautions – compensations for safety improvement or deductions for safety incompliance	Historical safety records of the project or the locality of the projects
I-4 Ultimate	NO	NO	YES	YES
Port of Miami	NO	NO	YES	YES
I-595	NO	NO	YES	NO

SR 125	NO	NO	YES	NO
Presidio Parkway	NO	NO	YES	NO
SH 183	NO	NO	YES	NO
LBJ 635	NO	NO	YES	NO
North Tarrant Express	NO	NO	YES	NO
SH 130 (Seg. 5 & 6)	NO	NO	YES	NO
Elizabeth River Tunnel	NO	NO	YES	NO
I-495 Express Lanes	NO	NO	YES	NO
I-95 Express Lanes	NO	NO	YES	NO
Pocahontas Pkwy	NO	NO	YES	NO
Chicago Skyway	NO	NO	YES	NO
Indiana Toll Road	NO	NO	YES	NO
PR-5 and PR-22	NO	NO	YES	NO
Northwest Parkway	NO	NO	YES	NO

The investigation in this section aimed to identify the usage of monetary incentives for managing safety performance in PPP transportation projects. Through the review of the concession agreements and other documents regarding payment mechanisms for all selected 17 projects, we found that all the selected projects implemented mechanisms to improve roadway safety in different ways, but not necessarily through a particular payment type or incentives tied to safety performance indicators. In literature review, this study found that safety payments or safety incentives were innovative payment mechanisms that tied the monetary compensation to the traffic safety performance provided by the concessionaire. According to the analysis of all provisions regarding the payment mechanisms of the 17 target projects, this study found that none of the projects included any payment mechanism that linked a monetary compensation to traffic safety performance. The reasons could be as follows:

- As a relatively new delivery system in the United States, most of the existing PPP projects focused on the aspects of project financing and risk allocation, with less or scarce attention on other areas such as roadway safety.
- The PPP payment mechanisms used in the early U.S. projects were almost dominated by toll revenues rather than a comprehensive payment mechanism.
- According to a NHTSA traffic safety report, many issues exist with current safety performance measures, such as the large cost of database maintenance and inaccurate data. These issues have hindered public agencies in evaluating operations quality on the basis of project performance. Additionally, there is no effective framework or guidelines that provide instructions for linking safety performance to a payment mechanism.

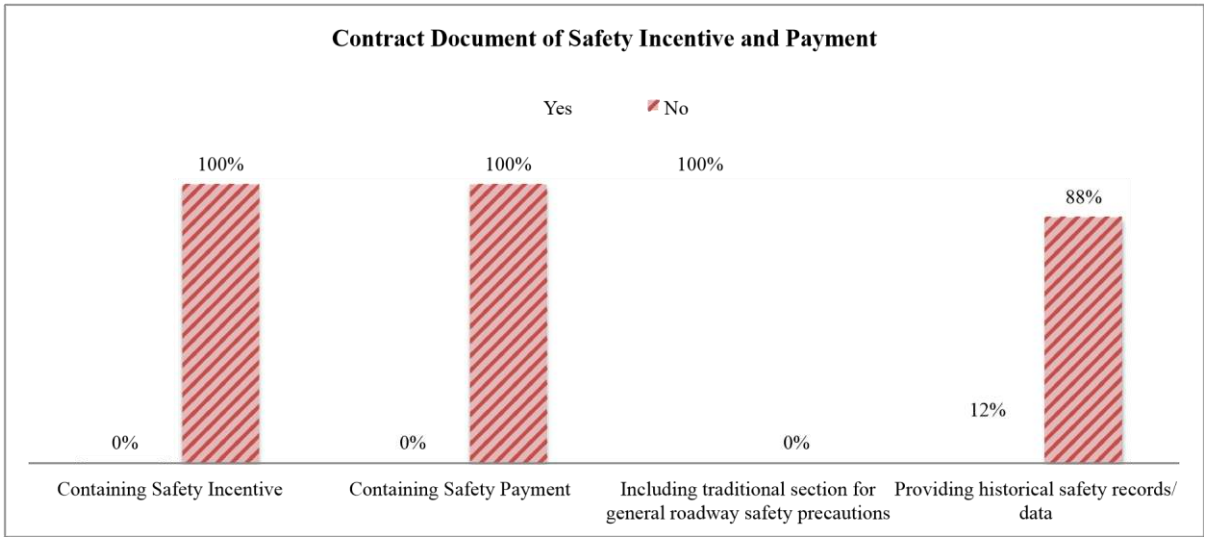


Figure 5.11 The implementation of safety payments or incentives in target projects

We also investigated whether the selected projects contained traditional provisions with regard to roadway safety precautions. If yes, we would further investigate whether these terms potentially related to a compensation or deduction. The results are summarized in the fourth column of table 5.9.

As shown in figure 5.11, all target projects contained traditional provisions regarding roadway safety precautions. Two contractual chapters, Safety Compliance and Remedies for Failure to Meet Safety Standards or perform Safety Compliance, were widely applied to all PPP projects. In addition to the terms that required the concessionaire to comply with the safety plan and safety standards, these two chapters also included some terms potentially related to safety deductions or compensation. For example, the I-4 Ultimate project required that if the concessionaire failed to comply with safety standards or any other regulations, the public agency had the right to take actions directly to ensure the safety and quality of the project, and the concessionaire would be responsible for all the expenses and potential losses due to such actions. However, these provisions cannot be regarded as a concept of safety payment. One reason is that the "safety" mentioned in most of the provisions did not clearly refer to the roadway or traffic safety. None of the 17 projects required the evaluation of any safety performance measure (*e.g.*, number of crashes, injuries, or fatalities). None provided any safety payment or safety incentive or deduction for substandard safety performance.

According to figure 5.11, few projects required the use of historical safety records to assess roadway safety performance. The results have are in the fifth column of table 5.7. In these 17 projects, only two projects—the I-4 Ultimate project and the Port of Miami Tunnel—mentioned that traffic data should be utilized for analysis in their technical requirements. However, the Port of Miami Tunnel required using only AADT to establish a revised traffic operational analysis. This analysis was primarily used for congestion management instead of improving traffic safety. The I-4 Ultimate project was the only one of the 17 target projects that included traffic safety analysis in its contracts by using historical safety records. In Volume III Additional Mandatory Standards, section 1.3.7 Safety, it required the concessionaire to adopt the

safety ratio as an index to evaluate roadway safety performance. One such provision was, “The safety ratio is defined as the ratio between the actual crash rate and the critical crash rate. The actual crash rate is a function of the roadway section length times the annual number of vehicles in relation of the number of crashes. The critical crash rate is a function of the roadway section length, the traffic volume, and the statewide average crash rate for similar roadway facilities.” However, the contract mentioned that the safety ratio was only adopted for the purpose of identifying hazardous locations in the project. The safety ratio and analysis were not use to evaluate the safety performance provided by the concessionaire. In addition, there were no specific terms requiring the concessionaire to collect such safety data. Although the safety analysis adopted in the I-4 Ultimate project was not used for evaluating whether there would be any safety improvements through PPP, this project still shed light on implementing safety performance measures into a PPP contract.

As a result of this analysis, we found that all selected PPP projects adopted mechanisms to improve roadway in different ways, but not one through a payment or incentive tied to safety performance indicators. Although two monetary mechanisms were included in the traditional chapters of safety compliance and remedies for failure to meet safety standards or perform safety compliance, they could not be treated as a safety-related payment or incentive. We also found that safety performance measures and indicators were not applied widely to the selected PPP projects. The I-4 Ultimate project was the only target project that included a traffic safety analysis in its contract by using historical safety records. However, the analysis was used to identify hazardous locations instead of evaluating the safety performance of the concessionaire. Additionally, this analysis was not linked to any payments or deductions.

5.3.4 Contractual Documents Part III: Roadway Accident Management

We reviewed of the contractual terms regarding traffic accident/incident reports and management. The review mainly focused on two areas. One was related to safety data collection and incident reports, which is reflected in the first three questions in the columns 2 to 4 of table 5.9. Another area was related to emergency management and repair work, which is reflected in the last three questions in columns 5 to 7 of table 5.9.

Table 5.9 Review of the contract documents part III: roadway accident management

Project	Requiring the project concessionaire to collect roadway safety data	Requiring the project concessionaire to report safety data	Providing for the highway agency to record and report roadway safety incidents	Providing for Independent agency or third party to record and report roadway safety incidents	Requiring concessionaire to manage roadway incidents	Requiring concessionaire to carry out roadway emergency maintenance	Requiring concessionaire to carry out capital work for incident maintenance
I-4 Ultimate	NO	NO	YES	NO	YES	YES	YES
Port of Miami	NO	NO	YES	NO	YES	NO	YES
I-595	NO	NO	NO	NO	YES	YES	YES
SR 125	NO	NO	YES	NO	YES	YES	NM
Presidio Pkwy	YES	NO	YES	NO	YES	YES	YES
SH 183	NO	NO	YES	NO	YES	YES	YES
LBJ 635	YES	YES	YES	YES	YES	YES	NO
North Tarrant Ex	NO	NO	YES	NO	YES	NO	NO
SH 130	NO	NO	YES	NO	YES	YES	YES
Elizabeth River Tu	NO	NO	YES	NO	YES	YES	YES
I-495	NO	NO	YES	NO	YES	YES	YES
I-95	YES	NO	YES	NO	YES	YES	YES
Pocahontas Pkwy	NO	NO	YES	NO	YES	YES	YES
Chicago Skyway	NO	NO	YES	NO	YES	NM	YES
Indiana Toll Road	YES	NO	YES	NO	YES	YES	NM
PR-5 and PR-22	NO	NO	YES	NO	YES	YES	NM
Northwest Pkwy	NO	NO	YES	NO	YES	YES	NM

In terms of incident data collection, recording, and reporting, although some PPP projects had data collection chapters in their comprehensive agreements that contained provisions on collecting, storing, and reporting traffic data (*e.g.* ,AADT), no safety-related data were particularly mentioned in the data collection chapters of most of the selected projects. For instance,

- For the I-95 Express Lanes, the contract mentioned in the Data Collection Chapter that "a process of data collection will be established that includes, at a minimum, traffic data." Additionally, the contract required the concessionaire to store all data and make the data accessible to the department in accordance with the agreement. However, it must be pointed out that only traffic data collection was required (*e.g.,* AADT) and safety data were not specifically mentioned (*e.g.,* crashes, injuries, or fatalities).
- The Indiana Toll Road required the concessionaire to collect traffic data through the toll collection system. Although its Toll Collection Plan included procedures for addressing events and incidents associated with toll collection and operations, the collected data were to be used only for traffic demand analysis, and there was still no specific requirement for safety data collection.

Figure 5.12 shows the results of the review and analysis of the contractual terms regarding safety data collection and reporting and traffic accident/incident management. We found that collecting and keeping safety data (*e.g.,* number of accidents, crashes, fatalities, and injuries) was not a major requirement for the concessionaire. In fact, only four (24 percent) of the contracts required the concessionaire to collect data, and only one contract (6 percent) required the concessionaire to report safety data. The Presidio Parkway was the only project that required the developer to establish a self-monitoring program in order to ensure a safe and reliable roadway system, with the main objective of maximizing public safety, reliability, and roadway availability. On the other hand, the majority of the contracts (94 percent) required the public

highway agency to carry out this task instead, *i.e.*, to record and report the roadway accidents. In only one project (6 percent), the LBJ 635 project, was a provision made to allow an independent agency to do this task. The Elizabeth River Tunnel was the only project that required the concessionaire to manage and control information identified through incident reports, noncompliance reports, and traffic reports to address quality improvement.

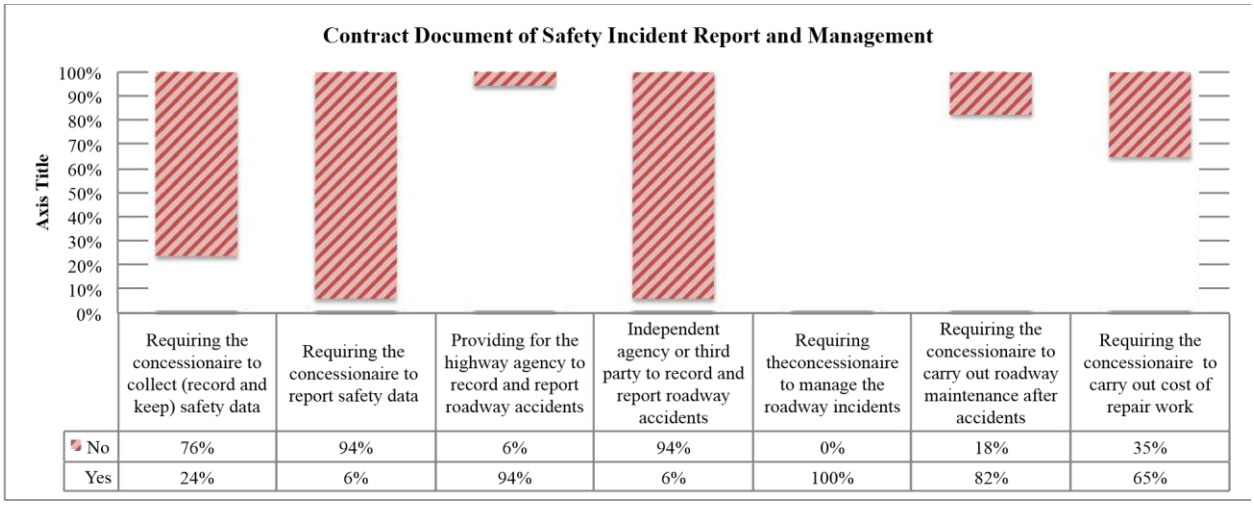


Figure 5.12 Safety incident report and management in target projects

While collecting and keeping safety data was not a major requirement, all 17 target projects included a set of requirements for incident response and put forward specific incident management/response plans in the contract. As shown in figure 5.12, most of the target projects required their concessionaires to immediately report any safety-related incidents to the public law enforcement agency.

Although almost none of the PPP projects included specific requirements for safety data collection and management in their data collection chapters, we found that all 17 projects included explicit requirements for incident response and put forward specific incident response/management plans in technical provisions, which potentially had contractual requirements regarding safety event reports. Therefore, we further investigated the incident response/management plans. In such plans, 16

of the 17 projects explicitly required their concessionaires to immediately report any safety-related incidents to the Department of Public Safety or other public law enforcement agency, and only the I-595 Improvement project had no explicit terms related to incident reporting. For instance, the Indiana Toll Road required "the concessionaire shall promptly notify the IFA (Indiana Finance Authority) of all emergencies, and promptly notify the IFA of all accidents and incidents occurring on or at the Toll Road." Other projects had a similar provision to require incident reporting in their contract. However, note that some of these projects did not clearly distinguish between traffic incidents and construction incidents. For example, the contract for the I-495 Express Lanes required that "the contractor should immediately report in writing any safety-related injury, loss, damage or accident arising from the Work." This provision referred to construction incidents rather than traffic incidents.

Although most of the selected PPP projects had particular provisions for incident reporting, almost none of them required concessionaires to be responsible for the management and analysis of safety data. The Elizabeth River Tunnels was the only project that required the concessionaire to "manage and control information identified through incident reports, noncompliance reports, and traffic reports to address quality improvement" in the research targets.

Sometimes, it is more effective to manage such safety data through a third party. On the one hand, it is more fair and objective for the safety data to be recorded and managed by a third party rather than by the concessionaire. If a payment mechanism is linked to traffic safety performance, then the project concessionaire may remove or ignore accident records intentionally in order to show good safety performance. On the other hand, the expense of data collection and management by a third party may be less than that by either the concessionaire or the public agency. However, we found that almost none of the 17 projects required an independent agency or a third party to collect, manage, and report traffic safety data. Of the 17 projects, only he LBJ 635 project suggested that a separate party could be engaged for data management. In the LBJ

635 contract, it mentioned that the "Developer may engage private security firms or employ passive security devices or technology to protect, collect, accumulate, transfer and deposit tolls and incidental charges or identify toll violations." Although this provision was designed more for toll collection, it can be regarded as a foundation for including a third party to provide the service of collecting and managing traffic safety data.

In terms of incident management and repair works, unlike safety data collection and recording, all of the target projects required the concessionaires to develop a comprehensive emergency/incident management plan to immediately respond and manage roadway incidents. For example:

- The I-4 Ultimate project required that the concessionaire "shall perform and comply with the provisions of the Technical Volumes concerning emergencies, incident response, safety and security."
- The Port of Miami Tunnel project required the concessionaire to provide a "First Response Team with required special equipment for incidents."
- In the contract for the I-595 Improvement project, the "Concessionaire shall comply with all rules, directives and guidance of the US department of Homeland Security and comparable State agency and shall coordinate and cooperate with FDOT and all other governmental entities providing security, first responder and other public emergency response services in accordance with the Contract Document."

Additionally, most (82 percent) of the 17 projects required the concessionaires to be responsible for maintenance and roadway repair after incidents. In some projects, particular provisions or procedures for emergency/incident repair were contained in the emergency/incident management plan, such as the I-4 Ultimate project, I-595 Improvement project, Presidio Parkway project, SH 183 Managed Lanes, LBJ 635 project, Elizabeth River Tunnel, I-495 Express Lanes,

I-95 Express Lanes, Pocahontas Parkway, Chicago Skyway, Indiana Toll Road, PR-5&PR-22 project, and Northwest Parkway. However, in some other projects, the contract mentioned that the concessionaire did not have to assume all maintenance responsibility. For example, the Port of Miami Tunnel required that the emergency response procedure should be developed by the parties in conjunction with the government.

For capital work in response to accidents, 11 projects required the concessionaires to pay for the costs of repair work. However, some public agencies authorized concessionaires to pursue claims against any responsible third party for reimbursement of expenses incurred. For example,

- The contract for the I-4 Ultimate project stated, "when an incident/emergency causes damage to any element within the applicable O&M limits, FDOT authorizes Concessionaire to pursue claims against any responsible third party for reimbursement of expenses incurred."
- For the Elizabeth River Tunnel, I-495, and I-95 projects, the contracts allowed the concessionaires to charge incident fees, but the amount of any such other incidental fees and charges would not exceed the amount reasonably necessary for the concessionaires to recover their reasonable out-of-pocket and document costs and expenses.

As a result of the review of contractual terms related to traffic accident/incident reporting and management, we found that projects in the same state commonly had similar contract models. For incident reporting and data collection, all of the 17 projects had an incident management plan in the contract, and most of them included explicit provisions requiring the concessionaire to report an incident immediately. However, some projects did not clearly distinguish between traffic incidents and construction incidents. Also, we found that although most of the selected PPP projects had particular provisions on incident reporting, almost none of them required concessionaires to be responsible for the management and analysis of safety data,

and none of them required an independent agency or a third party to collect, manage, and report the traffic safety data. For incident maintenance and repair work, all of the 17 selected projects required that the concessionaire be responsible for maintenance and roadway repair after an incident. Eleven projects also required the concessionaire to pay for the capital costs of the repair work. However, some public agencies also authorized concessionaires to pursue claims against any responsible third party for reimbursement of expenses incurred.

Chapter 6 Discussion

6.1 Research Implications and Significance

Improvement in road safety is an important objective for all highway agencies. There are multiple ways to address safety improvement, and this research addressed a dimension that had not been addressed before. This research considered the type of project delivery system to check whether choosing one delivery system over another would have an effect on improving roadway safety. When a safety objective is ranked or rated high for a highway, particularly for roads that have high collision/accident rates, it is important for decision makers to understand what delivery system could be used to contribute to reducing collisions or improving the safety record. This research provides PPP contractual safety measures to use in managing safety in the long term.

Even though it would be expected that roadway safety would be improved by long-term maintenance in PPP contracts, there were few quantitative studies that supported this perception. This research shed light on quantifying PPP for improving road safety. The research outcomes have been presented in this technical report. State, city, and county managers or other stakeholders will find the outcomes useful in getting more information about the relationships between safety, maintenance, and delivery systems. This will help in setting priorities for road maintenance and in choosing delivery systems.

6.2 Limitations

Note that because of the limitations of the roadway safety database, this study was not about establishing a causal model to determine whether PPP impacts roadway safety performance. In this study, statistical tools were used only to identify whether there were any differences between the safety performance of PPP projects and those of their local average.

This research should be considered as an initial stage toward more substantial analysis that would segregate the states' safety data into groups, e.g., in clustered analysis, which would

recognize the design-bid-build system, design-build system, and other traditional systems, along with historical maintenance records for highways. Well-maintained roads under traditional systems would play a role in comparing PPP safety data. According to he previous research, a number of exogenous variables have the potential to influence the roadway safety performance, but they are beyond the concessionaire's ability to manage, such as traffic flow (Abdel-Aty and Radwan 2000; Persaud et al. 2000; Hauer and Bamfo 1997), percentage of heavy goods vehicles (Hiselius 2004; Ramirez et al. 2009), and number of lanes and intersections (Ivan and O' Mara 1997; Milton and Mannering 1998; Noland and Oh 2004). In future research, with a more comprehensive database, a Poisson and Negative Binomial Regression model (Rangel et al. 2012), which includes more comprehensive predictor variables, could be used to establish causality. This model would provide a coefficient of PPP and the significance of coefficient from the statistical perspective to determine whether PPP is a factor affecting safety performance.

Chapter 7 Conclusions and Recommendations

7.1 Conclusions

This study helps to establish an understanding of the relationship between roadway safety and innovative project delivery systems in transportation sector in the U.S.

An analysis of safety data from PPP projects in this study showed that PPP projects have better safety performance than traditionally delivered highways in relation to injury rates and accidents rates. It was difficult to come the same conclusion for fatality rates.

The content analysis of the PPP contracts of target PPP projects indicated that PPP projects in the United States take a lenient or less than expected stance toward enforcing better roadway safety performance. By default, all studied projects had to account for the traditional requirements of safety as set by the states and the federal government. However, PPP projects did not seem to be any different in relation to safety, even during the operations phase. The analysis showed that safety was mentioned as an important objective in the procurement documents of most (76 percent) of the studied PPP projects. However, there was no special mechanism to implement that objective in the real conduct of the projects. Only about half of the projects (53 percent) mentioned safety as part of their proposal evaluation, and only two projects actually assigned points and weights to their safety requirements. In the PPP agreements, regular safety plans were required from private partners. However, extra design or construction safety parameters were requested in only eight of the studied 17 projects (47 percent). In the operations phase, the status was similar, as 12 of the 17 projects (71 percent) called for conducting inspections and updating roadway safety plans. The collection of roadway safety, traffic, and crash data was not a requirement except in four projects. The biggest example of this lenient approach was that contract compensation carried no link or relationship to the safety performance of the project. There were no safety incentives, safety payments, or other

mechanisms used in this regard. In fact, no provisions were made to assess any safety performance indicators except for one project out of 17.

Knowing that most states have records of accidents, injuries, and fatalities, this research suggests that these states could use such data to benchmark the safety performance of potential PPP projects to help enforce better roadway safety on future PPP projects.

7.2 Recommendations

One of the objectives of using PPPs is to take advantage of private sector skills in the management of facilities and enterprises. Public highway agencies could use proactive systems that enforce and incentivize the private partners to attain higher roadway safety standards and performances. Public agencies trying to achieve such objective would be recommended to do the following:

- Assessing the safety objectives

  A highway agency must decide whether roadway safety is an essential objective. For example, if the locality of a proposed PPP transportation facility has high levels of accidents per mile or per 10,000 VMT, then safety should be an essential objective. If it was a basic/normal objective, then perhaps the traditional safety requirements would be sufficient.

- Procurement Stage

  If safety is an essential objective, then the procurement documents, RFQ, and RFP must reflect that safety will be part of the PPP proposal evaluation, and a number of points or weight will need to be set for the safety objective.

- Contract and Operation Stage

  If safety is an essential objective, then a link should be established between the private partner compensation and the achievement of the safety objectives. This could be done by

using a safety incentive payment, a core safety payment, safety deductions as part of the performance and availability deductions, and compensation for the contractor for capital/maintenance safety improvements.

- Establishing a safety benchmark

  A highway agency would need to establish a minimum or average safety benchmark to use in making payments. For example, the agency would need to establish the average number of accidents/fatalities/injuries per mile or per 10,000 VMT on a number of comparable roads or for a city/county average. A formula would link the actual number of accidents/fatalities/injuries to the average benchmark to establish safety compensation to the private partner. The agency could be more sophisticated by incorporating the severity of the accident severity (e.g., percentage of fatalities to injuries) and the accident frequency.

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Appendix A Bidding Document

1. I-595 Improvement, Florida

Project Objective

RFP Volume II – Technical Requirements Division II, Section 1 – Project Description

4. Project Objectives

The primary objectives throughout the Term of the Project are to:

- Optimize mobility in the corridor by maximizing traffic throughput and minimizing congestion in both the Express Lanes and the General Purpose Lanes;
- Maintain a high level of quality and safety provisions in the engineering, construction, maintenance and operations services provided by the Concessionaire;
- Ensure a premium free-flow service is provided at all times on the Express Lanes, providing a reliable travel time; and
- Expedite the construction of improvement components that provide congestion relief, while minimizing impacts to adjacent communities and adhering to established NEPA commitments for the Project.

M. ITS / Systems Integration

The Concessionaire shall be responsible for the design, construction, integration, operation, and maintenance of the existing, new and permanent I-595 corridor Intelligent Transportation Systems (ITS) deployment to support traffic management and operations of the Express Lanes and the General Purpose Lanes. This deployment shall include a fiber optic communication network subsystem, an Express Lanes Access Control subsystem, an emergency access gates (EAG) subsystem, a Closed Circuit Television (CCTV) camera traffic monitoring subsystem, a Dynamic Message Sign (DMS) subsystem, a Changeable Message Sign (CMS) subsystem, a Highway Advisory Radio (HAR) subsystem, a Microwave Vehicle Detection Station (MVDS) subsystem, Electronic Toll Collection (ETC) subsystem, and a power backup subsystem, including all ancillary components within the I-595 corridor. The Concessionaire's responsibilities for each of these subsystems are defined in Attachments 1 and 2 of Vol II Div II Sect 3 and in Vol II Div II Sect 4.

The Concessionaire shall be responsible for the design, construction and integration of a CCTV camera traffic monitoring subsystem and a MVDS subsystem along Florida's Turnpike at the I-595 / Turnpike interchange from Peters Road to Griffin Road. The Concessionaire shall also be responsible for the relocation of the DMS/CMS subsystem currently installed on the Turnpike between Peters Road and Griffin Road. The Concessionaire shall turn these subsystems over to FTE upon the completion of construction and acceptance by the Department.

Refer to the ITS Deployment Requirements provided as Attachment 1 to Volume II, Division II, Section 3 for a full description of the Concessionaire's responsibilities in the maintenance of the interim ITS system during construction, and the design, construction and integration of the new I-595 and FTE ITS systems.

N. Operations and Maintenance

The Concessionaire will be responsible for operation and maintenance of the Project in accordance with the Operations and Maintenance Requirements specified in Vol II Div II Sect 4, which includes detailed requirements for the preparation of operations procedures and manuals, maintenance procedures and manuals, maintenance management information systems, etc. The operations and maintenance criteria have stringent requirements with respect to safety, operations activities, and maintenance activities as required in order to provide a safe environment for the public's use of the facilities.

O. Handback Requirements

The Concessionaire will be required to handback the operations and maintenance of the facility to the Department at the Termination Date. The Handback Requirements contained in Vol II Div II Sect 5 define the terms and conditions of the transfer and identify inspection and Renewal Work requirements, the required conditions of the facilities and equipment, the expected life remaining, system demonstration tests, etc., all of which are required prior to the actual handback.

Evaluation Criteria

6.3 Evaluation Criteria and Weighting.

FDOT will evaluate and score each responsive SOQ meeting all of the "pass/fail" qualification requirements in Section 6.2 according to the criteria set forth below. The order in which the evaluation criteria appears within each category (i.e., Financial Qualifications and Capacity, Technical Qualifications and Capability, Statement of Financial Approach and Statement of Technical Approach) is not an indication of weighting or importance.

6.3.1 Financial Qualifications and Capacity (47.5% Weighting).

(a) The Proposer's experience in successfully closing the financing of large transportation concession projects, with an emphasis on roadway public-private partnership projects involving comparable payment mechanisms;

(b) The Proposer's demonstrated experience in successfully developing large transportation projects that involved the Proposer sharing

substantial risks associated with design, construction, finance, operation and maintenance;

(c) The financial capability of the Proposer as demonstrated by the documents included in the SOQ; and

(d) The extent of financial support for the Proposer from lenders and investors as indicated by bank letters of support indicating willingness to finance the Project, parent company letters of support and letters from sureties/banks indicating their willingness to provide a surety bond or letter or credit to the Proposer.

6.3.2 Technical Qualifications and Capability (47.5% Weighting).

(a) The extent and depth of the Proposer's relevant experience, including its success in carrying out comparable projects and responsibilities independently and in combination with other firms, including:

- The Proposer's experience in successfully managing the design and construction process for large road civil works projects that were open to traffic during the construction period; and
- The Proposer's track record in successfully operating and maintaining transportation infrastructure to a high standard over an extended contract term;

(b) The stability and likelihood of success of the proposed management structure and team; and

(b) The stability and likelihood of success of the proposed management structure and team; and

(c) The extent and depth of relevant experience of the management team and key personnel listed as required by Section 5.2.1.3(d).

6.3.3 Statement of Financial Approach (2.5% Weighting).

(a) The extent to which the Statement of Financial Approach demonstrates an understanding of the financial complexity of the Project; and

(b) The extent to which the Statement of Financial Approach identifies Project financing problems and challenges and suggests innovative solutions to these problems and challenges.

6.3.4 **Statement of Technical Approach (2.5% Weighting).**

(a) The extent to which the Statement of Technical Approach demonstrates an understanding of the technical complexity of the Project; and

(b) The extent to which the Statement of Technical Approach identifies Project technical problems and challenges and suggests innovative solutions to these problems and challenges.

2. Presidio Parkway, California

Project Objective

SECTION 1.0 INTRODUCTION AND GENERAL PROVISIONS

1.1 Introduction

These Instructions to Proposers ("ITP") are a part of the Request for Proposals ("RFP") issued by the State of California ("State") Department of Transportation ("Department"), in cooperation with the San Francisco County Transportation Authority ("Authority"), collectively the project sponsors ("Sponsors") to seek proposals ("Proposals") to design, build, finance, operate and maintain the Presidio Parkway Project ("Project") through a public-private partnership agreement ("Agreement"). This ITP provides instructions to be followed by Proposers in their responses to the RFP. Proposals must comply with ITP requirements.

Proposals will only be considered from those entities that Sponsors short-listed based on their Statement of Qualifications ("SOQ") submitted in response to the Request for Qualifications issued by the Department in cooperation with the Authority for the Project on February 2, 2010, as subsequently amended (the "RFQ").

Sponsors' goals for the Project are as follows

A) Improve mobility by improving travel times or reducing the number of vehicle hours of delay

B) Improve the operation or safety of the Presidio Parkway

C) Provide quantifiable air quality benefits

D) Improve the seismic, structural and traffic safety on Presidio Parkway

E) Maintain the functions that the Presidio Parkway corridor serves as part of the regional and city transportation network

F) Improve the functionality of Presidio Parkway as an approach to the Golden Gate Bridge

G) Preserve the natural, cultural, scenic and recreational values of affected portions of the Presidio, a national historic landmark district

H) Be consistent with the San Francisco General Plan and the General Management Plan Amendment Final Environmental Impact Statement, Presidio of San Francisco, Golden Gate National Recreation Area (NPS 1994a and 1994b) for Area A of the Presidio and the Presidio Trust Management Plan: Land Use Policies for Area B of the Presidio of San Francisco (Presidio Trust 2002)

I) Minimize the effects of noise and other pollution from the Presidio Parkway corridor on natural areas and recreational qualities at Crissy Field and other areas adjacent to the project area

J) Minimize the traffic impacts of Presidio Parkway on the Presidio and local roadways

Evaluation Criteria

Appendix F

Evaluation Criteria and Weighting

The maximum score for a Proposal will be 100 points, which will be allocated as described below.

1 Technical Proposal Criteria [Up to 30 Points]

The Technical Proposal shall consist of the information set forth in Appendix C. The Technical Proposal evaluation factors are set forth in Sections 1.1, 1.2 and 1.3 below.

1.1. Management / Administration Evaluation Criteria - *Maximum 5 Points*

Sponsors will use the following evaluation criteria to score the Management / Administration portion of the Technical Proposal:

A) The degree to which the Preliminary Project Management Plan contains an efficient construction management concept that: (a) integrates the management of all Project construction sections, as determined by Proposer's Construction Phasing/Sequencing Plan; (b) allocates the resources needed to meet the Project requirements and implement the Proposer's Construction Phasing/Sequencing Plan; (c) demonstrates the existence of a comprehensive safety program that ensures the safety of the Developer's employees and the travelling public; and (d) demonstrates an understanding and plan for addressing the limitations contained in the right of entry agreement with the Presidio Trust;

B) The degree to which the Preliminary Project Management Plan contains an efficient design management concept that: (a) integrates the design of all Project sections, as determined by the Proposer's Construction Phasing/Sequencing Plan; (b) allocates the resources needed to meet the Project requirements and implement the Proposer's Construction Phasing/Sequencing Plan; (c) clearly identifies the approach to consultation, interface, approval and permitting issues associated with the developing design and construction planning; (d) addresses the aesthetic requirements and values of the project; (e) integrates the whole life cycle of the asset into the design development; and (f) demonstrates the inter-relationship between temporary works and permanent works design and construction;

C) The degree to which the Preliminary Project Management Plan demonstrates an efficient and effective interface: (a) between the design, construction, and O&M personnel; (b) between the design / construction organizations and the QA/QC organization; (c) the construction personnel and the O&M organization in the commissioning of the Project; (d) the Proposer and Department and Authority, other governmental entities, utility agency owners, stakeholders and the public during the Construction Period; (e) between the existing contractors employed by the Department and the Proposer at the commencement of the Project; and (f) between the Departments operations and maintenance teams and the Proposer at the commencement of the Project;

D) The degree to which the Preliminary Project Management Plan demonstrates an efficient approach to management of traffic during the Construction Period and the O&M Period;

E) The degree to which the Preliminary Quality Plan demonstrates: (a) that adequate QA/QC procedures and staffing will be in place during performance of the Design Work, Construction Work and O&M Work; and (b) that design and construction activities performed by different firms will be coordinated to ensure consistency of quality;

F) The length in days that the Project Schedule sets forth for the time that will elapse between NTP 2 and the Final Acceptance Date;

G) The degree to which the Project Schedule and Construction Phasing/Sequencing Plan: (a) demonstrates a comprehensive understanding of the activities necessary to achieve final completion of the Project; (b) incorporates and sets forth an aggressive but realistic time frame for the required completion of all Construction Work; (c) demonstrates, reasonably contemplates and accommodates contingencies likely to be encountered during construction; (d) identifies a coherent and realistic strategy, to progressively and continually alleviate traffic congestion along the Presidio Parkway throughout the Construction Period; (e) addresses the limitations contained in the right of entry agreement with the Presidio Trust; and (f) demonstrates a coherent and realistic strategy for coordination with Phase I Construction; and

H) The degree to which the Environmental Compliance Plan: (a) identifies adequate staffing to address environmental issues; (b) identifies and tracks environmental and permitting requirements and how the Proposer intends to verify these requirements have been met, including mitigation and design features, and the ability to work with Section 4f and Section 106 issues; (c) demonstrates a comprehensive understanding of environmental risks and sensitivity to environmental concerns; and (d) sets forth an effective and efficient process for identification and mitigation of environmental risks and (e) sets out the commitment to staff awareness and training.

1.2 Preliminary Master Design Submittal Evaluation Criteria - *Maximum 10 Points*

Sponsors will use the following evaluation criteria to score the Preliminary Master Design Submittal portion of the Technical Proposal:

A) The degree to which the Proposer's Preliminary Master Design Submittal utilizes innovative approaches to design, construction, operations and maintenance that will minimize the overall cost of the Project during the Term;

B) The degree to which the Proposer's Preliminary Master Design Submittal: (a) improves upon the Indicative Preliminary Design for the Project's general purpose mainline lanes, auxiliary lanes, signing, pavement marking, lighting, grading and landscaping, structures, and ramp lanes; (b) accommodates movements, minimizes clear zone obstructions and conflict points, including

weaving sections; (c) incorporates profiles that promote driver comfort; (d) contains a geometric layout of at-grade intersections that maximizes operational capacity; and (e) incorporates a consistent application of aesthetic features;

C) The degree to which the strategies presented in the Proposer's Transportation Management Plan: (a) minimize Project-related traffic impacts and delays associated with the Construction Work; and (b) efficiently coordinate construction sequencing;

D) The degree to which the Proposer's Preliminary Master design Submittal improves upon the indicative Preliminary Design for: (a) the available and/or required types, locations, and sizes of stormwater management facilities that will be required for the Project; and (b) the required collection system and conveyance systems necessary for the Project;

E) The degree to which the Proposer's Preliminary Master Design Submittal addresses the environmental and landscape requirements and aspirations of the Department and other Project stakeholders including the users of the Presidio;

F) The degree to which the Proposer's conceptual utilities relocation plan efficiently ties to the phasing of the Construction Work; and; and

G) The degree to which the tunnel systems plans included in the Proposer's Preliminary Master Design Submittal present coherent and realistic strategies for (a) fire and life safety; (b) tunnel ventilation; (c) fire suppression; and (d) tunnel lighting

1.3 Operation and Maintenance Evaluation Criteria - *Maximum 15 Points*

Sponsors will use the following evaluation criteria to score the Operation and Maintenance portion of the Technical Proposal:

A) The degree to which the Proposer's Preliminary O&M Plan contains an efficient approach to the operations and maintenance requirements during the Construction Period (and the O&M Period);

B) The degree to which the Proposer's Preliminary O&M Plan demonstrates an efficient: (a) self-monitoring processes for purpose of calculating adjustments to the Monthly Disbursement; (b) method of tracking and reporting Construction and O&M Noncompliance Points accumulation; (c) approach to the development, updating and implementation of the O&M implementation plan; (d) approach to Routine Maintenance; (e) approach to handling the response to accidents and roadway incidents; (f) approach and assumptions for Renewal Work and capital equipment replacement; (g) approach to safety; (h) approach to fulfill the Handback Requirements; and (i) approach to coordinating and working with other government agencies whose operations are associated with the Project; and

C) The degree to which the Proposer's System Integration Plan demonstrates an

efficient integration of the Project systems where the unified interface will support the operation of the Project and the self-monitoring/payment mechanism process.

2 Financial Proposal Criteria [Up to 70 Points]

2.1 NPV of MAP Score - *Maximum 60 Points*

A) The NPV of Maximum Availability Payments and the MAP to be made by the Sponsors will be evaluated for each Proposal.

B) The NPV of these payments will be assessed from the information set out by the Proposer in the forms in Appendix D-2 and the Substantial Completion Date from the Proposer's Project Schedule. The date to which cash flows are discounted back is the anticipated date of Financial Close.

C) The results of the Maximum Availability Payments evaluation, rather than being presented in NPV terms, are converted into a score. A Proposer's MAP will be scored out of 60 points, with higher points assigned to Proposals with lower NPVs of cost to the Sponsors. Scores are allocated in accordance with the following method:

The Sponsors will review and perform their own analysis of the financial model and NPV calculation provided by the Proposers. The lowest NPV will be awarded the maximum points available for NPV (60 points). In calculating the scores for the other Proposers the Sponsors will deduct 1.5 points from the maximum points available for NPV for every percentage point by which each other Proposer's NPV exceeds the lowest NPV.

2.2 Feasibility of Financial Proposal - *Maximum 10 Points*

Proposals that provide evidence of a stronger level equity commitment and support from providers of finance will receive a higher score in this element of the evaluation. Factors that will be considered in evaluating the strength of support from lenders and evidence of equity commitment in the Proposer's Financial Proposal include the following:

A) Evidence of advanced development in financial structuring of the Project (e.g. provisional financing term sheets and indicative credit ratings);

B) Evidence of lenders' due diligence process and the extent of completion of the due diligence (legal and tax review, technical review, financial model audit, etc.);

C) Elements of the approach that appear to reduce the risk of delay or failure to achieve Financial Close for the Project;

D) Lenders' support letters evidencing the proposed lenders' willingness to provide funding for the project, including evidence of discussions held with credit committees and indication of the level of approval for funding achieved;

E) Depth and quality of the commitments for equity and assurance that private

equity will be in place, including letters from the Proposer's equity owners evidencing their commitment to provide equity funding and copies of board meeting minutes evidencing approval of the equity subscription; and

F) Commitment on behalf of the equity sponsors to maintain a transparent funding process, including express acceptance of the Department's option to require or initiate a funding competition after Notice of Intent to Award with Department oversight as set out in the Appendix G.

3. SH 183 Managed Lanes, Texas

Project Objective

2.1 Description of Project Objectives and Proposed Contracting Opportunity

TxDOT intends, through this procurement, to enter into a P3A with a private developer or consortia ("Developer") that will result in the achievement of Project objectives which include but are not limited to the following:

(i) Securing quality design and construction in order to optimize the operational life cycle performance of the Project;

(ii) Expediting delivery of Project improvements;

(iii) Managing mobility within the Project area during construction;

(iv) Improving mobility within the Project area after the construction period;

(v) Implementing safe construction, operation and maintenance;

(vi) Obtaining high quality operation and maintenance meeting or exceeding TxDOT requirements and expectations;

(vii) Facilitating participation by disadvantaged business enterprises ("DBEs"), women-owned business enterprises and minority business enterprises;

(viii) Leveraging available local, regional and state/federal funds and toll revenue to maximize funding for the Project;

(ix) Increasing phased managed lane access opportunities to generate additional revenues for the Project; and

(x) Promoting connectivity of managed lane systems in the region.

Evaluation Criteria

(d) Each of the Equity Member(s) and the Lead Contractor of the Proposer has the financial capability to carry out the Project responsibilities potentially allocated to it as demonstrated by the materials provided in Volume 3 of the QS (see Part B, Volume 3).

(e) The information disclosed in Form C and/or in response to Part B, Volume 1, Section C Legal Qualifications does not materially adversely affect the Proposer's ability to carry out the Project responsibilities potentially allocated to it.

(f) The Proposer makes the express, written commitments regarding Key Personnel as required in Part B, Volume 2, Section B, 2)(b) and Part B, Volume 4, Section A, 2)(b).

5.3 Qualifications Evaluation Criteria and Weighting

Each responsive QS passing all of the "pass/fail" qualification requirements set forth above in Part A, Section 5.2 will be evaluated and scored according to the criteria set forth below. TxDOT will evaluate responsive QSs according to the criteria in this Part A, Section 5.3. The relative weighting or importance of the evaluation criteria within each category is described in Part A, Sections 5.3.1 through 5.3.5 below and is summarized below;

- Technical Qualifications and Capability (35% Weighting)
- Statement of Technical Approach (10% Weighting)
- Project Finance Qualifications and Capability (35% Weighting)
- Conceptual Project Finance Discussion (10% Weighting)
- Safety Qualifications (10% Weighting).

In addition to the criteria set forth below, TxDOT intends to utilize performance evaluations for Proposers and any of their team members that have been completed with respect to prior or ongoing contracts entered into with TxDOT for either a CDA or a design-build contract in accordance with the process described in Part A, Section 2.13 above. Any available performance evaluations will be used in the QS evaluation process to provide additional information on some or all of the evaluation criteria set forth below as appropriate based on the contents of each performance evaluation.

5.3.1 Technical Qualifications and Capability (35% Weighting)

The background and experience of the Proposer, individual team members, and technical Key Personnel in developing, designing, constructing, operating and maintaining comparable projects will be evaluated in accordance with the criteria in this Section 5.3.1. The evaluation criteria within Subsection (a) are of equal importance to the evaluation criteria in Subsection (b) and of greater importance than the evaluation criteria in Subsection (c).

Project and personnel references, as well as the information provided as required in Part B, Volume 4, Section A, will be used, as deemed appropriate by TxDOT, to assist in the evaluation of the

Project Finance Qualifications and Capability evaluation category.

5.3.4 Conceptual Project Financing Discussion (10% Weighting)

The conceptual project financing discussion will be evaluated in accordance with the criteria in this Section 5.3.4. The evaluation criteria within Subsection (a) is of equal importance to the evaluation criteria in Subsection (b).

(a) Demonstrated knowledge and understanding of the current project financing markets, with specific reference to the availability of project financing for a managed lane toll concession project of the proposed scope and complexity of the Project; and

(b) Demonstrated in-depth understanding of the tools, requirements and critical considerations involved in developing and implementing a financing plan for the Project.

5.3.5 Safety Qualifications (10% Weighting)

This RFQ seeks to identify those Proposers that can demonstrate the ability to develop and implement an effective safety program for the Project that ensures worker safety and protects the traveling public. The safety qualifications of the Proposer, as documented in the Forms G submitted by the Lead Contractor and each Construction Team Member, will be evaluated in accordance with the criteria in this Section 5.3.5. The evaluation criteria within Subsections (a) through (c) are of equal importance.

(a) The strength and consistency of the Proposer's and individual team member's safety records.

(b) The strength of the Proposer's and individual team member's safety practices and the extent to which such practices demonstrate an understanding of an effective safety program.

(c) The experience and qualifications of the Safety Manger.

5.4 QS Evaluation Procedure

TxDOT anticipates utilizing one or more committees to review and evaluate the QSs in accordance with the above criteria and to make recommendations to the Commission based upon such analysis. At various times during the deliberations, TxDOT may issue one or more requests for written clarification to the individual Proposers. TxDOT may also schedule interviews with one or more Proposers on a one-on-one basis, for the purpose of enhancing TxDOT's understanding of the QSs and obtaining clarifications of the terms contained in the QSs.

TxDOT may at any time request additional information or clarification from the Proposer or may request the Proposer to verify or certify certain aspects of its QS. The scope, length and topics to

4. Elizabeth River Tunnel, Virginia

Solicitation for Conceptual Proposal

Project Objective

1.3 Project Objectives

VDOT is procuring this Project under the provisions of the PPTA to secure private sector funds and offset the need for public allocations to fund the Work. A successful project will satisfy the following transportation objectives:

- Increase capacity, reduce congestion and provide safe and efficient operations;
- Develop a multi-modal transportation facility that may be integrated into the operations of a regional transportation network and that serves as an emergency evacuation route;
- Develop a project that reduces and mitigates its impacts to the environment and surrounding communities while supporting the movement of commercial traffic; and
- Develop a project that is coordinated with adjacent land uses and supports the anticipated growth in personal and commercial traffic.

Evaluation Criteria

Section 10.4.1 Priority 1 Qualifications Criteria		
.1	Financial Capacity	The Offeror must demonstrate that it has the financial resources and capabilities to (a) provide necessary equity; (b) obtain debt and/or additional equity financing; (c) provide guarantees, as required, as they relate to this Project; and (d) otherwise undertake this Project. **Documentation requested:** For all team members who will be providing equity and/or providing the performance security for the initial construction of the Project, (to include any parent or related companies from whom financial guarantees will be provided) the following documentation must be provided: 1. Audited financial statements for each of the last five (5) years prepared: a. in accordance with U.S. Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS); b. in English; c. in US dollars; and d. including balance sheet, profit and loss statements, and statement of changes in financial position and accompanying notes to financial statements. If the audited financial statements are prepared in accordance with an accounting standard other than U.S. GAAP or IFRS, a letter must be provided by a Certified Public Accountant (or equivalent professional accountant) discussing the major differences between the standards upon which these financial statements are prepared and U.S. GAAP or IFRS.

Section 10.4.4 Priority 4 Information Criteria		
.1	Innovations and Ideas	What innovative concepts or value added ideas will the Offeror contribute to the Project to enhance the financial feasibility, development and/or operation of the facility? Provide a brief narrative discussing any proposed product, service, or value added idea for the Project that will enhance VDOT's abilities to complete the Project and meet the Project's objectives. The narrative should include an explanation of Offeror's rationale for any concept listed and how it adds value to the Project.
.2	Risk Allocation	Complete the model risk registers contained in Appendix J.

		Risk Register 1 relates to Project risks, the consequences of which have the potential to arise **before** Financial Close. Risk Register 2 relates to Project risks, the consequences of which have the potential to arise **after** Financial Close. Offerors are not restricted to identification of Project risks that are contemplated to be assigned to the private entity under the Interim and/or Comprehensive Agreement, but should instead identify all Project risks, whether or not such risks are commonly assigned to a private entity under a P3 arrangement. Offerors shall include a full description of each risk, using a separate line for each, and including positive opportunities as well as potentially negative occurrences where appropriate. Offerors shall include the consequence of the risk to the Project in the appropriate column, for example a consequence may be to delay the Project, to create an unsafe condition or an environmental hazard. Offerors shall indicate whether, in their opinion, a given risk may best be managed by VDOT or by private entity or shared. A shared risk shall be disaggregated, where possible, to include separate descriptions at a level of detail that would permit specific assignment of a risk. Offerors shall complete their proposed mitigation strategy in the final column of each risk register and shall use this opportunity to make reasoned suggestions for the risk allocations they propose, explaining why the allocation would best suit the Project objectives. Where Offerors suggest that a particular risk should best be assigned to VDOT, Offerors shall identify the mitigation that is considered most appropriate for VDOT to adopt; where assigned to the private entity, Offerors shall identify the mitigation that they would propose and where shared, the mitigations to be adopted by both parties shall be described. Offerors shall assign their relative estimate of the severity and probability of each risk, using the 3-point scale (low, medium and high) and that such assignment of severity and probability shall be assessed in accordance with ALARP principles. Risks entered on Risk Register 1 and the suggested assignment and mitigations may help to define the risk allocation between VDOT and the private entity in any Interim Agreement and/or Comprehensive Agreement prior to Financial Close. All such risks would be expected to expire at Financial Close.

		Risks entered on Risk Register 2 and the suggested assignment and mitigations may help to define the risk allocation between VDOT and the private entity in any Comprehensive Agreement after Financial Close. All such risks would be expected to expire at Handback. Evaluation will be based on the appropriateness of risk identification description and classification and the reasonableness, effectiveness and appropriateness of mitigations including a demonstration that management and assignment of risk is to the party best able to manage the risk. The risk registers may be extended to multiple 11x17 sheets and do not count towards the 150 page limitation. However, Offerors should note that the objective is a clear and succinct description of the top few risks in each category.
.3	Project Understanding and Approach	What is the Offeror's understanding of the complexities of the Project components and a conceptual approach to meeting the challenges of the Project? Provide a narrative identifying the Offeror's general understanding of the Project scope and how it contributes to meeting the Project's objectives, including but not limited to development of a transportation facility that may be integrated into the operations of a regional transportation network and that increases capacity, is safe and efficient and serves as an emergency evacuation route. Provide a narrative identifying the Offeror's conceptual approach to the following Project components: 1. Project management; 2. Environmental permitting and mitigation, including Offeror approach to coordinating with marine stakeholders; 3. Public involvement, awareness & communication, including the Offeror's approach to fostering and maintaining a strong relationship with the users and surrounding communities; 4. Quality assurance and quality control; including context sensitive design solutions; 5. Design, including LEED and Energy Star rating systems, and context sensitive solutions; 6. Construction, including the percentage of work Offeror plans to self-perform, and Offeror's approach to maintaining a free flow of traffic during construction activities; 7. Right of way acquisition and relocation; and

		8. Utilities relocation. Provide a narrative describing the Offeror's conceptual approach to the following Operations and Maintenance components: 1. Transition between construction and service commencement, including transfer of existing assets to Offeror (Handover requirements) and undertaking human resources responsibilities for transitioning existing VDOT operations and maintenance personnel under new management structure; 2. Tolling operations and systems; 3. Public relations and communication; 4. Traffic, safety, congestion management and incident management; 5. System integration and integrated network; 6. Handback requirements; 7. Normal and capital maintenance; and 8. Management and coordination between existing and new tunnel facilities.
.4	Organizational Structure	What is the overall adequacy of the Offeror's organizational structure, including the allocation of the roles and responsibilities of Key Personnel and consortium firms to facilitate completion of the Project? Provide information as to the form of lead Offeror's organizational (LLC, corporation, etc.) structure, ownership, management and legal framework of the Offeror's team. Provide information, on other Key Personnel and consortium firms with substantial and material roles and responsibilities (Material Participants), as to the form of organization, ownership, management and legal framework. Material Participants should include financing, design, construction, operations and maintenance.

5. I-495 HOT Lanes, Virginia

Project Objective

This **AMENDED AND RESTATED COMPREHENSIVE AGREEMENT RELATING TO THE ROUTE 495 HOT LANES IN VIRGINIA PROJECT** (this "Agreement") is made and entered into as of December 19, 2007 by and among:

(1) the VIRGINIA DEPARTMENT OF TRANSPORTATION (the "Department"), an agency of the Commonwealth of Virginia (the "State"), the address of which Department is 1401 East Broad Street, Richmond, Virginia 23219; and

(2) CAPITAL BELTWAY EXPRESS LLC, a Delaware limited liability company (the "Concessionaire"), the address of which is 405 Lexington Avenue, 43rd Floor, New York, New York 10174.

ARTICLE 1

RECITALS

(1) On March 25, 1995 the Governor of the State signed into law, effective July 1, 1995, the Public-Private Transportation Act, which was amended and re-enacted by Chapters 504 and 562 of the 2005 Acts of Assembly and signed into law by the Governor, effective July 1, 2005 (as amended, the "PPTA").

(2) In re-enacting the PPTA, the State General Assembly found and declared, among other things, that:

(a) there is a public need for timely development and/or operation of transportation facilities within the State to address the needs identified by the appropriate state, regional, or local transportation plan by improving safety, reducing congestion, increasing capacity, and/or enhancing economic efficiency and that such public need may not be wholly satisfied by existing methods of procurement in which qualifying transportation facilities are developed and/or operated;

(b) such public need may not be wholly satisfied by existing ways in which transportation facilities are developed and operated; and

(c) authorizing private entities to acquire, construct, improve, maintain, and/or operate one or more transportation facilities may result in the availability of such transportation facilities to the public in a more timely or less costly fashion, thereby serving the public safety and welfare.

(3) The PPTA grants the Department the authority to allow private entities to develop and/or operate qualifying transportation facilities if the Department determines there is a need for the facilities and private involvement would provide the facilities to the public in a timely and cost-effective fashion.

(4) On July 1, 1995 the Department adopted Implementation Guidelines developed by the Commissioner for the selection of solicited and unsolicited proposals for negotiation under the PPTA, which were revised in April 2001 and further revised on October 31, 2005.

Evaluation Criteria

Fluor Daniel indicates they have had discussions with local government officials and communities. Additionally, they conducted a poll of registered voters along the corridor. According to the proposal, the results of these efforts indicate public support for their concept. While there is obvious support for improving the Capital Beltway, there appears to be substantial variance with regards to the type of improvements necessary, and the means of financing. The proposal demonstrates an understanding of the national and regional transportation issues and needs, as well as the impacts this project may have on those needs. There is demonstrated ability to work with the community.

3. Public Involvement Strategy - What strategies are proposed to involve local and state elected officials in developing this project? What level of community involvement has been identified for the project? Is there a clear strategy for informing, educating and obtaining community input through the development and life of the project?

Fluor Daniel identifies its public relations strategies as: opinion research; community outreach; communications. Several community involvement methods including use of interactive web site, direct communications etc., are identified for informing, educating and obtaining community input through the development and life of the project.

Project Compatibility Is the proposed project compatible with state and local comprehensive plans?

1. Compatibility with the Existing Transportation System - Does this project propose improvements that are compatible with the present and planned transportation system? Does the project provide continuity with existing and planned state and local facilities?

The proposed project will upgrade the region's transportation infrastructure in accordance with the local and regional plans. The project would work best if there were a regional network of HOT lanes.

2. Fulfills Policies and Goals - Does the proposed project help achieve performance, safety, mobility or transportation demand management goals? Does the project improve connections among the transportation modes?

It is not very clear that the proposed project would help achieve performance, safety, mobility or transportation demand management goals. The proposed improvements could improve connections among the transportation modes by facilitating express buses and HOVs, if direct access is provided.

3. Enhance Community-Wide Transportation System - Are there identified project benefits to the affected local jurisdiction's transportation system? Does this project enhance adjacent transportation facilities?

6. I-95 HOV/HOT Lanes, Virginia

Project Objective

1.2 Project Administration

1.2.1 General Requirements

A. The Concessionaire's management approach shall provide all components of an effective and efficient management system, including communication and reporting; documentation of Work; supervision of Work personnel and activities; all tools, facilities, and materials; environmental protection and mitigation; safety of Work personnel; and any other management elements needed to produce and document a quality, safe, efficient, and operable Project that complies with Good Industry Practice.

B. All prospective Contractors and prime contractors of joint ventures shall prequalify with the Department and shall have received a certification of qualification.

C. The Concessionaire shall not subcontract any part of the Work to a Contractor who is not prequalified with the Department. This restriction does not apply to consultants, manufacturers, suppliers, or haulers. Consent to subcontract or otherwise delegate any portion of the Work shall not relieve the Concessionaire of any responsibility for the fulfillment of the entire Agreement. Further, delegation or subcontracting of the Concessionaire's responsibilities shall not diminish the Concessionaire's obligation to report directly to the Department, unless the Department expressly agrees to accept reports or communications from third parties.

D. The Concessionaire shall note and comply, where applicable, with the requirements of the eVA vendor system prior to the execution of the Agreement.

Evaluation Criteria

4.0 EVALUATION OF THE STATEMENTS OF QUALIFICATIONS

4.0.1 VDOT's Evaluation Team will rate and score (in their sole discretion) the Offeror's Statements of Qualifications based upon the evaluation criteria found in this RFQ and in accordance with the Design-Build Evaluation Guidelines, revised October 2011. Failure to meet all RFQ requirements may render a Statement of Qualification non-responsive while the extent to which an Offeror meets or exceeds evaluation criteria will be rated by the VDOT Evaluation Team and will be reflective of the VDOT Evaluation Team's scoring (in their sole discretion) of the Statements of Qualifications submitted by Offerors

4.0.2 In its sole discretion, VDOT may hold interviews, ask written questions of the Offerors, seek written clarifications, conduct discussions on the SOQs and solicit updated SOQs during the evaluation and short-listing process.

4.1 Statement of Qualifications Evaluation Factors

4.1.1 The Statements of Qualifications will be evaluated based upon the following:

Section	Weight
3.3 Offeror's Team Structure	30%
3.4 Experience of Offeror's Team	35%
3.5 Project Risks	35%
TOTAL	**100%**

7. Pocahontas Parkway, Virginia

Project Objective

COMPREHENSIVE AGREEMENT TO DEVELOP AND OPERATE ROUTE 895 CONNECTOR

This COMPREHENSIVE AGREEMENT TO DEVELOP AND OPERATE ROUTE 895 CONNECTOR ("Agreement") is made and entered into as of June 3, 1998, by and between the Virginia Department of Transportation ("Department"), a department of the Commonwealth of Virginia ("State"), the address of which Department is 1401 East Broad Street, Richmond, Virginia 23219, and FD/MK Limited Liability Company, a Delaware limited liability company ("FD/MK"), the address of which is 100 Fluor Daniel Drive, Greenville, South Carolina 29607.

ARTICLE I

RECITALS

Section 1.1. On March 25, 1995 the Governor of the State signed into law, effective July 1, 1995, the Public-Private Transportation Act (as amended, the "PPTA").

Section 1.2. In enacting the PPTA, the State General Assembly found and declared, among other things, that:

(a) there is a public need for timely acquisition or construction of and improvements to transportation facilities within the State that are compatible with state and local transportation plans;

(b) such public need may not be wholly satisfied by existing ways in which transportation facilities are acquired, constructed or improved; and

(c) authorizing private entities to acquire, construct, improve, maintain, and/or operate one or more transportation facilities may result in the availability of such transportation facilities to the public in a more timely or less costly fashion, thereby serving the public safety and welfare.

Section 1.3. The PPTA grants the Department the authority to allow private entities to construct and/or operate qualifying transportation facilities if the Department determines there is a need for the facilities and private involvement would provide the facilities to the public in a timely and cost-effective fashion.

Section 1.4. The PPTA allows for both solicited and unsolicited project proposals.

Transurban will evaluate each Proposal from each Offeror, with such evaluation being based upon the numerical weighting set forth in Sections 5.1 and 5.2 below. Subject to Section 4.0.3 of this RFP, the Technical Proposal will have a weighting of thirty percent (30%) and the Price Proposal will have a weighting of seventy percent (70%).

At its sole discretion, Transurban may hold interviews, ask written questions of the Offerors, seek written clarifications, conduct discussions on the Proposals, and solicit updated proposals during the evaluation and selection process.

5.1 Technical Proposal Evaluation Factors

5.1.1 The Technical Proposal will be evaluated by Transurban based upon the proposal criteria listed under Sections 4.2 and 4.3 of this RFP, with the respective subsections being assigned the following weights:

Sub-Sections		**Rating Weight**
4.2	Qualifications and Experience	30
4.3.1 and 4.3.2	Design Factors and Utility Relocation Coordination	10
4.3.3 and 4.3.4	Geotechnical and Construction Factors	25
4.3.5	Schedule	25
4.3.6 and 4.3.7	Quality Assurance/ Quality Control and Safety	10
4.3.8	DBE/SWAM	Pass/Fail
TOTAL		**100 points**

The order in which the proposal criteria appear within each of the above subsections under Sections 4.2 and 4.3 is not an indication of weighting or importance.

5.1.2 For purposes of determining the pass/fail requirements for the DBE goal and the SWAM goal, the only item that will be considered will be the Offeror's submission of the written statements required by Section 4.3.8.

5.1.3 Each evaluation criterion has an assigned maximum number of points that demonstrates its relative importance. The total Technical Proposal score to each Offeror will be (a) the sum of the scores that each evaluation team member assigns to that Offeror; (b) divided by the number of evaluation team members, rounded to the nearest one hundredth of a point. The figure derived from the preceding sentence is to be converted to a 30-point scale by multiplying such figure by 0.30, with the product being rounded to the nearest one hundredth of a point.

5.1.4 If Transurban determines that the Technical Proposal of any Offeror does not comply with or satisfy requirements of the RFP Documents, Transurban may find such Offeror's entire Proposal to be non-responsive. In such event, the Price Proposal corresponding to the non-

8. Indiana Toll Road, Indiana

Project Objective

I. Overview of RFP and Lease Process

Introduction

The State of Indiana (the "State") has engaged Goldman, Sachs & Co. (the "Advisor") as its financial advisor to assist in evaluating the possible long-term lease and concession (the "Lease") of the Indiana Toll Road (the "Toll Road"). The State's primary objective is to maximize value to the State, while maintaining the high safety standards and service levels of the Toll Road.

Overview of Request for Toll Road Lease Proposals ("RFP")

This RFP allows prospective Bidders to formally express their interest in bidding on the Lease of the Toll Road. Sections II and III of this RFP provide an introductory description of the Toll Road and include highlights of the possible Lease. Section IV summarizes the required Bidder qualifications. Section V lists the RFP submission requirements and procedures for those looking to bid on the Lease. The Appendix provides the 2005 Wilbur Smith Rate Review and Revenue Projection Study.

Those interested in bidding on the Lease should respond to this RFP no later than 4:00 pm Chicago time on **Wednesday, October 26th, 2005**. The State may determine in its discretion whether to accept any responses that are not received by the date and time set forth in this paragraph. Based on the RFP submissions, the State will determine those Teams that are qualified to bid on the Lease as submissions are received. There will be no restriction as to the number of Bidders that may qualify.

For the purposes of this RFP, the following definitions will apply:

- "Team" or "Bidder" means an individual, a company, or a consortium of individuals and/or companies formed to undertake the transaction.

  "Team Member" means a member of a Team.

Evaluation Criteria

IV. Bidder Qualification Requirements and Evaluation Criteria

This RFP is open to prospective Bidders capable of meeting the requirements highlighted in this section and detailed further in Section V. Upon receipt, all RFP submissions will be reviewed for completeness in accordance with the submission requirements highlighted in Section V of this RFP. At the end of this completeness review, the State will assess each Team's qualifications in the areas of (i) technical capability and (ii) financial capability. There will be no restriction as to the number of Teams that may qualify to bid on the Lease. The State may allow changes in the composition of a Team if the Team is comprised of more than one entity (e.g., joint venture, partnership, etc.).

Technical Capability

The evaluation of technical capabilities will address whether the RFP submission adequately responds to the technical capability requirements of the Lease with respect to the following areas of expertise:

Operation and maintenance;
Customer service; and
Safety.

Financial Capability

The evaluation of financial capabilities will address whether the RFP submission adequately responds to the financial capability requirements of the Lease with respect to the following areas:

Financial capacity to pay purchase price and maintain Toll Road; and
Ability to raise financing.

F. Technical Capability

Teams should address the following areas with respect to technical capability:

1. Operations and Maintenance Expertise: Teams must provide evidence demonstrating their ability to operate and maintain a project of this nature and scope. Specifically, the Team should have:
   a. substantial high volume toll facility maintenance and operation experience;
   b. advanced knowledge of highway maintenance, repair, construction, and practical application of equipment and materials in toll facility operations;
   c. demonstrated understanding in highway aging behavior to assess and determine the applicability of remedial maintenance action;
   d. extensive experience in using highway condition and weather information to prepare for seasonal maintenance; and
   e. all the capabilities necessary to successfully operate and maintain the Toll Road including routine maintenance (summer and winter), operations management, tolling management and operations, administration and public relations, and traffic operations.

2. Customer Service: Teams must demonstrate their commitment to achieving the highest standards of customer service and satisfaction. Specifically, the Team must highlight their experience and qualifications in the following areas:
   a. maintaining productive ongoing relationships with government entities, similar to the relationship that the winning Toll Road bidder will have with the State; and
   b. providing excellent customer service to the traveling public.

3. Safety: Teams must demonstrate their ability to address and resolve safety issues. Specifically, the Team should have:
   a. knowledge of highway safety techniques and methodologies;
   b. experience in emergency response support; and

c. background in relevant traffic engineering standards, specifications, policies, practices, and processes.

G. Financial Capability

Teams should address the following areas with respect to financial capability:

1. Financial Capacity to Pay Purchase Price and Maintain Toll Road: Teams must demonstrate their financial capacity to pay the equity portion of the purchase price and to maintain the Toll Road for the term of the Lease. To demonstrate sufficient financial capacity, Team Members must provide copies of audited financial statements for the past two years, together with any other relevant financial information. If audited financial statements cannot be provided, Team Members should provide enough financial information to demonstrate that they have the financial resources to successfully execute a project of this nature and scope. Financial factors which will be assessed include:

   a. adequacy of equity;

   b. profitability;

   c. availability of liquid equity;

   d. debt/capitalization and interest coverage ratios; and

   e. demands from other projects.

9. PR-5 & PR-22, Puerto Rico

Project Objective

RESPONSE DUE THURSDAY JULY 29, 2010

1. Overview of RFQ and Concession Process

1.1 INTRODUCTION

The Puerto Rico Highways and Transportation Authority (the "**PRHTA**") is interested in entering into a 50 year concession agreement (the "**PPP Contract**") relating to two toll roads on the island of Puerto Rico – PR-22 and PR-5 (the "**Toll Roads**").

The Puerto Rico Public-Private Partnerships Authority (the "**Authority**") wishes to conduct a tender whereby the PRHTA will ultimately enter into a PPP Contract relating to the Toll Roads, under which a private entity (the "**Contractor**") will be required to finance, operate, maintain and improve the Toll Roads (the "**Project**").

The Authority and the PRHTA (collectively, the "**Sponsors**") are seeking to achieve their primary objectives of 1) maximizing the upfront value for the Toll Roads, which will allow the PRHTA to invest in transportation improvements in Puerto Rico and enhance the municipal bonding capacity of the PRHTA and 2) improving the Toll Roads' safety standards, service levels and roadway quality.

Prospective Proponents are encouraged to review the following documents, which are available for download on the Authority's website at http://www.p3.gov.pr:

i. the Project's Desirability and Convenience Study, which discusses the (a) improvement and expansion requirements of toll roads in Puerto Rico, (b) options to meet these improvement and expansion requirements, (c) differences between various alternatives to meet these improvement and expansion requirements, and (d) feasibility of meetings these requirements via a PPP; and

ii. the Commonwealth of Puerto Rico's (the "**Commonwealth**") Financial Information and Operating Data Report, dated May 1, 2010, which presents detailed information regarding the Commonwealth's economy and the government's finances.

Evaluation Criteria

4. Proponent Qualification Requirements and Evaluation Criteria

4.1 PROPONENT QUALIFICATION REQUIREMENTS AND EVALUATION CRITERIA

This RFQ is available for prospective Proponents who desire to participate in the RFP for the Project. All RFQ submissions will be reviewed based on the requirements set forth in Section 5 of this RFQ.

The Regulation states that:

The PPP Committee reserves the right to qualify a limited number of prospective Proponents in order to arrive at a short list for a particular Project; provided, that such right is contemplated in the applicable RFQ or RFP.

The Authority hereby notifies prospective Proponents of its right to limit the number of Proponents who will be shortlisted. The Authority will only do so if this would be in the interests of the Authority in achieving its objectives.

EVALUATION CRITERIA

Prospective Proponents who submit a response to this RFQ will be evaluated on the basis of the following three sets of criteria:

Compliance with Requirements of the Act

The RFQ submission will be reviewed to determine whether it satisfies the Act's requirements with respect to the following areas:

- The prospective Proponent shall have available such corporate or equity capital or securities or other financial resources that, in the judgment of the Authority and the PPP Committee, are necessary for the proper operation and maintenance of the Project;
- The prospective Proponent shall have a good reputation and the managerial, organizational and technical capacities, as well as the experience, to develop and administer the Project;
- The prospective Proponent shall certify that neither he or she, and in the case of a legal entity, its directors or officers, and in the case of a private corporation, the stockholders with direct or substantial control over the corporate policy, and in the case of a partnership, its partners, and in the case of natural persons or legal entities, any other natural person or legal entity that is the alter ego or the passive economic agent thereof, have been formally convicted for acts of corruption, including any of the crimes listed in Act No. 458 of December 29, 2000, as amended, whether in Puerto Rico or in any jurisdiction of the United States of America or in any foreign country. The prospective Proponent shall certify that it complies and shall continue to comply at all times with laws which prohibit corruption or regulate crimes against public functions or funds, as may apply to the prospective Proponent, whether Federal or State statutes, including the Foreign Corrupt Practices Act.

Technical Capabilities

The review of technical capabilities will address whether the RFQ submission sufficiently demonstrates the prospective Proponent's technical capabilities required to operate and maintain a highway with respect to the following areas of expertise:

- Operation and maintenance;
- Capital improvements;
- Customer service;
- Community relations;
- Environmental responsibility; and
- Safety.

Financial Capability

The review of financial capabilities will address whether the RFQ submission sufficiently responds to the following requirements:

- Financial capacity to pay up-front acquisition proceeds and maintain and improve the Toll Roads;
- Ability to raise financing; and
- Credit quality to ensure the payment of any ongoing obligations, including, but not limited to, obligations under any PPP Contract.

10. Port of Miami Tunnel, Florida

Project Objective

INTRODUCTION

1.1. Overview and Project Description

This Project Information Memorandum ("PIM") is being issued by the Florida Department of Transportation ("FDOT") in connection with the issuance of a Request for Qualifications ("RFQ") for the Port of Miami Tunnel and Access Improvement project (the "Project") to be developed through a public-private partnership ("PPP"). The PIM describes the Project as currently planned and provides information for the use of entities ("Proposers") considering submission of a Statement of Qualifications ("SOQ") in response to the RFQ.

With the issuance of the RFQ, FDOT will commence the process for awarding a contract ("Concession Agreement") for the rights to design, construct, finance, operate and maintain elements of the Project and to receive related payments (the "Concession"). The Project consists of three primary components:

- Widening of the MacArthur Causeway Bridge;
- A tunnel connection between Watson Island and Dodge Island (the Port of Miami); and
- Connections to the Port of Miami ("POM") roadway system.

The Project will improve access to and from the POM, serving as a dedicated roadway connector linking the POM with the MacArthur Causeway (State Road A1A) and I-395. The primary objectives of the Project are to:

- Improve access to the POM, helping to keep it competitive and ensuring its ability to handle projected growth in both its cruise and cargo operations;
- Improve traffic safety in downtown Miami by removing POM traffic, trucks and buses, from the congested downtown street network; and in so doing,
- Facilitate ongoing and future development plans in and around downtown Miami.

The Project is being undertaken in cooperation with Miami-Dade County ("MDC"), the Port of Miami (a Department of MDC), the City of Miami, and other local stakeholders.

Proposer asserts to be exempt from public disclosure and placed other than in the confidential attachment will be considered waived by the Proposer upon submission, effective after opening.

(c) In the event FDOT is requested to disclose any of the materials identified by the Proposer as confidential in the confidential attachment, FDOT will promptly notify the Proposer so that Proposer may seek a protective order or other appropriate remedy. The Proposer shall seek court protection immediately on an emergency basis. In the event that such protective order or other remedy is not timely sought or obtained by the Proposer, FDOT will be free to release the requested information.

5.3 SOQ Submittal Requirements.

All packages constituting the SOQ shall be individually labeled as follows:

Response to the
Request for Qualifications to
Develop, Design, Construct, Finance, Maintain and Operate the
Port of Miami Tunnel Project through a
Concession Agreement RFQ-DOT-05/06-6001DS

The SOQ shall be delivered no later than 2:00 p.m. local Miami time on the SOQ Due Date to:

Florida Department of Transportation
District Contracts and Procurement Office
1000 Northwest 111th Avenue, Front Lobby
Miami, Florida 33172
Attn: Nancy Kay Lyons

Acknowledgment of receipt of SOQs will be evidenced by the issuance of a receipt by a member of FDOT staff. FDOT will not accept facsimile or other electronically submitted SOQs.

SOQs will be accepted and must be received by FDOT before 2:00 p.m. Miami local time on the SOQ Due Date. Any SOQs received after the SOQ Due Date will be rejected and not considered. Proposers are solely responsible for assuring that FDOT receives their SOQs by the SOQ Due Date at the time and address listed above. FDOT shall not be responsible for delays in delivery caused by weather, difficulties experienced by couriers or delivery services, misrouting of packages by courier or delivery services, improper, incorrect or incomplete addressing of deliveries and other occurrences beyond the control of FDOT.

6. EVALUATION PROCESS AND CRITERIA.

6.1 Responsiveness.

Each SOQ will be reviewed for (a) minor informalities, irregularities and apparent clerical mistakes which are unrelated to the substantive content of the SOQ, (b) conformance to the RFQ instructions regarding organization and format and (c) the responsiveness of the Proposer to the requirements set forth in this RFQ. Those SOQs not responsive to this RFQ may be excluded from further consideration and the Proposer will be so advised. FDOT may also exclude from consideration any Proposer whose SOQ contains a material misrepresentation. FDOT may in its discretion request clarifications of the information submitted in the SOQ.

6.2 Pass/Fail Review

In conjunction with evaluation of each SOQ for responsiveness, FDOT will evaluate each SOQ based upon the following pass/fail criteria. A Proposer must obtain a "pass" on all pass/fail items in order for its SOQ to be evaluated qualitatively under Section 6.3.

(a) The Proposal contains an original executed **Form A** in accordance with Section 5.2.1.1(a).

(b) The Proposer is capable of obtaining payment and performance bonds in the amount of $250 million from a surety rated at least A minus (A-) or better and Class VIII or better by A.M. Best and Company. In the alternative, the Proposer is capable of obtaining a letter of credit in the amount of $250 million from a bank that must have long-term, unsecured debt ratings of not less than "A-" or "A3", as applicable, issued by at least two of the three major rating agencies (Fitch Ratings, Moody's Investor Service and Standard & Poors Ratings Group).

(c) Neither the Proposer nor any other entity that has submitted **Form F** as required by this RFQ has been disqualified, removed, debarred or suspended from performing or bidding on work for the federal government or any state or local government where such disqualification, removal, debarment or suspension would preclude selection and award under Section 337.165 of the Florida Statutes.

(d) The Proposer Team includes, at a minimum, the following Equity Members or Major Non-Equity Members:

i. One or more Equity Members responsible for providing and/or securing equity and debt financing for the Project, with collective experience over the last seven (7) years in closing

(g) The Proposer made the express, written commitments as required in Section 5.2.1.3(d).

(h) The Proposer has submitted the letters of bank support as described in Section 5.2.1.2(e).

6.3 Evaluation Criteria and Weighting.

Each responsive SOQ passing all of the "pass/fail" qualification requirements set forth above will be evaluated and scored according to the criteria set forth below. The order in which the evaluation criteria appears within each category (i.e., Financial Qualifications and Capacity, Technical Qualifications and Capability, State of Financial Approach and Statement of Technical Approach) is not an indication of weighting or importance.

6.3.1 Financial Qualifications and Capacity (45% Weighting).

(a) The Proposer's experience in closing large transportation concession projects efficiently on terms favorable to public owners;

(b) The Proposer's demonstrated experience in successfully sharing of substantial risks associated with design, construction, finance, operation and maintenance for large public transportation infrastructure projects;

(c) The financial capability of the Proposer's team as demonstrated by the documents included in the SOQ;

(d) The extent of financial support for the Proposer from lenders and investors as indicated by bank letters of support indicating willingness to finance the Project, parent company letters of support and letters from sureties/banks confirming the financial capacity of the Proposer.

6.3.2 Technical Qualifications and Capability (45% Weighting).

(a) The technological capability of the Proposer's team in large tunnel design and construction as demonstrated by the documents included in the SOQ;

(b) The extent and depth of the Proposer's and its team members' relevant experience, including its/their success in carrying out comparable projects and responsibilities, independently, with each other and in combination with other firms;

(c) The Proposer's experience in successfully managing the design and construction process for large transportation construction projects, including highway bridge projects;

(d) The Proposer's track record in operating and maintaining transportation infrastructure and large tunnels in particular, to a high standard over an extended contract tenor;

(e) The stability and likelihood of success of the proposed management structure and team;

(f) The extent and depth of relevant experience of the management team and key personnel listed as required by Section 5.2.1.3(b);

(g) The extent of the Lead Tunneling Contractor's experience on bored tunnels in excess of thirty (30) feet using a pressure face TBM.

6.3.3 Statement of Financial Approach (5% Weighting).

(a) The extent to which the Statement of Financial Approach demonstrates an understanding of the financial complexity of the Project;

(b) The extent to which the Statement of Financial Approach identifies Project financing problems and challenges and suggests innovative solutions to these problems and challenges.

6.3.4 Statement of Technical Approach (5% Weighting).

(a) The extent to which the Statement of Technical Approach demonstrates an understanding of the technical complexity of the Project;

(b) The extent to which the Statement of Technical Approach identifies Project technical problems and challenges and suggests innovative solutions to these problems and challenges.

6.4 SOQ Evaluation Procedure.

FDOT anticipates utilizing one or more advisory subcommittees to review and evaluate the SOQs in accordance with the above criteria and to make recommendations to the Project Selection Committee based upon such analysis. FDOT may also schedule interviews with one or more Proposers on a one-on-one basis for the purpose of enhancing FDOT's understanding of the SOQs and obtaining clarifications of the terms contained in the SOQs. FDOT may at any time request additional information or

11. Northwest Parkway, Colorado

Project Objective

Safety and Other Operating Standards. The Concessionaire must operate and maintain the Parkway in a safe and reliable manner during the term of the Agreement. The Concessionaire must adhere to a specific set of operating standards (the "Operating Standards") relating to the operation, maintenance and rehabilitation of the Parkway and must undertake certain capital improvements to the Parkway during the term, including, at such time as the Parkway reaches a certain capacity, expanding the Parkway to include an additional lane in each direction. The Concessionaire must undertake all such activities at its own cost and expense. The Concessionaire is required to retain an independent engineer, approved by the Authority to monitor and report to the Authority on the Concessionaire's operation, maintenance and rehabilitation of the Parkway and compliance with the Agreement. Near the end of the term, the Concessionaire must post a letter of credit to guarantee that it continues to meet its maintenance and rehabilitation requirements.

Police and Fire Services. The Concessionaire must contract with a municipal or state law enforcement agency approved by the Authority to provide appropriate levels of traffic control and traffic law enforcement services on the Parkway. The Concessionaire must permit access to the Parkway, without notice or compensation, to any police, fire and emergency services and any other security or emergency personnel and any governmental entity with jurisdiction over the Parkway as necessary for emergency management and homeland security purposes. The Agreement does not affect the police powers of any governmental entity.

Tolls. Parkway tolls are subject to specific tolling limits set forth in a tolling schedule in the Agreement. From the date of the closing until December 31, 2009, the maximum toll that the Concessionaire may charge to travel the entire length of the Parkway in one direction will be $3.00 for two-axle vehicles and $3.00 for the first two axles and $3.00 for each additional axle for vehicles with more than two axles. Beginning on January 1, 2010, the maximum toll level will increase each year based on the greater of (i) an adjustment for inflation; (ii) an adjustment based on an increase in per capita GDP (i.e., consumer purchasing power); or (iii) 2%.

The Concessionaire may charge tolls lower than the applicable maximum toll levels and may offer discount programs. The Concessionaire also may utilize time-of-day variable rate tolling, congestion-related tolling, including high-occupancy-toll lanes, or any other method of charging tolls, so long as it stays within the maximum toll levels on an average basis throughout the year. The Concessionaire must provide advance notice to the public if it intends to change the toll levels or the methodology used for charging tolls.

The Concessionaire may not charge tolls on the existing Parkway at any location other than those locations at which tolls are collected as of the date of the Agreement. The Concessionaire will have the right to enforce the payment of tolls and may contract with a private security service to identify toll violators and an approved law enforcement agency to apprehend toll violators.

Electronic tolling transponders must be compatible with E-470 and the Colorado Tolling Enterprise, pursuant to state law.

Evaluation Criteria

SCORING CRITERIA

The submitted qualifications for preparing the Location Study and Environmental Document will be scored as follows:

1. Experience of the RESPONDENT (35 Points):

The RESPONDENT must demonstrate the experience, qualifications and technical competence of the RESPONDENT's team in preparing location studies, complex environmental documents, and related documents as identified under SERVICES TO BE PERFORMED BY THE RESPONDENT including:

- Lead firm's experience in past ten years
- Experience of firms teamed with the lead firm
- Role of key individuals on projects identified in the firm's experience
- RESPONDENT's experience should demonstrate the responsiveness of the firm to meet the needs of multiple local, state and federal agencies and the client in preparing a complex environmental document
- References for three similar projects completed within the past ten years. At least three references are required. Please provide contact information including a verified phone number

5 6-30-10

- If an individual recently joined the RESPONDENT's team, this should be so noted and applicable individual experience should be demonstrated as described in the appropriate following sections

Example projects should include information on ability to meet budget and schedule requirements and explain variances in performance on such items.

2. Experience of Project Manager (35 Points):

The RESPONDENT should identify a Project Manager, who must have experience in managing the NEPA process. In particular, the proposal must demonstrate that the Project Manager has:

- Experience managing recent (within last ten years) projects of similar length and complexity, including experience with preparing Location Studies, Environmental Assessments, and Environmental Impact Studies, through final action by the FHWA
- Experience with creative approaches for required public involvement
- Availability to manage this process
- Demonstrated ability to meet schedule and budget requirements

The RESPONDENT's Project Manager's resume must be included.

3. Experience of Key Personnel (25 Points):

The RESPONDENT must designate experienced professional and technical staff to competently and efficiently perform the work through its own personnel or sub-RESPONDENTs. The proposal must identify the project team composition, project leadership, key personnel, reporting responsibilities, and address how sub-RESPONDENTs will fit into the team's management structure. The RESPONDENT's team is expected to demonstrate the ability to address the scope of work including the following areas:

- Corridor Planning
- Civil Engineering
  - Horizontal & Vertical Roadway Geometry
  - Structural Engineering
  - Hydraulic Engineering
- Land Planning and Land Use Analysis, including interpretation of comprehensive plans and related documents
- Traffic Modeling
- Multi-modal considerations
- Traffic Noise Analysis
- Air Quality Analysis
- Waters of the United States (Wetland Delineation)
- Threatened and Endangered Species

- Biological Surveys
- Section4(f) (Title 23, United States Code of Federal Regulations §771.135) and/or Section6(f) (Title 49, United States Code §303) Evaluations
- Historic and Cultural Resource Surveys, Analysis and Documentation
- Socio-Economic and Demographic Analysis
- Environmental Justice Analysis
- Hazardous Materials Initial Site Assessment
- Impact Evaluation Assessments
- Environmental Document Preparation
- Route Studies and Schematic Design – Complex Highways
- Access Justification Reports
- Stakeholder and community involvement meetings.
- Right-Of-Way requirements
- Utility Coordination
- Funding source identification

The key personnel and any proposed sub-RESPONDENT(s) must demonstrate experience in performing work of similar magnitude, and must provide documentation (project names, brief descriptions, and references) to demonstrate experience in completing these studies, including expedited completion of the Environmental process. Resumes of key personnel must be included.

4. Experience of RESPONDENT's Team in Working Together (10 points):

Provide examples of the member firms of a RESPONDENT's team having worked together on similar projects. Not all member firms need to have worked together collectively in the past. Provide project names, dates of completion, and references with names and phone numbers if not included in item one above.

5. Capability and Capacity of RESPONDENT to Perform the Work (10 points):

Indicate the proposed role of personnel on the RESPONDENT's team organizational chart. Indicate the location of the personnel and their availability. Demonstrate the ability of the team to complete the necessary work in a timely manner appropriate to the type of work being performed.

6. Knowledge of Local and Regional Setting (15 points):

The RESPONDENT(s) must demonstrate a knowledge and understanding of the local and regional community environment and stakeholders. This should include a proposal to address community issues related to project development efforts in the north St. Louis County corridors. Qualifications should also demonstrate the RESPONDENT's approach to the public information process and describe creative ways to engage the public and surrounding communities.

7. Understanding and Approach (35 points):

In its qualifications, the RESPONDENT must:

- Demonstrate an understanding of the local transportation system, federal and state planning requirements, and NEPA requirements and guidelines
- Communicate a clear, logical, and legally defensible approach to this work. The approach should outline the process, quality assurance, and management controls to be employed to ensure successful implementation of the recommended approach
- Demonstrate the prime firm's experience with the NEPA process conforming to current federal laws
- Communicate the ability to expedite the NEPA process to successfully meet the 36-month schedule

8. Public and Stakeholder Involvement (20 points):

Demonstrate through examples from projects of similar scope and scale the ability to engage the public and key stakeholders in the NEPA process.

9. Ability to Meet Disadvantaged Business Enterprise Goal (15 points):

The Disadvantaged Business Enterprise (DBE) participation requirement is 12% of the total contract value. The qualifications should show how the RESPONDENT plans to meet this goal and has met goals on similar past projects. The DBE must be registered with the Missouri Department of Transportation for the specific services they will perform.

12. I-4 Ultimate, Florida

Project Objective

1. Purpose of and Need for Proposed Action

This section outlines the purpose of the proposed project and summarizes the need for transportation improvements in the Ultimate project study area and the Preferred Alternative study area. The items discussed in this section include the following:

- Purpose (Section 1.1)
- Project Overview (Section 1.2)
  - Background (Section 1.2.1)
  - Description of Project (Section 1.2.2)
- Need for Transportation Improvements (Section 1.3)
  - System Linkage (Section 1.3.1)
  - Capacity Deficiencies (Section 1.3.2)
  - Transportation Demand (Section 1.3.3)
  - Governmental Authority (Section 1.3.4)
  - Social Demands and Economic Development (Section 1.3.5)
  - Modal Interrelationships (Section 1.3.6)
  - Safety (Section 1.3.7)
  - Navigation (Section 1.3.8)
- Summary of Related Studies (1.4)

1.1 Purpose

The Federal Highway Administration (FHWA), in consultation with the Florida Department of Transportation (FDOT), proposes to upgrade the safety and mobility of the existing Interstate 4 (I-4) corridor that services the Orlando metropolitan area while maintaining access to the surrounding community. The Ultimate project limits extend from just west of the SR 528 (Bee Line Expressway) interchange in Orange County to just east of the SR 472 interchange in Volusia County. This represents a distance of approximately 43 miles. Figure 1-1 presents a regional location map. In addition, the Ultimate project includes improvements to portions of SR 528 (Bee Line Expressway) and SR 408 (East/West Expressway). The Ultimate project limits along SR 528 (Bee Line Expressway) extend from the interchange with I-4 to approximately 3,200 feet east of the interchange with International Drive and the project limits along SR 408 (East/West Expressway) extend from approximately Tampa Avenue to Bumby Avenue. Figure 1-2 shows the Ultimate project study limits.

The Preferred Alternative study limits are located within the Ultimate project study limits. The Preferred Alternative limits extend from just south of Kirkman Road (SR 435) to just north of Maitland Boulevard (SR 414) in Orange County, a length of approximately 15.4 miles. Refer to Figure 1-2 for the Preferred Alternative study limits.

6.3.4 Statement of Technical Approach (2.5% Weighting).

(a) The extent to which the Statement of Technical Approach required by Section 5.2.1.3(k) demonstrates an understanding of the technical complexity of the Project; and

(b) The extent to which the Statement of Technical Approach identifies Project technical problems and challenges and suggests innovative solutions to these problems and challenges.

6.3.5 Statement of Approach to Subcontracting/Subconsulting (2.5% Weighting).

(a) The extent to which the Statement of Approach to Subcontracting/Subconsulting required by Section 5.2.1.3(l) demonstrates an effective approach to integration and management of subcontractors and subconsultants; and

(b) The extent to which the Statement of Approach to Subcontracting/Subconsulting demonstrates use of subcontractors and subconsultants with an understanding of, and familiarity with, challenges and requirements particular to this Project and this region.

6.4 SOQ Evaluation Procedure.

FDOT anticipates using one or more scoring committees to review and evaluate the SOQs in accordance with the above criteria and to make recommendations to the Project Selection Committee based upon such analysis. FDOT may also schedule fact-finding interviews with one or more Proposers on a one-on-one basis for the purpose of enhancing FDOT's understanding of the SOQs and obtaining clarifications of the terms contained in the SOQs. FDOT may at any time request additional information or clarification from the Proposer or may request the Proposer to verify or certify certain aspects of its SOQ. The scope, length and topics to be addressed shall be prescribed by, and subject to the discretion of, FDOT and applicable law. At the conclusion of this process, Proposers may be required to submit written confirmation of any new information and clarifications provided during an interview. Upon receipt of requested clarifications and additional information as described above, if any, FDOT will re-evaluate the SOQs to factor in the clarifications and additional information.

FDOT will evaluate and rank SOQs and select the Short-Listed Proposers in a manner that furthers the best interests of the State as determined in the sole discretion of FDOT.

Proposers are required to conduct the preparation of their SOQs with professional integrity and free of lobbying activities. Proposers and their respective agents and consultants are not permitted to contact, directly or indirectly, any member of the Project Selection Committee, FDOT's administration, FDOT's staff or FDOT's consultants regarding the subject matter of this RFQ after the issuance date of this RFQ, except as specifically permitted hereby or approved in advance by the Secretary of FDOT or his designee. Any verified allegation that a responding

Evaluation Criteria

(j) The information disclosed in Form F and in response to Section 5.2.1.1(e) and (f) does not materially adversely affect the Proposer's ability to carry out the Project responsibilities potentially allocated to it, as determined by FDOT in its sole discretion.

(k) The Proposer made the express, written commitments regarding the availability of personnel as required in Section 5.2.1.3(j).

(l) The Proposer has submitted the letters of bank support as described in Section 5.2.1.2(g).

(m) If the Proposer is a consortium, partnership or any other form of joint venture, the SOQ contains an executed teaming agreement or, if the entities making up the Proposer have not executed a teaming agreement, a summary of the key terms of the anticipated teaming agreement.

(n) If the Proposer is a consortium, partnership or any other form of joint venture, the SOQ includes a letter signed by each member indicating a willingness to accept joint and several liability until the point at which the Concessionaire creates a special purpose entity as will be allowed in the Concession Agreement.

6.3 Evaluation Criteria and Weighting.

FDOT will evaluate and score each responsive SOQ meeting all of the "pass/fail" qualification requirements in Section 6.2 according to the criteria set forth below. The order in which the evaluation criteria appears within each category (i.e., Financial Qualifications and Capacity, Technical Qualifications and Capability, Statement of Financial Approach and Statement of Technical Approach) is not an indication of weighting or importance.

Note that inaccurate or out of date project or personnel reference information (e.g., references related to Form C, Form D and Form E) may result in FDOT excluding the related experience from consideration and negatively impact the SOQ score.

6.3.1 Financial Qualifications and Capacity (45% Weighting).

(a) The Proposer's experience in successfully closing the financing of large transportation concession projects, with an emphasis on roadway public-private partnership projects involving comparable payment mechanisms;

(b) The Proposer's demonstrated experience in successfully developing large transportation projects that involved the Proposer sharing substantial risks associated with design, construction, finance, operation and maintenance;

(c) The financial capability of the Proposer as demonstrated by financial statements included in the SOQ and all other information submitted under Section 5.2.1.2; and

(d) The specificity and degree of unqualified financial support for the Proposer from lenders and investors as indicated by bank letters of support indicating willingness to finance the Project, parent company letters of support and letters from sureties/banks indicating their willingness to provide a surety bond or irrevocable letter of credit to the Proposer.

6.3.2 Technical Qualifications and Capability (45% Weighting).

(a) The extent and depth of the Proposer's relevant experience, including its success in carrying out comparable projects and responsibilities independently and in combination with other firms, including:

- The Proposer's experience in successfully managing the design and construction process for large road civil works projects that were open to traffic during the construction period; and
- The Proposer's track record in successfully operating and maintaining transportation infrastructure to a high standard over an extended contract term;

(b) The extent and depth of relevant experience of the management team and the stability and likelihood of success of the proposed management structure; and

(c) The extent and depth of relevant experience of the management team and key personnel listed as required by Section 5.2.1.3(g)(i) to (vi).

6.3.3 Statement of Financial Approach (5% Weighting).

(a) The extent to which the Statement of Financial Approach required by Section 5.2.1.2(i) demonstrates an understanding of the financial complexity of the Project; and

(b) The extent to which the Statement of Financial Approach identifies Project financing problems and challenges and suggests innovative solutions to these problems and challenges.

Evaluation Criteria

SECTION 5.0 EVALUATION AND POST-SELECTION PROCESS

TxDOT's goal is to create a fair and uniform basis for the evaluation of the Proposals in compliance with all applicable legal requirements governing this procurement.

The Proposal evaluation process will include an initial review of each Proposal for responsiveness and pass-fail criteria, followed by an evaluation of the Concession Facility Development Plan, the Proposal for the CDA for Segments 2-4, and the Financial Proposal, and a best value determination. The process may, at TxDOT's sole discretion, include a request for revised Proposals (Proposal Revisions), and may include a negotiations phase with the selected Proposer(s). The steps in the process and evaluation criteria are set forth in Sections 5.3 through 5.13.3. The evaluation and selection process is subject to modification by TxDOT, in its sole discretion.

The evaluation process will involve the following steps:

1. TxDOT evaluation committees will:

(a) evaluate the Proposals and determine which Proposer has offered the apparent best value Proposal, considering the specific evaluation criteria set forth herein and

(b) provide a recommendation to TxDOT senior management regarding the apparent best value.

2. TxDOT senior management will review and consider the recommendations from the TxDOT evaluation committee, and will provide a recommendation for conditional award to the Commission. The Commission will issue notice of conditional award after considering the recommendations received.

The details of the evaluation and selection process are set forth more fully in this Section 5.

5.1 Organization of the TxDOT Evaluation Committees

Evaluation of Proposals will be conducted by TxDOT's Evaluation and Selection Recommendation Committee ("ESRC") with assistance from subcommittees consisting of TxDOT personnel.

The ESRC and the various subcommittees will be comprised of representatives from TxDOT and will be chaired by individuals designated by the Texas Turnpike Authority Division Director. In addition to TxDOT voting members, the ESRC and subcommittees may also be assisted by advisors, including TxDOT representatives and outside consultants who will offer advice on the technical, financial and legal aspects of each Proposal. The primary responsibility of these advisors will be to assist the ESRC and subcommittees in making the educated and informed assessment of the individual strengths and weaknesses of the Proposals. In addition, observers from federal or other agencies, including representatives of local agencies and municipalities, with

specific interests and responsibilities associated with the Project may be invited to observe aspects of the evaluation process. All evaluators and outside consultants and observers will be required to sign confidentiality statements and will be subject to TxDOT conflict of interest control requirements.

5.2 Best Value Determination

The determination of apparent best value shall be based on an 80-10-10 point scale and will be computed using the following formula:

Total Proposal Score = Concession Financial Score (max. 80 points)
+ Concession Technical Score (max. 10 points)
+ CDA for Segments 2-4 Score (max. 10 points)

(a) The Concession Financial Score, calculated solely for evaluation purposes pursuant to Section 5.6, will be comprised of the sum of the Base Scope Proposal Financial Score and the Ultimate Scope Proposal Financial Score. The Concession Financial Score shall be calculated based on the following formula:

Concession Financial Score (max. 80 points) =

Base Scope Proposal Financial Score (max. 70 points)
+ Ultimate Scope Proposal Financial Score (max. 10 points)

(b) The Concession Technical Score will be calculated based on the Evaluation Score for the Concession Facility Development Plan (maximum 100 points) as described in Section 5.4.2. The Concession Technical Score will be calculated using the following formula:

Concession Technical Score = Evaluation Score x 0.10

(c) The CDA for Segments 2-4 Score will be calculated based on the Evaluation Score for the Proposal for Segments 2-4 (maximum 100 points) as described in Section 5.5.5. The CDA for Segments 2-4 Score will be calculated using the following formula:

CDA for Segments 2-4 Score = Evaluation Score x 0.10

Appendix B Concession Contract Part I: Design & Operation

1. I-595 Improvement

RFP Volume II – Technical Requirements

Special Design

1.4 Coordination

Enhancements, modifications, and obsolescence of tolling equipment technology are common place and should be expected on every project. Therefore, some items in this document may need modification as technology changes or may require more detailed descriptions as the tolling infrastructure design progresses. It is critical and required that the Concessionaire following this document have extensive and frequent communication with FTE, especially with FTE Toll Operations. Required communication begins at the Project conceptual phase and continues on through the construction of the tolling infrastructure until the Project is open to traffic and all final punch list items have been completed by the Concessionaire. Communication should at a minimum include coordination meetings, requests for information, field visits, and plan submittals between FTE and the Concessionaire. The Concessionaire shall allocate at a minimum 21 consecutive calendar days for FTE to review and provide comments on each of the Concessionaire's phase submittals of concepts, plans, and other applicable documents in conjunction with the District's required review phases.

The signature gantry is the preferred gantry. Should the Concessionaire choose to use a custom designed gantry, then additional coordination and time shall be required for the new design beyond the standard time frames. A custom design shall meet or exceed all of the operational, aesthetic, safety, and access for toll maintenance personnel requirements provided by the standard signature gantry. Technical Special Provisions (TSP) applicable to a design other than the FTE Signature Gantry shall be the responsibility of the

2.0 Design Elements

The tolling infrastructure elements as discussed herein shall be provided by the Concessionaire and coordinated with FTE.

- Tolling Site Location
- Gantry design, if Concessionaire proposes an alternative
- Fiber Reinforced Concrete Pavement
- Roadway Infrastructure
- Equipment Buildings
- Generator
- Communications
- Electrical
- Signing
- Accessibility

2.1 Tolling Site Location

The Tolling Site Location is where the tolling gantry is located and its immediate surrounding area. The Tolling Site Location shall be primarily placed to ensure optimum performance of the Tolling Collection System. To optimize the performance and operation of the Tolling Equipment, the Tolling Site Location shall have the following characteristics:

- Tangent roadway section - cross slope meets the requirements of FDOT PPM
- Curve roadway sections – Super elevation shall not exceed 4.2%
    - 3.33% (Maximum for four 12' lanes with two shoulders)
    - 4.17% (Maximum for two or three 12' lanes with two shoulders)
- Application of cross slope is from outside edge of travel to outside edge of travel
- Consult with FTE Toll Services for any slopes greater than 4.2%
- At grade roadway section preferred
- Roadway section in which uniform vehicle speeds above 45 mph are expected

- Constant roadway lane widths, (i.e. not merge or diverge roadway sections)
- Support horizontal and vertical alignment for unobstructed driver vision of the tolling point
- Support the installation of a non-steel reinforced concrete pavement section of 120'
- Support safe access of maintenance vehicles and personnel
- Support the construction and operation of a Tolling Equipment building. The maximum cable length between tolling gantry and the roadside racks in the equipment building is not to exceed 250'
- Site free from environmental concerns such as proximity to other large power sources, or communication towers. Failure to avoid this shall be brought to the attention of FTE such that a radio frequency spectrum analysis can be performed by the FTE TEC

A conceptual location has been identified for the I-595 project by FTE. This location, shown in the Indicative Preliminary Design (Line and Grade Concept) in the Reference Documents to this RFP package, is west of Flamingo Road and east of the westbound exit Ramp R-6. The Concessionaire may identify other suitable locations for coordination with FTE, if available. FTE shall approve any changes to the conceptual location and configuration as depicted in the Indicative Preliminary Design.

Device for Data Collection

M. ITS / Systems Integration

The Concessionaire shall be responsible for the design, construction, integration, operation, and maintenance of the existing, new and permanent I-595 corridor Intelligent Transportation Systems (ITS) deployment to support traffic management and operations of the Express Lanes and the General Purpose Lanes. This deployment shall include a fiber optic communication network subsystem, an Express Lanes Access Control subsystem, an emergency access gates (EAG) subsystem, a Closed Circuit Television (CCTV) camera traffic monitoring subsystem, a Dynamic Message Sign (DMS) subsystem, a Changeable Message Sign (CMS) subsystem, a Highway Advisory Radio (HAR) subsystem, a Microwave Vehicle Detection Station (MVDS) subsystem, Electronic Toll Collection (ETC) subsystem, and a power backup subsystem, including all ancillary components within the I-595 corridor. The Concessionaire's responsibilities for each of these subsystems are defined in Attachments 1 and 2 of Vol II Div II Sect 3 and in Vol II Div II Sect 4.

The Concessionaire shall be responsible for the design, construction and integration of a CCTV camera traffic monitoring subsystem and a MVDS subsystem along Florida's Turnpike at the I-595 / Turnpike interchange from Peters Road to Griffin Road. The Concessionaire shall also be responsible for the relocation of the DMS/CMS subsystem currently installed on the Turnpike between Peters Road and Griffin Road. The Concessionaire shall turn these subsystems over to FTE upon the completion of construction and acceptance by the Department.

Refer to the ITS Deployment Requirements provided as Attachment 1 to Volume II, Division II, Section 3 for a full description of the Concessionaire's responsibilities in the maintenance of the interim ITS system during construction, and the design, construction and integration of the new I-595 and FTE ITS systems.

2. Port of Miami Tunnel

Special Design

2.5.4. Contamination

Although soil and groundwater contamination has not been documented in the proposed Project construction area, releases may have occurred from past storage and handling of fuel for aircraft, vehicles, and marine applications. FDOT will be conducting a Level I and Level II Site Assessment along the Project corridor prior to the issuance of the RFP to determine potential contamination impacts. Related reports will be available on the website when completed. FDOT will include further information and remediation requirements in the RFP. Supplemental testing will be the responsibility of the Concessionaire.

2.5.5. Maintenance of Vehicular Traffic

During the Construction Period, the Concessionaire must ensure that during peak hours there are no reductions in the number of existing traffic lanes on MacArthur Causeway and that access to POM operations is maintained at all times. Specific criteria will be set forth in the RFP.

2.5.6. Maintenance of Vessel Traffic and Port Operations

During the Construction Period, the Concessionaire must ensure that there are no interruptions of scheduled vessel movements at affected berths, in the ship channel and in the Turning Basin beyond agreed construction windows. Peak cruise vessel traffic days are Wednesday and Friday through Monday of each week.

However, FDOT anticipates that the bored tunnel construction method will not result in any significant or extended interruptions of scheduled vessel movements or berthing. In the conceptual plans, the only activity which may impact berthing would be the temporary placement of ballast over the Tunnel at the bulkhead line at Dodge Island. This activity would last 2-3 weeks for each of the two bores and would need to be coordinated with the POM.

2.6. Operating Period Requirements

The Operating Period will commence when the Project is accepted by FDOT and opened for traffic. The Concessionaire will be obligated to operate and maintain the O&M Segments during the Operating Period. The RFP will delineate O&M requirements based on key objectives including high levels of:

- Availability and user service
- Safety standards
- Security
- Environmental and aesthetic standards
- Protection of the Project capital asset, including routine and periodic maintenance

To the extent possible, the technical specifications for the Operating Period will be defined as functional requirements. They will set forth the standards that must be met for the O&M Segments to be deemed open and available, and they will also define the operational standards to be maintained throughout the term of the Concession. The specifications will mandate such terms as minimum maintenance, health, safety, environmental and security levels, e.g. defined levels for lighting and air quality in the tunnels, sufficient surface friction and acceptable tracking depth, integration with POM security, safety equipment in place and established evacuation plans. In addition, the Concessionaire will also be obliged to regularly inspect the O&M Segments and to report to FDOT all conditions that have or can have relevance for road availability and safety. FDOT and the POM must also be apprised of traffic conditions, safety and security issues on an integrated, real-time basis. Severe weather-related conditions such as heat, humidity, rain storms, wind, storm surges, water spouts, hurricanes are foreseeable in the South Florida area and it is expected that the Project will be designed, constructed and maintained so as to minimize the impact of such factors on Project availability and operations.

To the largest extent possible, the Concessionaire will be responsible for choosing the means, method, action and resources it finds necessary to meet the functional requirements. Deviation from the O&M requirements will lead to reduced Availability Payments in accordance with the mechanism described below in Chapter 5. In the event of increased costs due to excess traffic, the RFP will include a mechanism to provide some additional compensation to the Concessionaire.

2.7. Traffic

The Project will be a single-use facility for vehicles entering and leaving the POM. The existing Port Boulevard bridge will remain in use with the future traffic split between the two facilities. It is anticipated that signage from the major freeways will direct arriving vehicles through the Tunnel. All cargo truck traffic departing to the freeways will be directed through the Tunnel. However, there will be a split for departing cruise oriented traffic. It is expected that signage will direct all buses and taxis to the Tunnel. Passenger cars may be signed to either route depending on which roadways the vehicles are traveling. The Port of Miami currently operates between approximately 6 AM to 6 PM.

A traffic forecast is posted on the Website and summarized below. This traffic data is made available for informational purposes only. It is anticipated that the Concessionaire will be paid additional compensation by FDOT should actual traffic exceed levels which will be set forth in the RFP.

The Project will contain four, 12-foot lanes in a tunnel expected to consist of two bores, each shown in conceptual plans with a total length of approximately 3,900 feet. The tunnels are planned to convey traffic eastbound (to) and westbound (from) the Port. The clearance envelope requires a tunnel with a minimum vertical clearance of approximately 16.5 feet. The total interior diameter will be approximately 36-feet, minimum, for the two lanes of traffic, with allowances for curbs, walkways, ventilation fans and ancillary features. Due to the geometry of existing roadways and development on both Dodge and Watson islands, the Project limits will necessitate steep grades. However, it is anticipated that the maximum grade in the Tunnel will be approximately 5%. The Tunnel will have to comply with ADA requirements. For both travel directions conceptual designs show that the roadway ramp connector alignments will descend into a depressed "U-wall" section, continuing to cut and cover sections and then into the separate tunnel bores. The roadways emerge once again into cut and cover and "U-wall" sections.

The Project is technically challenging and Proposers will need to develop adequate plans to accommodate differences in site conditions, geology and ground cover. Tunnel and machine buoyancy, and above-ground and sub-surface conditions related to channel depth, existing structures, seawalls, foundations, utilities, and contaminated materials all must be addressed. In addition to boring, plans will need to be made for de-watering and construction of cut-and-cover entry sections.

The Project will be located in a region which frequently experiences extreme weather-related conditions such as storm surges, water spouts and hurricanes. The Concessionaire is responsible for anticipating these foreseeable events and designing and constructing the works accordingly. Reasonable, foreseeable events will not be considered force majeure during construction or operation, and water intrusion in all cases shall be limited to levels to be specified in the RFP. The Concession Agreement is also expected to anticipate the occurrence of certain human-related events and accidents during the Operating Period. A tunnel blast analysis will be required with specific performance requirements that, along with the design fire criteria, will be set forth in the RFP. Tanker trucks will not be permitted in the Tunnel.

The Concessionaire will be responsible for installation of required safety equipment in addition to incorporating emergency provisions as will be defined in the RFP into the final design. The Project must include adequate ventilation for the Tunnel, as will be set forth in the RFP. The Tunnel will be used by heavy trucks and buses operating at steep grades

Figure 3 provides a conceptual illustration of the Tunnel profile for reference purposes only.

Special Operation

APPENDIX 4

OPERATIONS AND MAINTENANCE REQUIREMENTS

OPERATIONS & MAINTENANCE REQUIREMENTS

1. General Obligations

Concessionaire shall be responsible for developing and providing the resources, equipment, materials and services required to operate and maintain the facility in accordance with the Contract Documents. Concessionaire shall provide sufficient levels of properly trained personnel, on site and off site facilities, storage areas, garages, fleet vehicles, computer hardware and software, tools, Customer Relations Unit, and other items as required to operate and maintain safe, reliable roadways and facilities with the main objectives to maximize public safety, reliability and roadway availability. To this end, Concessionaire shall coordinate, plan and perform the O&M Work required within this Appendix in a manner that will provide safe conditions for the maintenance staff and the motorists using the facilities, while minimizing traffic disruptions. The Maximum Availability Payment to Concessionaire will be subject to adjustment depending upon Concessionaire's level of performance as described in Appendix 7 ("Payment Mechanism For Availability Payments") to the Agreement.

Concessionaire shall be responsible for all O&M Work related tasks, including, but not limited to the following:

(a) Determining the organizational staff plan requirements for the O&M Work, including staff positions, locations, and work hours;
(b) Recruiting, hiring and employing all personnel for the O&M Work;
(c) Determining the qualifications required for all staff positions for the O&M Work;
(d) Implementing organizational processes and procedures such as drug testing, labor polices, photographic employee identification cards, training, etc.;
(e) Determining the amount and types of equipment, fleet vehicles, facilities, staff, tools, spares required to support the O&M Work requirements;
(f) Procurement of tools, equipment consumables, employee amenities, and spare parts and spare equipment;
(g) Securing major subcontracts for services that will be performed by subcontractors under the direction of Concessionaire;
(h) Establishing any service agreements needed such as leases and insurance for vehicles, insurance policies related to the O&M Work, arrangements for utilities including power, water, sewer, telephone, etc.;
(i) Providing first responder incident response support in the form of professional, uniformed staff, marked and easily identifiable, well maintained and equipped patrol vehicles, equipment, etc., as required to assist stranded motorists, remove disabled vehicles, assist outside agency emergency personnel during incidents, in addition to other duties required elsewhere in this Appendix; and
(j) Providing an O&M Plan that identifies all of the functions, procedures, and manuals necessary to operate and maintain the Project in accordance with the requirements of this Appendix.

The O&M Segments comprise an operating facility that shall be available 24 hours per day, 7 days per week, 365 days per year. Concessionaire shall provide staff for these hours of

operation. There will be periods where the roadways and/or Tunnel(s) within the O&M Segments may be closed due to Planned Maintenance, unplanned maintenance repairs/activities, vehicular incidents, weather, or other circumstances that require either complete or partial closure of the Tunnel.

Concessionaire's O&M Work staff, and any subcontractors, shall comply with Florida Statute 311.12, Seaport Security Standards. Concessionaire's procedures for the O&M Work shall be developed in accordance with these requirements and shall include the necessary provisions and requirements for compliance with this security standard.

1.1. Operations & Maintenance Plan

Concessionaire shall prepare and submit an O&M Plan that meets the following minimum requirements:

(a) Includes the staff organizational chart for the O&M Plan;
(b) Identifies the major documents that are the basis of the O&M Plan;
(c) Describes Concessionaire's self-monitoring processes, including a list of the procedures to be used to monitor compliance with minimum performance criteria;
(d) Describes the Operations Report system/means in accordance with Appendix 14;
(e) Describes the Maintenance Report system/means in accordance with Appendix 14;
(f) Describes the process for calculating the monthly invoice in accordance with Article 12 of the Agreement;
(g) Describes the method of tracking and reporting Performance Points, Critical Faults, Non-Critical Faults and Unavailability Events accumulated through O&M Work;
(h) Includes a list of all Performance Points, Critical Faults, Non-Critical Faults and Unavailability Events accumulated through O&M Work, that are equivalent to those specified within this Appendix if those specified herein are not directly applicable to the Final Design;
(i) Includes a list of the methods of monitoring and verifying operator compliance with procedures;
(j) Includes a description of Concessionaire's Computerized Maintenance Management System (CMMS);
(k) Includes a description of Concessionaire's policies and procedures for the prohibiting Contaminated Materials in the Tunnels in accordance with all applicable federal, state, local and FDOT requirements;
(l) Describes Concessionaire's approach to Routine Maintenance;
(m) Describe Concessionaire's approach and assumptions for the Major Maintenance items and equipment replacement, including life cycles;
(n) Includes preliminary Planned Maintenance Schedules and Major Maintenance Plans;
(o) Include a list of the facilities, including any off-site storage or maintenance facilities used by Concessionaire;
(p) Include a list of vehicles, tools, incident response and major equipment furnished by Concessionaire to support the O&M Work;
(q) Include a list of real estate, facilities, computers, software and other major assets/items to support the O&M Plan;
(r) Include a list of spare equipment and the inventory levels;
(s) Includes an annual Tunnel inspection program;
(t) Include copies of drawings that indicate the types of O&M Work to be provided and the physical limits or boundaries of each type.

The O&M Plan shall be submitted to the Department for review and approval at least 18 months prior to Substantial Completion.

1.2. Limits of Operations & Maintenance

Concessionaire shall be responsible for various categories of O&M Work. The categories of O&M Work are: Roadway & Facilities O&M, Landscape Maintenance, and Incident Response. The Concept of Operations Report included in Volume III includes drawings showing the intended limits of the various types of O&M Work which are based upon the Indicative Preliminary Plans. Concessionaire's Final Design will determine the actual O&M Segments, however Concessionaire's O&M Segments shall be based upon the intent and concept of the O&M Segments as described herein, and in the drawings related to the O&M Work included in the Concept of Operations Report.

1.2.1. Roadway & Facilities O&M Limits

Concessionaire's Roadway and Facilities O&M Limits are generally defined as from the end of each ramp, and/or depressed roadway or U-wall section on Watson Island that is contiguous to the Tunnels, the entire Tunnels, to the end of each depressed roadway of U-wall section on Dodge Island that is contiguous to the Tunnel. These areas include operations and maintenance of all items within the boundaries that are furnished and installed by Concessionaire. All pump stations, garages or other facilities that are necessary for the Tunnel and the operation and maintenance of the Tunnel and constructed by Concessionaire shall be included within these limits, regardless of the location. Concessionaire shall not be responsible for the maintenance of any bridges.

The end of the ramp or depressed roadways contiguous to the Tunnel is further defined by the following:

(a) Watson Island Ramp 1A Eastbound: The Roadway and Facilities O&M Limits for Ramp 1A (eastbound) are bounded by the MacArthur Causeway bridge abutment, the right hand shoulder of the MacArthur Causeway and Frontage Road (Ramp C), to the Tunnel portal.

(b) Watson Island Ramp 1B Westbound: The west end of the U-Wall structures, the north and south U-wall structures, to the west Tunnel portal.

(c) Dodge Island Ramp 1F Eastbound: The Tunnel portal, the north and south U-Wall structures/depressed roadways, to the Atlantic Way Bridge abutment.

(d) Dodge Island Ramp 1A Eastbound: The Tunnel portal, the north and south U-wall structures/depressed roadways, to the merge point location of the south side of Ramp 1A and the north side of Port Boulevard EB.

(e) Dodge Island Ramp 1B Westbound: The construction limit of Ramp 1B (Port Boulevard WB) at station 567+74.29, the north and south U-wall structures/depressed roadways, to the east Tunnel portal. The boundary where Port Boulevard splits from Ramp 1B is defined by the edge of Ramp 1B pavement at the east end and the edge of Ramp 1B pavement at the west end of the split.

(f) Dodge Island Europe Way Ramp: The western end of the Europe Way Ramp bridge abutment, the north and south ramp, the north and south U-wall structures/depressed roadways, to the Tunnel portal.

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TABLE 08-1A Functional Highway Classifications

Classification	Roadway
Urban Interstate	General Purpose Lanes, Managed Lanes, direct connectors, ramps, Frontage Road/cross street by-passes
Urban Other Principal Arterial	Harry Hines Boulevard, Marsh Road, Midway Road, Preston Road
Urban Minor Arterial	Frontage Roads, Josey Lane, Webb Chapel Road, Hillcrest Road
Urban Collector	Denton Drive, Rosser Road, Welch Road, Montfort Drive, Park Central Drive

8.2.3 Geotechnical Instrumentation

For subsurface Managed Lanes, the Developer is responsible for developing a geotechnical instrumentation program, including plans and specifications as necessary, to monitor surface and subsurface components, prior to and during construction, in response to ground and groundwater conditions. The performance of the following components shall be included:

a) structures;
b) buildings and enclosed facilities;
c) tunnels and subsurface facilities, and
d) Utilities.

The geotechnical instrumentation program shall monitor the safety and adequacy of the design and construction approach, and shall permit appropriate modifications or remedial action if necessary.

8.2.4 Preconstruction Survey Requirements

The Developer shall develop appropriate procedures and plans for and shall perform a pre-construction survey(s) of the Project Right of Way (ROW) and immediate vicinity to identify facilities or structures that could be affected by movements initiated by Project construction activities. The survey(s) shall accurately establish the structural condition of the identified facilities or structures prior to commencing construction in the vicinity of these facilities or structures.

8.3 Construction Requirements

8.3.1 Construction Impacts

When performing construction activities under or adjacent to existing structures or Utilities, the Developer shall limit vertical settlements and ground deformations so as to not damage structures, including foundation elements, and/or Utilities. For those occurrences involving TxDOT's structures and Utilities, the Developer shall coordinate excavation activities with TxDOT. For those occurrences involving third party structures and Utilities, the Developer shall coordinate excavation activities in accordance with Sections 5 and 6.

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19.2 Maintenance Management Plan (MMP)

19.2.1 Additional Requirements

The MMP shall address, but shall not necessarily be limited to, the following:

a) Maintenance and service manual
b) Spare parts
c) Inventory control
d) Maintenance Management Information System (MMIS) functionality
e) Software maintenance
f) Special tools and equipment
g) Defect tracking and corrective action
h) Reliability and maintainability analysis
i) Vendors for equipment and maintenance services
j) Retaining wall monitoring

The Developer shall include in the MMP how the following specific obligations are implemented:

a) Preventative Maintenance

- The minimum standards shall be as determined by the equipment manufacturer's recommended maintenance schedule and operating procedures.

b) Maintenance and Service Manual

- The Developer shall outline the procedure for the development and subsequent updating of a Maintenance and Service Manual in both printed and electronic file format (portable document format (PDF)). This document shall be comprehensive and shall include, but not be limited to, detailed technical maintenance and servicing descriptions for all major and safety critical components as well as equipment that is specialized to meet the needs of this Project. Preventive maintenance schedules, testing and trouble shooting techniques, corrective measures, both temporary and permanent, the location and availability of support services, point to point component wiring schematics and logic signal flows, assembly and disassembly drawings, including exploded view drawings, shall be included.

- Standard service manuals for unmodified commercial products are acceptable for inclusion in the MMP provided that they contain details and accurate information in order to properly service the specific equipment supplied under this Agreement. Large size diagrams and mechanical assembly diagrams need not be reduced or incorporated into the manual if these drawings are delivered with the manuals.

c) Spare Parts and Inventory Levels
The Developer shall maintain a comprehensive, accurate, and auditable parts and spares inventory adequate to address the maintenance obligations. This information contained in the inventory shall be compatible with the Maintenance Management Information System (MMIS) as described in Section 19.3.3.

d) Maintenance Records
   - The Developer shall outline the preparation of quarterly Work Plans together with one year and five year Work Plans. The five year Work Plan is to be updated each year and include all renewal activities. The one year Work Plans shall be updated every quarter and shall include a rolling 12-month Work Plan.

   - In respect of this requirement a Work Plan means a detailed plan that identifies all maintenance activities that will be undertaken during a specified period, including a schedule of the associated road closures expected.

19.2.2 Standard of Remedy or Repair

The remedy or repair of any Element shall meet or exceed the standard identified in the column entitled "Target" in the Performance Measurement Table and an O&M Record shall be created by Developer to verify that this requirement has been met.

19.2.3 Accident Reduction Program

The Developer is to implement an accident monitoring and reduction program in accordance with FHWA requirements and Good Industry Practice. The TxDOT Wet Weather Accident Reduction Program (WWARP) is included as a reference document.

19.2.4 Highway Conditions Report (HCR) System

The Developer is required to report highway and weather conditions every workday morning by 8:10 a.m. and update the information as needed to TxDOT and include this information on the Developer's web page.

The following types of information are to be reported:

a) Local national weather service forecasts;
b) Highway conditions which close travel in one direction for more than four hours or create hazardous travel including construction or maintenance sites, roadway or right of way damage, major accidents or hazardous spills; and
c) Weather-related events which may cause unsafe driving conditions such as ice, sleet, snow, floods, high winds or hurricanes.

19.2.5 Renewal of Elements

Elements are to be renewed when any of the following conditions are evident:

a) The Asset Condition Score of an Element is below 3 as described in Table 19-1BA, except for asphalt and concrete pavement.
b) For asphalt and concrete pavement, rehabilitation must be initiated when the pavement condition rating of any one-mile continuous segment falls below 75 or the International Roughness Index (IRI) is greater than 140.
c) The "reliability" is less than 99.9% for any safety critical Element. Such an Element is one that, should it fail, the safe operation of the Project would be in jeopardy or an immediate or imminent safety hazard would result.
d) The "reliability" is less than 90% Element other than a safety critical Element.
e) The Element ceases to function, or dies (as in the case of certain landscaping).
f) The frequency of repair is higher than that recommended in the manufacturer's preventive maintenance schedule.

Installation of CCTV

17.2.3 Closed Circuit Television (CCTV) Cameras

A system of cameras shall provide 100% viewing coverage within the Project limits as well as along intersecting cross streets. The system of cameras shall accurately identify all vehicle(s) involved in an Incident or Emergency, the extent of vehicle(s) damage, and if applicable the likelihood of personal injury. Operation of the cameras shall result in no visual delay in response of the camera pan/tilt/zoom by a user.

The Developer shall participate in the regional data and video communications system (RDVCS) for video exchange with TxDOT and appropriate Governmental Entities.

17.2.3.1 Equipment

The Developer shall provide all the equipment necessary for TxDOT secondary control of all CCTV cameras. The method of secondary control shall be in accordance with TxDOT standards and specifications.

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3.4.2 Slope Design

Cut and fill slopes shall be no steeper than 2H:1V, unless supported by an engineering analysis based on site-specific field investigation and site-specific laboratory strength testing. Slopes steeper than 2H:1V must be approved by the Department. All cut and fill slopes shall be designed to be stable for the interim construction stages, for the end-of-construction condition, and for design-life conditions.

The following factors of safety are to be used with limit equilibrium methods of analysis to identify factors of safety for representative sections of all soil cut and soil embankment fill slope areas higher than 10 feet, and/or where slopes are supporting, or are supported by, retaining structures. The factors of safety listed in Table 3.4 are valid for subsurface investigations performed in accordance with Chapter III of the Department's Materials Division's *Manual of Instructions* or for site-specific investigation plans approved by the Department's Materials Engineer. Approval of site-specific investigation plans with reduced boring frequency may require higher factors of safety. Table 3.4 is not applicable for rock cut slopes.

Table 3.4
Minimum Factors of Safety for Soil Cut/Fill Slopes

Soil Slope analysis parameters based on:	Factor of Safety	
	Involves Structure or Critical Slope[1]	Non-Critical Slope
In-situ or lab. tests and measurements[2,3]	1.5	1.3
No site specific tests	N/A[3]	1.5

1. A critical slope is defined as any slope that is greater than 25 ft. in height, affects or supports a structure, or whose failure would result in significant cost for repair, or damage to, private property
2. Site specific in-situ tests include both groundwater measurements and SPT testing but may also include CPT or DMT
3. Parameters for critical slopes involving structures must be based on specific laboratory testing
4. Problem soils (fissured or heavily over-consolidated soils), must be analyzed using shear strength parameters determined from appropriate laboratory strength tests
5. Problem soils should be analyzed for short- and long-term stability using residual strength parameters obtained from laboratory shear testing. These parameters should be determined by drained direct shear tests using sufficient stress reversals to obtain large strains as discussed in the U.S. Army Corps of Engineers laboratory testing procedures EM-1110-2-1906. Many reversals are required to reach residual strengths and some references suggest using a pre-split sample (Ref. Engineering properties of Clay Shales, Report No. 1 by W. Haley

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E. All new and existing ramps will be designed with a parallel design. Acceleration and deceleration lengths will be designed to meet AASHTO requirements including operational characteristics of the ramp and desirable lengths unless constraints prohibit this desirable length and the reduction justification is approved by the Department.

F. In order to preclude toll violations and wrong-way access, Concessionaire will provide a continuous physical barrier system throughout the corridor. Cross-overs from the GP lanes to HOT lanes will have overlapping barriers-and-gates systems. The Department will have the final approval on the location and type of such barrier system. **3.7.2 Requirements for Operational Analysis**

The Concessionaire, in coordination with the Department, shall provide an operational analysis for any changes to the I-95 HOV/HOT Lanes design as presented in the Design Public Hearing that require an amendment to the I-95 HOV/HOT Lanes Interchange Justification Report.

A. The operational analysis shall demonstrate that the Concessionaire's revised design does not have a significant adverse impact on the safety and operation of the existing facility based on an analysis of current and future traffic. Traffic and operational analysis shall conform to the requirements of IIM-LD-200.4 *Development of Justification for Additional or Revised Access Points: Creation of Interchange Justification/Modification Reports*.

3.8 Pavement

A. Pavements shall be designed and constructed to meet or exceed the minimum pavement section requirements set forth in Attachment 1.5a. Pavement design and construction shall meet the requirements of the federal pavement policy, 23 CFR 626 (Chapter 1).

B. The pavement for the Project on new alignment, south of the current HOV terminus at Dumfries, which shall be maintained by the Concessionaire, may be designed and constructed to meet the performance requirements for the applicable roadway classification and the design-year traffic as detailed in "VDOT Requirements for Geotechnical Investigations, Geotechnical Design and Minimum Pavement Sections for I-95 HOV/HOT Lanes", dated July 18, 2011 included in Attachment 1.5a. However, the pavement structure for the Project shall incorporate CTA and drainage layers pursuant to the standards and specifications set forth in Attachment 1.5a.

C. Pavements that will be maintained by the Department following Substantial Completion shall be designed and constructed in

B. The data collection process shall be continuous (not periodic).2. coordination of activities of third parties with interests within

Notwithstanding the requirements to collect and provide data for the the HOT Lanes

facility the parties recognize that from time-to-time, and in the normal course of business, data for specific locations may not be available due 3. monitoring the condition and operational performance of the

to technical issues, or other issues outside of the Concessionaire's HOT Lanes control. In such instances the Concessionaire will endeavor to remedy the issue in accordance with normal business practices. 4. incident response, management and reporting

C. 5.The Concessionaire shall store all data and make the data accessible to traffic operations restrictions, including periods of lane closure the Department in accordance with the Agreement. restrictions;

4.4.3 **Data Compiling and Reporting** 6. standard operating and communication procedures for Emergency preparation, response, and recovery

A. The Concessionaire shall archive all collected traffic data and make 7.the data available for the generation of reports and for audits of data by planning and coordination with all relevant Governmental any persons permitted by the Department for this purpose, in Authorities, including emergency services accordance with the Agreement.

8. operate the Electronic Toll and Traffic Management (ETTM)

B. The Concessionaire shall commence delivery of the report to the System

Department after the second full month following the Service 9.Commencement Date. Thereafter, reporting shall occur on a calendar liaison with the Department's Traffic Operations Center monthly basis.

10. analysis of vehicular accident patterns to identify safety issues

C. Data shall be compiled between the northern and southern termini of 11. investigation of reports or complaints received from all sources the Project, based on the Reporting Segments in accordance with the

12. Agreement, or as amended by the Agreement. toll enforcement and coordination with law enforcement for the

HOT Lanes

D. Data compilation will include Peak Periods traffic volumes and traffic

B. The Concessionaire shall monitor and observe weather and weather speeds on HOT lanes at each Mainline sensor station by lane and hour forecasts and deploy resources to minimize delays and safety hazards within the morning and evening weekday time period over a due to severe weather events, to the extent practical. The Department consecutive 180 day period. The time range of the Peak Periods may shall coordinate with the Concessionaire and deploy resources to be adjusted by the Department from time to time to reflect change in minimize delays and safety hazards due to snow and/or ice events, in travel conditions in accordance with the Agreement. accordance with the Agreement.

E. The report shall include, at a minimum:

C. The Concessionaire will respond within seven days to customer 1. Degradation section indicating Percent Degradation (as defined inquiries and complaints about the HOT Lanes where contact details of in these Technical Requirements) on the mainline of the HOT customers have been provided no matter whether the complaint is Lanes for each Reporting Segment for the period under review. received directly from customers, the customer service center, or from the Department. 2. Speed exception section showing Substandard Stations, days, and time periods where the Percent Degradation fell below the

4.4.2 Data Collection

defined threshold.

A. A process of data collection will be established that includes, at a 3. Documentation of any periods that were impacted by incidents minimum, traffic data (i.e., in each direction; traffic volume, lane or activities outside of the control of the Concessionaire where occupancy, and speed data).

the Percent Degradation fell below the defined threshold.

5. PR-5 & PR-22

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SCHEDULE 13
ACCELERATED SAFETY UPGRADES

Section 1. Accelerated Safety Upgrades. Pursuant to Section 4.2(a) of this Agreement, the Concessionaire, in addition to and in accordance with all other requirements of this Agreement, shall fund and complete the following improvements and upgrades on PR-22 and PR-5 at its sole cost and expense:

(a) *Year 1 Works*. The Concessionaire shall commence work on the following improvements no later than three (3) months after the Closing Date, and in addition shall complete such improvements no later than twelve (12) months after the Closing Date:

(i) *Drainage upgrades and repairs*.

(A) The objective of drainage upgrades and repairs is to ensure the uninterrupted operation of all drainage structures for the prompt removal of any stormwater so as to avoid or eliminate ponding, flooding; and to prevent, correct or eliminate areas of scour and erosion; all of which shall eliminate potential safety hazards, ensure that all drainage elements are performing as intended, and to ensure that the safe and orderly movement of traffic along PR-22 and PR-5 is not prohibited; and

(B) The Concessionaire shall upgrade or replace any and all elements that pertain to the drainage system of PR-22 and PR-5, including but not limited to curbs, inlets, catch basins, manholes, sewers, scuppers, downspouts, ditches, outlet structures, stormwater management basins and erosion control features pursuant to the requirements noted in clause (A); and

(C) The Concessionaire shall also upgrade or replace any and all drainage elements, in part or in whole, that currently create, or in the future may cause, stormwater ponding or flooding of the ingress and egress ramps to PR-22 and PR-5, including but not limited to curbs, inlets, catch basins, manholes, sewers, scuppers, downspouts, ditches, outlet structures, stormwater management basins and erosion control features pursuant to the requirements noted in clause (A).

(ii) *Removal and replacement of existing signage*.

(A) The objective of removal and replacement of existing signage is to ensure that all regulatory, warning, guide, informational, advisory and work zone (construction and maintenance) signage and their components are in proper operating condition, with the proper reflectivity, to be clearly read and understood and to properly regulate and facilitate the safe and orderly movement of traffic along PR-22 and PR-5 with the proper advance warning to the users;

(B) The Concessionaire shall remove and replace any and all signs that are faded, broken, obsolete, do not meet current reflectivity standards, or do not meet the criteria set forth in the Operating Standards; and

(C) The removal and replacement of existing signage work does not include the removal and replacement of the overhead signage trusses unless said trusses are in poor structural condition or represent a hazard to the safety of PR-22 and PR-5 users, in which case they shall be replaced immediately. For the purposes of clarity the signs mounted to the overhead truss structures shall be removed and replaced if not in accordance with the requirements of clause (A) and (B).

(iii) *Repair, upgrade and general rehabilitation of Toll System.*

(A) The objective of the repair, upgrade and general rehabilitation of the Toll System is to ensure that all elements, components and systems pertaining to the Toll System are in optimal operating condition, and such elements, components and systems include, but are not limited to, crash protection, canopies, booths, lighting, signage, restroom facilities, office space, and all related appurtenances;

(B) The Concessionaire shall repair, upgrade and rehabilitate those elements that pertain to the Toll System that are damaged or in poor condition or that do not meet the criteria set forth in the Operating Standards or typical industry practice;

(C) The repair, upgrade and rehabilitation of the Toll System during the first year does not include any structural elements of the canopies or buildings at each toll plaza location, unless said structural elements or facility buildings are damaged, in poor condition and represent a safety hazard, in which case these structures or buildings shall be repaired or replaced immediately and in accordance with the criteria set forth in the Operating Standards; and

(D) For the purposes of clarity, the Toll System shall include all office space, restrooms, garages, and working or habitable space, which shall be subjected to the requirements set forth in clauses (A) and (B).

(iv) *Replacement of deficient and deteriorated Concrete Barriers.*

(A) The objective of the replacement of the deficient and deteriorated Concrete Barriers is to ensure the safety of PR-22 and PR-5 users; and

(B) The Concessionaire shall remove all deficient and deteriorated Concrete Barriers within the length of PR-22 and PR-5 and

replace said concrete barriers with new concrete barriers in accordance with the criteria set forth in the Operating Standards.

(v) *Guardrail Works.*

(A) The objective of the Guardrail Works is the repair of damaged or deteriorated Guardrail in accordance with the Operating Standards to ensure the safety of PR-22 and PR-5.

(B) The Concessionaire shall repair, or remove and replace where necessary, all damaged or deteriorated Guardrail within the length of PR-22 and PR-5, either in part or in whole, so that the Guardrail meets the requirements of clause (A).

(C) The Concessionaire shall remove all damaged or substandard Guardrail end treatments within the length of PR-22 and PR-5 and replace said Guardrail end treatments so that they meet the most current practices and standards adopted and utilized within the Commonwealth at the time the work is undertaken.

(vi) *Landscaping and Community Gateways.*

(A) The objective of the Landscape and Community Gateways work is to improve the appearance of PR-22 and PR-5 by creating Community Gateways at the limits of each municipality, that create aesthetically pleasing areas, including signage identifying each municipality, by the use of softscape and hardscape landscaping materials;

(B) The objective of the Landscaping work is to improve, enhance and generally beautify the appearance of PR-22 and PR-5 by conducting landscaping work that includes but is not limited to: elimination of dangerous and overhanging trees and vegetation; providing and installing erosion control elements; ensuring safe sight distance criteria; controlling invasive and noxious weeds and plant habitat; and creating new or improving existing landscaping areas; and

(C) The Concessionaire shall revamp all landscaping within the Obligation Limits in accordance with the criteria set forth in the Operating Standards, and good industry practice, so as to improve the aesthetic appearance of PR-22 and PR-5 and to minimize current or future potential safety issues caused by overgrown or unkempt vegetation.

(vii) *Upgrade, enhancement, repair and replacement of deficient and unsafe areas of roadway lighting.*

(A) The upgrade, enhancement, repair and replacement of deficient and unsafe areas of roadway lighting work in part or in whole

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roadways and/or structures extending beyond the construction Project Limits or O&M Limits. Concessionaire shall be responsible for notifying the RTMC immediately upon occurrence of all major incidents/events and immediately upon road closure for all roadway and/or structure closures. Concessionaire shall notify FDOT upon roadway and/or structure reopening. Communications with the RTMC shall be maintained on 15 minute intervals during the incident/event.

3.8 Interagency Participation

Concessionaire shall participate in, and adhere to all guidelines set forth by interagency organizations as directed by FDOT.

3.9 Traffic Operations

FDOT will be responsible for monitoring safety and operations issues on the Project. Concessionaire shall conduct awareness meetings with traffic operations staff every 3 months (quarterly) to review any safety or operations issues on the Project, unless otherwise prompted by urgent traffic operations issues. FDOT will conduct traffic safety studies, review crash data annually and identify crash patterns. Concessionaire shall develop countermeasures for FDOT's review and approval, in its reasonable discretion, and implement as necessary, excluding signal re-timing.

Concessionaire shall coordinate with FDOT on the following traffic operations issues:

a. Speed limit changes to the ramps within the Project;

b. Signing and pavement marking improvements;

c. Modifications to regulatory, overhead and ground mounted signs;

d. Interchange modifications;

e. Ramp congestion;

f. Experimentation with new products

g. Special event approval / coordination; and

h. Safety studies.

Concessionaire shall request approval from FDOT for revisions and modifications to:

a. Speed limits within the Operating Period O&M Limits.

b. Modification to any interchanges within the Project.

3.9.1 Portable Traffic Monitoring Sites (PTMS)

Throughout the Operating Period, Concessionaire shall collect traffic classification / volume counts at each of FDOT's existing PTMS sites within the Project Limits. Data collection shall be in accordance with FDOT Traffic Monitoring Handbook. Traffic classification / volume counts shall be collected once annually for a single continuous 48 hour period between the dates of January 15 and April 15 of each calendar year. Proposed dates for data collection shall be submitted and approved by FDOT prior to collection of any data. All data shall be submitted in a format that can be processed with FDOT software. Any data not determined acceptable by the FDOT District 5 Data Collection Manager shall be recounted / resubmitted for approval.

Installation of CCTV

6. Closed Circuit Television (CCTV)

Concessionaire shall be responsible for the installation of a functional CCTV subsystem in accordance with the criteria specified below and the other requirements of the Contract Documents.

The CCTV subsystem shall have the following video coverage criteria:

- 100% video coverage of all lanes of the I-4 mainline and ramps throughout the Project Limits.
- 100% video coverage of interchanges and ramps throughout the Project Limits.
- 100% coverage shall be defined as video coverage of all roadway, shoulder, guardrail, median, clear zone areas, sign structures and supports, and ITS cabinets located within the Project Limits.
- Within areas of noise barrier installation, the above criteria may be modified to exclude any item located behind the noise barriers.

- For roadway facilities with access to the I-4 mainline, coverage shall be a minimum of one-half of a mile from I-4 in each direction of each facility.
- 100% coverage of the DMS sign display (for sign verification – DMS sign display must be visible and legible).
- 100% coverage of toll sign display (a dedicated CCTV camera is required at each toll sign that shall not be used to meet above noted video coverage criteria – toll sign display shall be visible and legible).

The CCTV subsystem shall include, at a minimum, the deployment of the following field subsystem components:

- CCTV camera assembly;
- CCTV support structure (pole type, foundation, sign truss, etc.);
- Pole mounted cabinet (where applicable);
- Video encoder (where applicable);
- Surge protection; and
- Uninterruptible Power Supply

Concessionaire shall design, construct, and integrate the CCTV subsystem into the Controlling Software. The design shall include all required supporting hardware and software necessary for full integration to the specified tie-in location of the network as defined by the Contract Documents. Concessionaire shall provide reasonable assistance to FDOT to ensure functionality of the CCTV subsystem and all ancillary components. The connection is subject to FDOT's reasonable approval. The design shall include:

- Final CCTV pole locations;
- Support structure design;
- Pole-mounted CCTV cabinet design;
- Utility coordination;
- Power service; and
- Line-of-sight assessments.

The CCTV subsystem shall be operated and controlled from the RTMC. The CCTV shall PTZ via the then current Controlling Software

The CCTV cameras shall feature built-in electronic image stabilization. The CCTV cameras shall be wired for and have all firmware necessary to fully integrate into FDOT's then current Controlling Software. CCTV poles shall be installed in areas with sufficient room for off-highway staging to allow future maintenance without lane closures. CCTV cameras shall be placed at a one (1) mile spacing maximum, while providing video coverage as noted in this section.

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Special Design

11.3 Roadway Design Criteria

Developer shall design and construct the Facility in accordance with the criteria shown in the tables below and the following requirements:

A. Grass slopes shall be 6:1 or flatter through the clear zone as per Table 11.3-1 except near bridge rail ends where steeper slopes are protected by guardrail. Beyond the clear zone, slopes shall be 4:1 or flatter. Extending the required limits of guardrail solely for the purposes of increasing the steepness of the slope shall not be allowed. Header slopes below bridges shall not be steeper than 2:1.

B. When entrances and exits are planned without frontage roads, the entire ramp shall be treated as a controlled facility. Control of access shall be applied back to the closest cross street. Control of access shall not create a landlocked condition.

C. All roadside safety devices such as metal beam guard fence, concrete traffic rail, bridge rails, sign supports, light poles, and crash cushions shall at a minimum meet Test Level 3 (TL-3) crash test criteria of the National Cooperative Highway Research Program (NCHRP) report on evaluating the safety performance of highway features entitled NCRHP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Special Operation

22 OPERATIONS

22.1 General Requirements

The requirements of this section apply to the Work from and after the Service Commencement Date.

In the FMP, within the Operating Traffic Management Plan, Developer shall set forth an approach, procedures and methods for:

1. Incident Management Plan
   - Incident Response
   - Incident Reporting
2. Safety and Security
3. Traffic Management
4. Traffic Operations Restrictions
5. Emergency Management Plan
   - Standard operating and communication procedures for emergency preparation, response and recovery, including contact numbers for key personnel and government agencies.
   - Employee training.
6. Planning and Coordination
   - Compliance with requirements of any Governmental Entity, which affect or may affect the Facility.
   - Liaison with law enforcement agencies in relation to all major road traffic accidents and full cooperation with their investigations into the cause of such accidents, and provision of such expertise and assistance as required under the circumstances.
   - Interfacing with Emergency Services.
   - Coordination with Emergency Services and any adjacent highway authorities or concessions to identify accident patterns and examine cost effective solutions to maximize safety.
   - Liaison procedures with any Traffic Management Centers that TxDOT may establish.
7. Tolling Equipment and Systems

22.2 Incident and Emergency Response

Developer shall:

- Cause personnel having at least five years relevant experience with TxDOT's traffic control requirements to be available, to patrol, monitor and maintain the traffic control devices and signs necessary for the safe passage of traffic
- Provide a courtesy patrol service that includes provision for fuel (25 gallon minimum); assistance with tire changing, capability of pushing light vehicles to safe locations, arrangements for towing assistance, placement of cones and safety flares; removal of objects from the roadway
- Cause the provision of on-call vehicle removal service 24 hours per day, seven days per week, for vehicles that obstruct travel lanes or become stalled

- Respond to service calls within 30 minutes of discovery or being notified, whichever occurs first.
- Coordinate with local and state law enforcements, emergency responders, and impacted Customer Groups.

Developer shall commence the implementation of safety procedures (road signing, information for Users, information for law enforcement agencies) as soon as practicable. Developer shall attend to the Incident with qualified personnel, equipped to carry out the functions required in this section, not later than the times stated in the Performance and Measurement Table.

Developer shall provide services for automobile towing of Users' light and heavy vehicles at the Users' expense and shall reach the site of the accident or breakdown within the time period set forth on the Performance and Measurement Table.

Where an Incident or Emergency has an effect on the operation of the Facility, Developer shall clear obstructions and repair damage to the Facility, under the supervision of law enforcement agencies if necessary, such that the Facility is returned to normal operating standards and conditions as quickly as possible. Where liquid or soluble material spills are involved, Developer shall take all necessary measures to minimize pollution of watercourses or groundwater. Where structural damage to highway structures is suspected, Developer shall cause that a suitably qualified bridge engineer or Special Inspection Inspector is available to evaluate the structure and to advise on temporary repairs and shoring needed to provide safe clearance of the Incident or Emergency. Where such an Incident or Emergency involves a personal injury, Developer shall not remove any vehicle or other item that may assist the investigation until authorized to do so by jurisdictional law enforcement agencies.

Following an Incident or Emergency, Developer shall promptly:

- Perform any work necessary to return the Facility to a safe condition and in any event shall carry out such work before the affected area of the Facility is reopened to traffic
- Assist Emergency Services to minimize danger, disruption or delay to the public and pollution of watercourses or groundwater.
- Test and classify all waste material arising from an Incident, and contain, store and dispose of all inert, industrial and non-hazardous waste material arising from an Incident
- For any Hazardous Material spills, call appropriate local, state or federal governmental regulatory agency as necessary.
- Remove spilled cargo to a safe location on the Facility ROW, as necessary, to restore traffic flow.

Within one hour of any Incident or Emergency, Developer shall:

- Provide accurate information to TxDOT and the appropriate Customer Groups through the use of the appropriate tools, such as dynamic message boards, HCR, e-mail/web alerts, and media releases/interviews.
- Continue to provide updated information, as available, until the Incident or Emergency no longer exists.

- In the event of an Emergency such as ice/snow for which advance warning is available, use appropriate methods to inform TxDOT and Users in a timely manner.

22.3 Incident and Emergency Reporting

Developer shall report, as part of Developer's Monthly Report, the following information from the previous month on any Incident or Emergency:

- The date, time, location and nature of the Incident or Emergency.
- All parties involved in the Incident, including names, addresses, telephone numbers and their involvement (including witnesses).
- Responsible party and insurance information.
- Status of all necessary actions taken to address the Incident or Emergency.
- Identification of any traffic control in place at time of Incident or Emergency.

22.4 Safety and Traffic Management Measures

Developer shall provide, erect, maintain, reposition, cover, uncover and remove traffic signs as required in respect of the Work on the Facility including any detours in accordance with the requirements of the Technical Documents.

Developer shall not reopen any area of the Facility which has been closed, until all appropriate safety and traffic management measures have been completed.

Developer shall appoint a traffic safety and control officer and one or more deputies to make all arrangements necessary for safety and traffic control including the provision and operation of recovery vehicles for breakdowns. Developer shall cause the traffic safety and control officer or one of his/her deputies to be on site at all times when safety and traffic management measures are proceeding and to be readily available at all times to deal with matters related to safety and traffic control.

Developer shall cause any shoulders carrying traffic as part of any traffic management measure to meet the performance requirements detailed in Attachment 11 for mainlines and ramps or frontage roads, as appropriate.

22.5 Traffic Operations Restrictions

Lane Closures on the Facility, including frontage roads and ramps, shall be planned to minimize disruption, interruption and other adverse effects on traffic flow, throughput and level of service. Except due to Incidents or Emergencies, unless otherwise approved by TXDOT in writing, Developer shall not allow or suffer lane closures on the main lanes during the following periods:

New Year's Eve and New Year's Day (December 31 through January 1)
Easter Holiday Weekend (Thursday through Monday)
Memorial Day Weekend (Thursday through Tuesday)
Independence Day (July 3 through July 5th Noon)
Labor Day Weekend (Thursday through Tuesday)
Thanksgiving Holiday (Wednesday through Monday)
Christmas Holiday December 23 through 26

8. Presidio Parkway

Special Operation

3.4. O&M Meetings

Developer shall have quarterly meetings with the Department to discuss the O&M Work. The items to be discussed shall include, but not be limited to:

A) O&M Work for the previous quarter, including Incidents/Emergencies and Incident Response coordination, Closures and Permitted Closures;

B) Calculation of the Availability Payment, Milestone Payment, assessment of Noncompliance Points, Construction Noncompliance Events, O&M Noncompliance Events, Closures, Construction Closures and any other pertinent information related to payment adjustments and Noncompliance Points calculation per the Contract Documents; and

C) Anticipated O&M Work for the next quarter, including but not limited to Planned Maintenance, Renew Work and Permitted Closures.

The Department may request a meeting at any time to discuss O&M Work-related issues, accidents and other operations and maintenance aspects of the Project. Developer shall be required to actively participate in other meetings as directed by the Department. Developer shall conduct incident debriefings to review lessons learned and best practices. Developer shall be required to attend quarterly meetings with the Department's Operations Division. The purpose of these meetings will be to review any safety and traffic operations issues or requests on the Project.

Special Operation

1.18.13 Traffic Monitoring Sensors

E. Traffic monitoring sensors shall be installed to monitor and report in real time traffic volume, lane occupancy and speed data at key locations along the roadway (outside of the tunnels). In addition to such sensors, the Concessionaire shall employ fixed camera-based software to detect incidents inside the tunnels. 2

F. Information collected on the project by the ITS will be made available to VDOT.

Special Design

H.3.3. Performance Time Frames

The Concessionaire, from the time a deficiency is or reasonably should be detected or reported, shall complete the repair or replacement work to the roadway safety feature and systems and their components within the maximum time duration set forth below:

Roadway Safety Feature or System	Maximum Time Duration
Guardrail System:	
- Damage to Structural Integrity	24 Hours
- Non-Structural Damage	30 Days
Barrier Wall:	
- Damage to Structural Integrity or Stability	24 Hours
- Non-Structural Damage	45 Days
Impact Attenuators	8 Hours
Toll Plaza Crash Protection Devices:	
- Damage to Structural Integrity	12 Hours
- Non-Structural Damage	30 Days

The Concessionaire shall:

- Clean all drainage holes in the barrier wall bases at least twice annually.
- Immediately establish and provide temporary barricades and traffic control whenever a Roadway Safety Feature or System is unsafe or has the potential to become unsafe for ITR users.
- Remove all Litter and Debris in and around the Impact Attenuators at least three times annually, or at a greater frequency as conditions and locations dictate.

H.3.4. Acceptance Criteria

Roadway Safety Features and Systems shall be deemed acceptable by the IFA when the following standards are met or exceeded:

- Guardrail Systems:
  - The guardrail shall be installed in compliance with the Reference Documents noted in Section H.2 of this Chapter and the system shall be within 3/4-inch of plumb and grade.

- The surface materials shall be smooth, undamaged and free of defects.
- The rails and terminal elements shall not be warped or otherwise deformed.
- The posts shall be installed square to the rail.
- The work site shall be left in a clean condition.
- The system shall be maintained in accordance with the IFA guidelines for OPI as outlined in the 2005 Annual Report.

❖ Impact Attenuators:
- The system shall be free of obstructions and shall be capable of functioning as designed and intended.
- The system components shall be free of damage and/or shall have been repaired with equal or comparable parts in consultation with the original manufacturer.

❖ Barrier Walls:
- Barrier Walls shall be properly aligned horizontally and vertically so as to conform to the roadway profiles, alignment and geometry.
- The barrier wall shall be free from defects and damage and shall be capable of functioning as intended.

❖ Toll Plaza Crash Protection Systems:
- Protection System shall be free from all damage and deficiencies, and all cosmetic defects shall have been removed or repaired.
- The protection system shall be structurally sound and capable of functioning as designed.

Special Operation

2.3 Safety and Health Plan

Developer shall be responsible for the safety and health of its personnel and of the general public affected by the Project. Developer shall prepare and submit to TxDOT for concurrence a comprehensive safety and health plan ("Safety and Health Plan") that is consistent with and expands upon the preliminary safety and health plan submitted with the Proposal for the Term of the Agreement during both the D&C and O&M Periods. All members of Developer's team shall adhere to Developer's Safety and Health Plan. Developer shall meet the following Safety and Health Plan content and preparation requirements.

The Developer shall take full account of the unique attributes of this project in preparing the Safety and Health Plan, including but not limited to, the urban environment, the heavy traffic conditions, and the size and scope of the Project. The Safety and Health Plan shall fully describe Developer's policies, plans, training programs, Work Site controls, and Incident response plans to ensure the safety and health of personnel involved in the Project and the general public affected by the Project. The Safety and Health Plan must cover all phases of the Work, and shall be reviewed, evaluated, and updated as often as necessary to reflect relevant changes during the Term of the Agreement. The Safety and Health Plan shall contain, as a minimum, the following provisions:

a) Safety Management

The personnel and responsible staff who will implement, maintain, and enforce the Safety and Health Plan, including policies and training programs shall be identified in the Safety and Health Plan. As a minimum, the Developer shall provide a fulltime on-the-job D&C and O&M Safety Manager during the D&C and O&M Periods, respectively. The D&C and O&M Safety Manager's qualifications, as a minimum, shall include:

- Ten (10) years of progressive safety experience, five years of which must be safety management experience, on complex heavy civil projects for the D&C Safety Manager;

- Ten (10) years of progressive safety experience, five years of which must be safety management experience, on similar O&M projects for the O&M Safety Manager. However, the D&C Safety Manager shall be deemed to satisfy these requirements;
- Designation, at or before the Effective Date, as a Construction Health and Safety Technician (CHST) or higher certification issued by the Board of Certified Safety Professionals (BCSP);
- Completed the OSHA 30-hour Safety and Health Course;
- Training and current certification for CPR and First Aid;
- Possess verifiable competency in the construction safety disciplines related to the Work to be performed and/or retain full-time competent persons required by State and Federal safety standards; and
- Knowledgeable in safety incentive programs.

As part of the Developer's safety and health management, all Work shifts shall have, as a minimum, an onsite Shift Safety Representative. The Shift Safety Representative shall have the following minimum qualifications:

- Three (3) years of progressive safety experience and general competency in the construction safety disciplines related to the Work;
- Completed the OSHA 10-hour Safety and Health Course; and
- Training and current certification for CPR and First Aid.

Devices for Safety Data Collection

17.2.3 CCTV Cameras

Developer shall provide CCTV cameras for Incident verification and traffic management. The system of cameras shall accurately identify all vehicle(s) involved in an Incident or Emergency, the extent of vehicle(s) damage, and if applicable the likelihood of personal injury. Operation of the cameras shall result in no visual delay in response of the camera pan/tilt/zoom by a user.

17.2.3.1 Equipment

Developer shall provide all necessary CCTV equipment, including cameras, camera controls, cables, and connections. Developer shall provide all the equipment necessary for TxDOT control of all CCTV cameras. The method of control shall be in accordance with TxDOT standards and specifications.

Developer shall provide a digital video format and communications protocol at all connections with TxDOT systems. The format and protocol provided by Developer shall be compatible with systems in use by TxDOT, and if necessary convertible for use by TxDOT's in-place ITS network.

17.2.3.2 Placement

Developer shall provide overlapping roadway coverage by CCTV cameras for all highway lanes and intersecting cross streets within the Project Limits to provide redundant camera field of view. CCTV cameras shall be placed to enable TxDOT to monitor traffic conditions on highway lanes, frontage roads, connecting facilities, and entrance and exit ramps, and messages displayed on any remotely-controlled dynamic message signs in the Project area. To provide a stable video image, Developer shall mount cameras on dedicated structures unless otherwise approved by TxDOT.

Distance between CCTV cameras shall not exceed 0.5 miles; however, the Developer is responsible for placing cameras to ensure 100% coverage. 100% coverage shall be defined as no blind spots for any reason, including but not limited to: trees, bridge structures, horizontal or vertical alignment, overhead or side mounted sign structures, or toll gantries. Additionally, each CCTV camera shall be able to view the CCTV camera immediately upstream and downstream from itself unless approved by TxDOT.

17.2.3.4 Operating Requirements

Developer shall provide cameras with built-in heaters, mounting structure, and related equipment capable of operating within the following weather conditions:

a) Wind load of 100 mph without permanent damage to mechanical and electrical equipment
b) Ambient temperature range of -35 degrees Fahrenheit to +140 degrees Fahrenheit
c) Relative humidity range not to exceed 95 percent within the temperature range of +40 degrees Fahrenheit to +110 degrees Fahrenheit
d) Humidity range of 0 to 100 percent condensing

17.2.3.5 Control Requirements

The Developer shall supply CCTV equipment on this project which is fully compatible with the existing CCTV control systems operated from DalTrans and TransVision. In order to prove compatibility and operability of CCTV systems submitted for use on this project, deliver one complete set of CCTV equipment to TxDOT for testing by DalTrans and TransVision Information Technology Personnel as part of the equipment submittal and approval process. Allow a minimum of 30 days for testing by TxDOT IT personnel. Submit the CCTV equipment for testing no later than 60 days after completion of TxDOT submittal review. The equipment submitted for testing must be fully assembled and in a fully operational condition. Configure all equipment submitted for testing as is intended for use on the project. Prototype equipment will not be allowed. The equipment will be interconnected to the existing CCTV control system and must be fully operational using that system. No modifications to the existing CCTV control system will be made to accommodate the submitted CCTV equipment. To be considered fully operational, as a minimum, the equipment must correctly respond to the following commands:

pan left	focus far
pan right	iris override

I-4 Ultimate

Traditional Safety Contractual Terms related to potential compensation or deductions

ARTICLE 9. SAFETY COMPLIANCE

FDOT is entitled from time to time to issue Safety Compliance Orders to Concessionaire with respect to the Project to correct a specific safety condition or risk involving the Project that FDOT has reasonably determined exists through investigation or analysis.

9.1 Safety Compliance Orders

9.1.1 FDOT shall use good-faith efforts to inform Concessionaire at the earliest practicable time of any circumstance or information relating to the Project which in FDOT's reasonable judgment is likely to result in a Safety Compliance Order. Except in the case of an Emergency, FDOT shall consult with Concessionaire prior to issuing a Safety Compliance Order concerning the risk to public or worker safety, alternative compliance measures, cost impacts, and the availability of Concessionaire resources to fund the required Work.

9.1.2 Subject to conducting such prior consultation, FDOT may issue Safety Compliance Orders to Concessionaire at any time from and after the Effective Date.

9.2 Duty to Comply

9.2.1 Subject to Section 9.1, Concessionaire shall implement all Safety Compliance as expeditiously as reasonably possible following issuance of the Safety Compliance Order. Concessionaire shall diligently prosecute the work necessary to achieve such Safety Compliance until completion. In no event shall Concessionaire be entitled to claim that any Relief Event relieves Concessionaire from compliance with any Safety Compliance Order.

9.2.2 Concessionaire shall be entitled to Extra Work Costs, Delay Costs, compensation under Sections 10.2.1, 10.2.2 and 10.2.3, time extension under Section 10.1.5.15 and relief under Section 10.2.5, as applicable, for a Relief Event described in clause (q) of the definition of Relief Event.

10.2 Delayed Payments; Other Relief; Mitigation; Insurance

10.2.1 **Delayed Periodic Payments Due to Relief Events**

10.2.2 **Delayed Availability Payments Due to Relief Events During Construction Period**

10.2.3 **Delayed Final Acceptance Payments Due to Relief Events**

10.2.5 **Defense to Noncompliance Points, Deductions, Liquidated Damages and Concessionaire Default**

19.2.3 **Remedies for Failure to Meet Safety Standards or Perform Safety Compliance**

19.2.3.1 If at any time Concessionaire, or its Surety under payment and performance bonds, fails to meet any Safety Standard or timely perform Safety Compliance or FDOT and Concessionaire cannot reach an agreement regarding the interpretation or application of a Safety Standard or the valid issuance of a Safety Compliance Order within a period of time acceptable to FDOT, acting reasonably, FDOT shall have the absolute right and entitlement to undertake or direct Concessionaire to undertake any

work required to ensure implementation of and compliance with Safety Standards as interpreted or applied by FDOT or with the Safety Compliance Order.

19.2.3.2 To the extent that any work done pursuant to Section 19.2.3.1 is undertaken by FDOT and is reasonably necessary to comply with Safety Standards or perform validly issued Safety Compliance Orders, Concessionaire shall pay to FDOT on demand FDOT's Recoverable Costs in connection with such work, and FDOT (whether it undertakes the work or has directed Concessionaire to undertake the work) shall have no obligation or liability to compensate Concessionaire for any Losses it suffers or incurs as a result thereof, except as a result of FDOT's gross negligence, recklessness, willful misconduct or bad faith.

19.2.3.3 To the extent that any work done pursuant to Section 19.2.3.1 is undertaken by FDOT and is not reasonably necessary to comply with Safety Standards or perform validly issued Safety Compliance Orders, FDOT shall compensate Concessionaire only for Losses it suffers or incurs as a direct result thereof.

19.2.3.4 Notwithstanding anything to the contrary contained in this Agreement, if, in FDOT's good faith discretion, Concessionaire has failed to meet any Safety Standards or perform Safety Compliance and the failure results in an Emergency or danger to persons or property, and if Concessionaire is not then diligently taking all necessary steps to cure or deal with such Emergency or danger, FDOT may (but is not obligated to), without notice and without awaiting lapse of the period to cure any breach, and in addition and without prejudice to its other remedies, (a) immediately take such action as may be reasonably necessary to rectify the Emergency or danger, in which event Concessionaire shall pay to FDOT on demand FDOT's Recoverable Costs, or (b) suspend the Work and/or close or cause to be closed any and all portions of the Project affected by the Emergency or danger. So long as FDOT undertakes such action in good faith, even if under a mistaken belief in the occurrence of such failure or existence of an Emergency or danger as a result thereof, such action shall not be deemed unlawful or a breach, shall not expose FDOT to any liability to Concessionaire, except if FDOT's action constitutes gross negligence, recklessness, willful misconduct or bad faith, and shall not entitle Concessionaire to any other remedy, it being acknowledged that FDOT has a high priority, paramount public interest in protecting public and worker safety at the Project and adjacent and connecting areas. Immediately following rectification of such Emergency or danger, as determined by FDOT, acting reasonably, FDOT shall allow the Work to continue or such portions of the Project to reopen, as the case may be.

and greenways) and pedestrian facilities within the Ultimate project and Preferred Alternative study areas.

1.3.6.5.1 Existing Services

Bikeway, trail, and greenway facilities are located throughout the project study area on crossroads and roadways adjacent to I-4. These facilities are categorized by use. Bikeway facilities include bike lanes, bike routes, and/or paved shoulders. Trail facilities include paved multiple use trails for walking, bicycling, and skating, and unpaved multiple use trails for hiking, horseback riding, and off-road bicycling. Greenway facilities are corridors of protected open space that are managed for conservation and/or recreation. Table 3-38 catalogues 44 existing and proposed facilities that either cross I-4 or are linked to facilities that cross I-4 within the Ultimate project and Preferred Alternative study areas. These facilities are presented graphically on Figure 3-14.

A summary of information for sidewalks crossing I-4 and for sidewalks in areas adjacent to I-4 within the study area is presented in Table 3-39 and Figure 3-15. The majority of the information was obtained from field surveys conducted in December 1996. In addition, METROPLAN ORLANDO's 2020 LRTP Update and Volusia County MPO's 2020 LRTP Refinement were reviewed for information on existing sidewalks within the vicinity of I-4.

1.3.6.5.2 Future Service

A number of new bicycle and pedestrian facilities have been proposed by the various jurisdictions within the project study area. These proposed facilities are included within Tables 3-38 and 3-39 and shown on Figures 3-14 and 3-15, respectively.

1.3.6.5.3 Complement to Bicycle and Pedestrian Facilities

The proposed improvements include provision for future development of bicycle and pedestrian facilities on cross streets. Future road widening projects within the state have been recommended to include roadway bicycle lanes to accommodate bicycle traffic. All interstate overpasses proposed for reconstruction as part of this project have been designed to ensure that all cross streets will have sufficient room to incorporate pedestrian and bicycle facilities during future cross street improvement projects. In addition, cross street overpasses proposed for reconstruction will be designed to accommodate pedestrian and bicycle facilities.

1.3.7 Safety

Crash data was provided by FDOT for I-4 for a three-year period from 1997 through 1999 and for SR 408 (East/West Expressway) from 1997 through 1999 (*Note: This three-year period summarizes the most recent crash data available to date*). The crash data provided includes the I-4 corridor from just west of the I-4/SR 528 (Bee Line Expressway) interchange in Orange County to just east of the I-4/SR 472 interchange in Volusia County, and the SR 408 (East/West Expressway) corridor from just west of the SR 408 (East/West Expressway)/Tampa Avenue interchange to just west of the SR 408 (East/West Expressway)/Bumby Avenue interchange.

Crash data was analyzed to determine high crash roadway sections, the types of crashes that occurred, and the associated economic loss per year associated with those roadway sections on I-4 and SR 408 (East/West Expressway) within the project study area. A summary of crash types on I-4 is presented in Table 1-7. Tables 1-8 through 1-11 summarize the I-4 crash data by segment in and include information on location, the number of fatalities/injuries, crash rates, safety ratios, and economic loss. Table 1-12 provides a summary of similar information for the SR 408 (East/West Expressway) crash data.

The safety ratio is defined as the ratio between the actual crash rate and the critical crash rate. The actual crash rate is a function of the roadway section length times the annual number of vehicles in relation to the number of crashes. The critical crash rate is a function of the roadway section length, the traffic volume, and the statewide average crash rate for similar roadway facilities. A safety ratio equal to or greater than one (1.00) indicates that the facility is experiencing more crashes than would

be typically anticipated on this type of facility, and that the roadway section is considered a high hazard location. The higher the safety ratio, the greater the hazard. The areas within the project area that experience a safety ratio greater than 1.00 are presented in Table 1-13.

As shown in Table 1-7, the most common type of crash on I-4 through this three-year period was rear-end collisions. A total of 2,490 rear-end collisions or 52.0 percent of the total number of crashes, occurred within the project area between 1997 and 1999. The second most frequent crash type was vehicle sideswipes, totaling 414 or 8.6 percent of the total number of crashes within the project area. The third most frequent type of crash was angled collisions, totaling 364 or 7.6 percent of the total number of crashes for the same three-year period.

Overall, the Ultimate project study area demonstrates a gradual increase in traffic crashes in urban areas over the past few years corresponding to annual increases in daily traffic volumes and area growth. The proposed improvements will involve the reconstruction of I-4 to current design standards to improve driver safety. The following sections discuss the crash data analysis by segment.

1.3.7.1 Segment 1

As shown in Table 1-8, the safety ratios for I-4 in Segment 1 range from 0.085 to 2.356. One interchange recorded a safety ratio greater than 1.00. The I-4/Kirkman Road (SR 435) interchange had a safety ratio of 2.356 in 1997, for a roadway section of approximately 0.009 miles (48 feet).

The high safety ratio for this roadway section along I-4 can be attributed to the short segment length. Roadway segment lengths less than one-mile result in an artificially high safety ratio. A total of six crashes occurred at the I-4/Kirkman Road interchange in 1997.

Another area with a high number of crashes is the section of I-4 between the interchanges of Florida's Turnpike and Orange Blossom Trail (US 441), a length of approximately 3.9 miles. Although this section of roadway had a safety ratio less than 0.400, the number of crashes were high totaling 88, 89, and 125 in 1997, 1998, and 1999, respectively.

1.3.7.2 Segments 2 and 3

As shown in Table 1-9, the safety ratios for I-4 within Segments 2 and 3 range from 0.077 to 1.275. One section had a safety ratio greater than 1.00. The I-4/Orange Blossom Trail (US 441) interchange had a high safety ratio of 1.275 in 1999 for a short roadway section approximately 0.007 miles (37 feet) in length. The high safety ratio for this roadway section is due to the short segment length. Roadway segment lengths less than one-half mile result in artificially high safety ratios. This section only experienced three crashes in 1997. Another high accident area within Segments 2 and 3 is along I-4 from Robinson Street to Lee Road.

Although the safety ratios in this area are less than 0.600, the number of crashes that occurred annually generally exceeds 131. This high number of crashes may be due to the less than desirable vertical and horizontal curves along I-4 and higher traffic volumes in that area.

Crash data for SR 408 (East/West Expressway) is presented in Table 1-12. The safety ratios for this facility were well below 1.00 for the same three-year period from 1997 to 1999. The safety ratios ranged from 0.158 to 0.259 for a roadway section of 3.1 miles in length. However, the number of crashes that have occurred on SR 408 (East/West Expressway) within the study area have increased approximately 20 percent between 1997 and 1999.

1.3.7.3 Segments 4 and 5

Safety ratios for sections on I-4 located in Segments 4 and 5 are presented in Table 1-10. The safety ratios fall within the range of 0.050 to 6.563. The Lake Mary Boulevard interchange had a safety ratio greater than 1.00 in a three-year period. The high safety ratio for this roadway section is due to the short segment length. Roadway segment lengths less than one-half mile result in artificially high safety ratios.

Table 1-7. Project Area Overall Crash Type Summary

Type of Crash	1997			1998			1999			Total	Percent
	Orange County	Seminole County	Volusia County	Orange County	Seminole County	Volusia County	Orange County	Seminole County	Volusia County		
Collision Rear End	595	272	45	570	177	74	540	160	57	2490	52.0%
Collision Head On	6	3	0	3	2	1	9	2	1	27	0.6%
Collision Angle	68	26	14	77	23	14	99	29	14	364	7.6%
Collision Left Turn	13	2	4	7	2	1	11	2	3	45	0.9%
Collision Right Turn	0	0	0	2	0	0	1	0	0	3	0.1%
Collision Sideswipe	94	38	12	78	37	11	66	41	17	414	8.6%
Collision Backed Into	0	1	0	2	0	0	2	2	0	7	0.1%
Collision Parked Car	5	1	0	4	3	0	6	1	0	20	0.4%
Collision w/MV on Other Road	1	0	1	1	1	0	0	2	0	6	0.1%
Collision w/Pedestrian	5	3	1	4	3	0	2	2	1	21	0.4%
Collision w/Bike	0	0	0	0	0	0	0	0	0	0	0.0%
Collision w/Bike (Bike Lane)	0	0	0	0	0	0	0	0	0	0	0.0%
Collision w/Moped	0	0	0	0	0	0	0	0	0	0	0.0%
Collision w/Train	0	0	0	0	0	0	0	0	0	0	0.0%
Collision w/Animal	1	0	0	0	0	0	0	0	0	1	0.0%
MV H/Sign/Sign Post	5	1	2	8	1	5	10	3	3	38	0.8%
MV H/Utility Pole/Light Pole	11	0	0	1	0	3	17	0	2	34	0.7%
MV H/Guardrail	68	25	5	62	17	13	66	15	9	270	5.6%
MV H/Fence	5	1	3	8	0	4	2	1	4	28	0.6%
MV H/Concrete Barrier Wall	49	2	1	68	4	6	47	4	7	188	3.9%
MV H/Bridge/Pier/Abutment	1	2	3	1	1	0	1	0	2	11	0.2%
MV H/Tree/Shrub	12	3	7	9	3	7	6	3	6	56	1.2%
Collision w/Construction Barricade/Sign	2	4	1	2	1	0	4	2	0	16	0.3%
Collision w/Traffic Gate	0	0	0	0	0	0	0	0	0	0	0.0%
Collision w/Crash Attenuators	1	0	0	0	0	0	1	0	0	2	0.0%
Collision w/Fixed Object Above Road	0	0	3	3	3	0	1	0	0	10	0.2%
MV H/Other Fixed Object	1	0	0	5	2	0	7	1	1	17	0.4%
Collision w/Moveable Object on Road	9	7	0	9	9	3	8	2	4	51	1.1%
MV Ran Into Ditch/Culvert	13	10	3	20	14	5	12	11	9	97	2.0%
Ran Off Road Into Water	3	0	2	3	0	2	1	2	5	18	0.4%
Overturned	33	23	14	36	23	22	31	37	23	242	5.1%
Occupant Fell From Vehicle	2	2	1	0	0	0	3	3	2	13	0.3%
Tractor/Trailer Jackknifed	3	2	2	3	3	2	1	3	6	25	0.5%
Fire	2	0	0	1	0	1	0	0	0	4	0.1%
Explosion	0	0	0	0	0	0	0	0	0	0	0.0%
All Other	69	22	11	38	23	14	56	28	10	271	5.7%
Sub Total:	1067	450	135	1025	352	186	1030	366	186	4789	100.0%
Year End Total:	1652			1565			1572				

Note: The most recent accident data available were for the three-year period of 1997 through 1999.
Most common type of crash: 1st - rear end; 2nd – sideswipe; 3rd - angle

Table 1-8. Segment 1 Crash Data

Description	Begin MP	End MP	Length (miles)	No. of Lanes	Type (Urban/ Rural)	Divided (Y/N)	Average Daily Traffic	No. of Crashes	No. of Fatalities	No. of Injuries	Actual Crash Rate	Critical Crash Rate	Safety Ratio	Property	Property Damage	Economic Loss
1997																
SR 528 (Bee Line Expwy) Interchange	5.971	6.014	0.043	7	U	Y	155,000	6	0	5	2.467	3.661	0.673	2	N/A	$501,600
SR 528 Interchange to approx. 1 mile west of Sand Lake Rd Interchange	6.014	7.376	1.376	6	U	Y	133,685	26	0	29	0.391	1.852	0.211	7	$5,400	$2,173,600
Approx. 1 mile west of SR 482 Interchange to Sand Lake Rd Interchange	7.376	8.413	1.037	7	U	Y	124,357	36	1	45	0.807	1.938	0.416	16	N/A	$3,176,800
Sand Lake Rd Interchange	8.413	8.444	0.031	14	U	Y	125,000	2	0	0	1.414	4.287	0.329	2	N/A	$167,200
Sand Lake Rd Interchange to approx. 0.60 miles west of International Dr Interchange	8.444	9.042	0.598	7	U	Y	125,000	7	0	4	0.266	2.107	0.121	4	N/A	$585,200
Approx. 0.60 miles west of International Dr Interchange to International Dr Interchange	9.042	9.592	0.550	6	U	Y	125,000	14	1	14	0.557	2.137	0.260	5	$3,000	$1,170,400
International Dr Interchange	9.592	9.659	0.067	10	U	Y	125,000	1	0	1	0.327	3.436	0.095	0	$0	$83,600
Kirkman Rd Interchange	9.659	9.939	0.280	7	U	Y	125,000	15	0	6	1.174	2.429	0.483	10	$500	$1,254,000
Kirkman Rd Interchange	9.939	9.948	0.009	10	U	Y	125,000	6	0	4	14.834	6.209	2.356	2	N/A	$501,600
Kirkman Rd Interchange	9.948	10.153	0.205	6	U	Y	115,613	8	0	5	0.923	2.642	0.349	5	N/A	$668,800
Kirkman Rd Interchange	10.153	10.192	0.039	10	U	Y	114,500	1	0	1	0.610	4.111	0.149	0	$0	$83,600
Kirkman Rd Interchange to Florida Turnpike Interchange	10.192	10.711	0.519	7	U	Y	114,500	8	0	5	0.368	2.193	0.167	4	N/A	$668,800
Florida Turnpike Interchange to approx. 0.50 miles west of Orange Blossom Tr Interchange	10.711	14.571	3.860	6	U	Y	127,386	88	0	108	0.490	1.671	0.293	32	$11,140	$7,356,800
Approx. 0.50 miles west of Orange Blossom Tr Interchange to Orange Blossom Tr Interchange	14.571	14.960	0.389	7	U	Y	141,500	27	0	24	1.343	2.223	0.604	12	$2,000	$2,257,200

Appendix D Concession Contract Part III: Safety Incidents and Accidents

1. I-95 Express Lanes

4.4 Operations Requirements

4.4.1 General Obligations

A. The Concessionaire shall be responsible for, or shall cause the O&M Contractor to be responsible for, in accordance with the Agreement, the following, among other things:

1. employment and training of competent personnel to carry out all operations aspects of the O&M Plan

2. coordination of activities of third parties with interests within the HOT Lanes

3. monitoring the condition and operational performance of the HOT Lanes

4. incident response, management and reporting

5. traffic operations restrictions, including periods of lane closure restrictions;

6. standard operating and communication procedures for Emergency preparation, response, and recovery

7. planning and coordination with all relevant Governmental Authorities, including emergency services

8. operate the Electronic Toll and Traffic Management (ETTM) System

9. liaison with the Department's Traffic Operations Center

10. analysis of vehicular accident patterns to identify safety issues

11. investigation of reports or complaints received from all sources

12. toll enforcement and coordination with law enforcement for the HOT Lanes

B. The Concessionaire shall monitor and observe weather and weather forecasts and deploy resources to minimize delays and safety hazards due to severe weather events, to the extent practical. The Department shall coordinate with the Concessionaire and deploy resources to minimize delays and safety hazards due to snow and/or ice events, in accordance with the Agreement.

C. The Concessionaire will respond within seven days to customer inquiries and complaints about the HOT Lanes where contact details of customers have been provided no matter whether the complaint is received directly from customers, the customer service center, or from the Department.

Chapter of Data Collection

4.4.2 Data Collection

A. A process of data collection will be established that includes, at a minimum, traffic data (i.e., in each direction; traffic volume, lane occupancy, and speed data).

B. The data collection process shall be continuous (not periodic). Notwithstanding the requirements to collect and provide data for the facility the parties recognize that from time-to-time, and in the normal course of business, data for specific locations may not be available due to technical issues, or other issues outside of the Concessionaire's control. In such instances the Concessionaire will endeavor to remedy the issue in accordance with normal business practices.

C. The Concessionaire shall store all data and make the data accessible to the Department in accordance with the Agreement.

4.4.3 Data Compiling and Reporting

A. The Concessionaire shall archive all collected traffic data and make the data available for the generation of reports and for audits of data by any persons permitted by the Department for this purpose, in accordance with the Agreement.

B. The Concessionaire shall commence delivery of the report to the Department after the second full month following the Service Commencement Date. Thereafter, reporting shall occur on a calendar monthly basis.

C. Data shall be compiled between the northern and southern termini of the Project, based on the Reporting Segments in accordance with the Agreement, or as amended by the Agreement.

D. Data compilation will include Peak Periods traffic volumes and traffic speeds on HOT lanes at each Mainline sensor station by lane and hour within the morning and evening weekday time period over a consecutive 180 day period. The time range of the Peak Periods may be adjusted by the Department from time to time to reflect change in travel conditions in accordance with the Agreement.

E. The report shall include, at a minimum:

1. Degradation section indicating Percent Degradation (as defined in these Technical Requirements) on the mainline of the HOT Lanes for each Reporting Segment for the period under review.

2. Speed exception section showing Substandard Stations, days, and time periods where the Percent Degradation fell below the defined threshold.

3. Documentation of any periods that were impacted by incidents or activities outside of the control of the Concessionaire where the Percent Degradation fell below the defined threshold.

4.4.7 Incident Management

A. The Concessionaire shall provide equipment and personnel to support incident and emergency management operations on the HOT Lanes in accordance with the Operations and Maintenance Plan. The Concessionaire shall take necessary action using appropriate resources to handle any and all traffic control needs to ensure the safety of the incident scene and traveling public and to minimize the potential for pollution of watercourses or groundwater.

B. In the event of an Incident, the Concessionaire shall provide traffic management, real time traffic information and video feeds to the Department, as appropriate, depending on the nature of the Incident in accordance with the Interface Control Document and protocols developed.

C. The Concessionaire shall coordinate and confer with the Department's NRO TOCs and other first responder community stakeholders in developing the incident management plans and when carrying out incident management operations.

D. Where structural damage to a HOT Lane structure, which poses an imminent risk to the traveling public, is suspected, the extent of damage and condition of the structure shall be evaluated, documented, and reported by a bridge/structural engineer with the following qualifications:

1. is a professional engineer, licensed in the Commonwealth of Virginia;

2. meets the qualifications to be a "Team Leader" in accordance with the requirements of Article 650.309 of the National Bridge Inspection Standards, 23 CFR 650.3; and

3. has extensive experience with in-service bridge inspection, emergency bridge inspection, maintenance, repair and rehabilitation of bridges, structural evaluations, and load ratings.

E. The Concessionaire shall not reopen any area of the HOT Lanes which has been closed, until all appropriate safety and traffic management measures have been completed and any issues related to Hazardous Substances have been mitigated to a safe level.

F. The Concessionaire shall ensure that procedures are in place for public/agency notifications, incident management, ensuring the safety of motorists, handling of hazardous waste, and coordination with the Department, police and other emergency personnel with respect to emergency incidents and occurrences.

G. The Concessionaire shall identify a management-level, on-call "duty officer" consistent with the Department's duty-officer policy.

4.4.8 Traffic Management – Detection of Incidents

A. In locations as outlined in the Agreement, an appropriate system shall be deployed that is capable of automatic video-based or equivalent, detection of incidents within 5 minutes of occurrence, 95% of the time within areas monitored under normal conditions ("AID system").

B. Incident information (including the character and severity of the incident) shall be communicated to the Department within five minutes of the Concessionaire determining the incident classification, in accordance with the Operations and Maintenance Plan.

2. Indiana Toll Road

Chapter of Data Collection

D.4.3 Toll Operations Data Center

The Toll Operations Data Center is located at the ground level of each toll plaza building and is commonly referred to as the UPS Room. The Data Center houses the TCS and UPS and provides the electronic storage; information; verification; power supply source; and computation tools to assist the Concessionaire manage and monitor Toll Collections and Operations on a continuous basis, in a secure, humidity and climate controlled setting. The Plan shall also include subsections on the following items, at a minimum:

D.4.3.3. Software

This section of the Toll Collection Plan shall include:

- the current version information of all software utilized by the TCS, and the upgrades and maintenance procedures
- the network operating system, server software, and the data collection processes used to produce traffic and financial reports. Currently, the TCS applications are designed to produce the following reports: Audit, Traffic, Administrative, System and Maintenance
- the procedures and protocol for technical support, which shall be provided on a continuous on-call basis.

The Concessionaire shall include the following TCS operations in the Toll Collection and Operations Plan:

- Touch Screen Toll Revenue Collection Data by Toll Lane
- Toll Lane Traffic Counting and Vehicle Classification Recognition Data
- Video-based facility surveillance system
- Video image recording and retention
- Toll Plaza Lane Control and Monitoring from the Toll Plaza Control Center
- Toll Plaza Data Center host, storage and back-up data systems
- Uninterruptible power supplies (UPS)
- Security System
- Remote data access, system reporting and back-up
- Communication system

D.4.8. Toll Incident Events data

This section of the Toll Collection Plan shall include procedures for addressing events and incidents associated with Toll Collections and Operations. At a minimum, the Plan shall address, without limitation, the procedures for handling the following:

- Unusual occurrences
- Disabled vehicles Lane accidents
- Vehicle collisions
- Lane run-through/violation procedures
- Robbery/Hold-ups
- Drunk drivers
- Road rage
- Emergency procedures

Incident Reporting

ARTICLE 8.
REPORTING; AUDITS; INSPECTIONS

Section 8.1. Reports.

(a) *Traffic Characteristics Reports.* In addition to any other traffic or traffic-related reports required pursuant to this Agreement, the Concessionaire shall provide to the IFA a quarterly traffic characteristics report providing the following details in a format specified by the IFA: (i) traffic volume forecasts for each type of classification of vehicle for the next three months, (ii) current Level of Service for each mile of the Toll Road as well as projected changes in Levels of Service during the coming 12 months, (iii) traffic volume forecasts for the entire Reporting Year and (iv) actual traffic counts for each month in the preceding quarterly period. The Concessionaire shall provide such reports to the IFA within 20 Business Days following the end of each calendar quarter of each Reporting Year.

(b) *Incident Management, Notifications and Reports.* The Concessionaire shall promptly notify the IFA of all emergencies, and promptly notify the IFA of all accidents and incidents occurring on or at the Toll Road, and of all claims made by or against the Concessionaire, or potential claims that the Concessionaire reasonably expects to make against, or to be made against it by, third parties. In addition, the Concessionaire shall provide to the IFA a quarterly report of all such occurrences, including the following details in a format specified by the IFA: (i) type of incident (e.g., bodily injury, death or property damage) and summary of each such incident, (ii) classification of incident (e.g., road-related, barrier hit, right-of-way or other), (iii) number of incidents by type and classification, (iv) costs to correct incidents by type and classification, (v) claims made by the Concessionaire and revenue received by type and classification and (vi) claims made against the Concessionaire and losses incurred or losses claimed by type and classification. The Concessionaire shall provide such report to the IFA within 30 Business Days following the end of each calendar quarter of each Reporting Year.

3. Presidio Parkway

A self-monitoring Program in the Project

Presidio Parkway

1. GENERAL OBLIGATIONS

The goal of the Department is to ensure that the Project is managed, maintained and operated in a manner that is consistent with Best Management Practice. For the duration of the Term, Developer shall operate and maintain the Project within the O&M Limits.

Developer shall establish a self-monitoring program in order to ensure a safe and reliable roadway system with the main objective of maximizing public safety, reliability and roadway availability. Developer shall coordinate, plan, and perform the O&M Work required under the Contract Documents in a manner that will provide safe conditions for the operations and maintenance staff and the traveling public using the Project, while minimizing traffic disruptions.

The scope of the O&M Work to be completed by Developer shall include, but shall not be limited to, the following:

A. providing for the maintenance and operations of the Project within the O&M Limits for the duration of the Term;

B. providing for the Renewal Work for the Project; and

C. providing first responder incident/emergency response and emergency repair.

1.1.2.5.1.4. Quality System Specific Operations and Maintenance Requirements.

The Quality Plan shall set out Developer's self-monitoring process and shall be utilized to monitor the performance and quality of Developer's and Developer-Related Entities' Operation and Maintenance (O&M) Work, as well as to verify conformance to procedures, plans and accuracy of monitoring and reporting. The Quality Plan shall detail the quality assurance systems and procedures provided for validating the information accuracy and results in the O&M Monthly Reports, O&M Annual Reports and Renewal Work Reports. The O&M Quality Management System shall include at a minimum, procedures to validate the data, times, dates, other information and calculations that form the basis of the Availability Payment calculations, Construction Noncompliance Events, O&M Noncompliance Events, Closures, Construction Closures and Noncompliance Points.

The O&M Plan for all O&M Work for O&M During Construction and O&M After Construction shall include at the minimum the following:

A. overview description of all roadway assets, facilities, ITS systems, tunnel systems and equipment within the O&M Limits to be operated and maintained by Developer;

B. description of Developer's approach to inspection, Routine Maintenance, Planned Maintenance and other maintenance services;

C. a staff organization chart and staffing plan including all positions, qualifications, training and certification processes, work locations, and work hours, contact details required for the O&M Work;

D. details of contractors employed to undertake O&M Works;

E. Developer's self-monitoring processes, including a list of the procedures to be used for all activities associated with the Routine Maintenance, Planned Maintenance and other maintenance services, Renewal Work, ITS systems and tunnel systems, including monitoring, response to Emergency, and Incident Response requirements as detailed in Tables 4.1 and 4.2;

14.3.3. Functional Requirements

The fully operational ITS shall support the following functions:

A) efficient movement of traffic in and around the Project;

B) video based traffic monitoring and incident detection;

C) motorist alerts to incidents by means of Variable Message Signs (VMS), Changeable Message Signs (CMS), Extinguishable Message Signs (EMS), Traffic Signals, Public Address (PA), and an AM/FM radio override system;

D) monitoring and data collection of traffic conditions using vehicle sensors;

E) communications with emergency services such as fire, police and emergency medical services; and

F) communication with the Department [and other highway authorities] in respect of incident response.

4. I-495 HOT Lanes

In the Design-Build Contract 2.7 Safety Precautions, it requires the concessionaire to report construction-related safety only.

2.7 Safety Precautions.

2.7.1 General Requirements. Contractor recognizes the importance of performing the Work in a safe manner so as to prevent damage, injury or loss to: (i) all individuals at the Project Right of Way, whether working or visiting; (ii) the Work, including materials and equipment incorporated into the Work or stored on-Site or off-Site; and (iii) all other property at the Project Right of Way or adjacent thereto. Contractor assumes responsibility for implementing and monitoring all safety precautions and programs related to the performance of the Work. Contractor and Subcontractors shall comply with: (i) all Applicable Laws relating to safety; (ii) Contractor's Health, Safety and Security plan (the "HS&S Plan"); and (iii) any Concessionaire-specific safety requirements set forth in the Contract Documents, provided that such Concessionaire-specific requirements do not violate any Applicable Laws. Contractor will immediately report in writing any safety-related injury, loss, damage or accident arising from the Work to Concessionaire's Field Representative and, to the extent mandated by Applicable Laws, to all Governmental Authorities having jurisdiction over safety-related matters involving the Project or the Work. Contractor shall, prior to commencing construction, designate a Safety Representative with the necessary qualifications and experience to supervise the implementation and monitoring of all safety precautions and programs related to the Work. Unless otherwise required by the Contract Documents, Contractor's "Safety Representative" shall be an individual stationed at the Project Right of Way who may have responsibilities on the Project in addition to safety. The Safety Representative shall make routine daily inspections of the Project Right of Way and shall hold weekly safety meetings with Contractor's personnel, Subcontractors and others as applicable. Contractor shall provide minutes of each weekly safety meeting held by Contractor to Concessionaire within five (5) days of such meeting.

2.7.2 HS&S Plan. Contractor shall provide, for Concessionaire's Review, a HS&S Plan on or before the earlier of fifteen (15) days of the Commencement Date, or seven (7) days before Contractor intends to commence any construction-related activities at the Project Right of Way. Contractor shall not perform any construction related activity (including any activity that disturbs the Project Right of Way) until an acceptable HS&S Plan is in place.

2.7.3 No Relief. Contractor's responsibility for safety under this Section 2.7 is not intended in any way to relieve Subcontractors of their own contractual and legal obligations and responsibility for: (i) complying with all Applicable Laws, including those related to health and safety matters; and (ii) taking all necessary measures to implement and monitor all safety precautions and programs to guard against injury, losses, Damages or accidents resulting from their performance of the Work.

5. Elizabeth River Tunnel

Managing and Controlling Incident Data

E. The Concessionaire shall submit an Operations and Maintenance Quality Management Plan, which shall be incorporated into the Operations and Maintenance Plan, containing the following:

1. Internal processes for managing and controlling information identified through incident reports, noncompliance reports, and traffic reports to address quality improvement;

2. Methods for documenting and correcting noncompliance issues;

3. Proposed approach to auditing and demonstrating continuous improvement in meeting the operations and maintenance Performance Requirements;

4. Description of operations and maintenance quality assurance and quality control functions; and

5. Integration of quality process into Ordinary Maintenance, Major Maintenance and inspections.

Incident Response and Third Party Involvement

8.9 Policing, Security and Incident Response

8.9.1 Police Services

8.9.1.1 Developer, without expense to TxDOT, shall permit the Texas Department of Public Safety and any other public law enforcement agency with jurisdiction to provide traffic patrol, traffic law enforcement and the other police and public safety services in accordance with applicable Laws and agreements with State and local agencies, including permitting at least the type and level of service that the Texas Department of Public Safety provides on Comparable Limited Access Highways owned and operated by TxDOT. In addition, Developer, without expense to TxDOT, shall engage, on mutually acceptable reasonable terms and conditions, either the Texas Department of Public Safety or another qualified public law enforcement agency with jurisdiction to provide enhanced levels of traffic patrol, traffic law enforcement services, special traffic operations services, accident assistance and investigation, and other enhanced police and Emergency services as needed due to any Developer-Related Entity's construction, operation, maintenance or other activities on or affecting the Project.

8.9.1.2 Developer shall not engage, or otherwise permit the engagement of, private security services to provide traffic patrol or traffic law enforcement services on the Project unless otherwise approved by TxDOT in its sole discretion. Notwithstanding the foregoing, Developer may engage private security firms or employ passive security devices or technology to protect, collect, accumulate, transfer and deposit tolls and Incidental Charges or to identify toll violators; provided, however, that services to physically apprehend toll violators may be performed only by the Texas Department of Public Safety unless otherwise approved in writing by TxDOT in its sole discretion. In providing such policing services through a private security firm, Developer shall comply and cause the firm to comply with applicable Laws, including the regulations of the Texas Department of Public Safety. The foregoing does not in any way limit Developer's enforcement of private rights and civil remedies respecting toll violations.

6.2.7 **Emergency Repair Work**

6.2.7.1 Unless specified otherwise by FDOT, Concessionaire shall be responsible for procuring and overseeing temporary and/or permanent emergency repair work for the Project from and after issuance of NTP 2. If specified by FDOT, Concessionaire shall solicit competitive bids for such work in accordance with policies and procedures established by FDOT. FDOT shall provide Oversight relating to emergency repair work in accordance with the Contract Documents.

6.2.7.2 Concessionaire shall ensure that such repair work is performed in accordance with the Contract Documents and State and federal Laws applicable to such repair work, including the requirements of the FHWA Emergency Relief Manual as most recently published by the FHWA (http://www.fhwa.dot.gov/reports/erm/). Further, Concessionaire shall maintain estimates, cost records and supporting documentation in accordance with such Laws, and in a form and content to enable FDOT to seek reimbursement for eligible costs from FHWA or FEMA, if applicable.

When an incident/emergency causes damage to any element within the applicable O&M Limits, FDOT authorizes Concessionaire to pursue claims against any responsible third party for reimbursement of expenses incurred. Such authorization does not, and is not intended to, authorize Concessionaire to seek reimbursement directly from FHWA for emergency repair work. Further, such authorization does not, and is not intended to, authorize Concessionaire to

6.8 Policing, Security and Incident Response

6.8.1 **Police Services**

6.8.1.1 Concessionaire acknowledges that any Governmental Entity empowered to enforce all applicable Laws is free to enter the Project at any and all times to carry out its law enforcement duties. No provision of this Agreement is intended to surrender, waive or limit any police powers of any Governmental Entity, and all such police powers are expressly reserved.

6.8.1.2 FDOT and Concessionaire shall not have any liability or obligation to each other resulting from, arising out of or relating to the failure of a public law enforcement agency to provide services, or its negligence or misconduct in providing services.

6.8.2 **Security and Incident Response**

6.8.2.1 Concessionaire is responsible for the safety and security of the Project and the workers and public thereon during the performance of the Work as provided in the Contract Documents.

6.8.2.2 Concessionaire shall comply with all rules, directives and guidance of the U.S. Department of Homeland Security and comparable State agency and shall coordinate and cooperate with FDOT and all other Governmental Entities providing security, first responder and other public emergency response services in accordance with the Contract Documents. Concessionaire shall be entitled to Extra Work Costs, Delay Costs, compensation under Sections 10.2.1, 10.2.2 and 10.2.3, time extension under Section 10.1.5.15 and relief under Section 10.2.5, as applicable, in respect of a Relief Event described in clause (r) of the definition of Relief Event.

6.8.2.3 Concessionaire shall perform and comply with the provisions of the Technical Volumes concerning Emergencies, Incident Response, safety and security, including implementing all procedures, plans, protocols and requirements set forth in Section 4 of the Technical Requirements and the Emergency Management Plan.

6.8 Policing, Security and Incident Response

6.8.1 Police Services

6.8.1.1 Concessionaire acknowledges that any Governmental Entity empowered to enforce all applicable Laws is free to enter the Project at any and all times to carry out its law enforcement duties. No provision of this Agreement is intended to surrender, waive or limit any police powers of any Governmental Entity, and all such police powers are hereby expressly reserved.

6.8.1.2 FDOT and Concessionaire shall not have any liability or obligation to each other resulting from, arising out of or relating to the failure of a public law enforcement agency to provide services, or its negligence or misconduct in providing services.

6.8.2 Security and Incident Response

6.8.2.1 Except as expressly set forth herein, Concessionaire is responsible for the safety and security of the Project and the workers and public thereon during the performance of the Work.

6.8.2.2 Concessionaire shall comply with all rules, directives and guidance of the U.S. Department of Homeland Security and comparable State agency and shall coordinate and cooperate with FDOT and all other Governmental Entities providing security, first responder and other public emergency response services in accordance with the Contract Documents.

6.8.2.3 Concessionaire shall perform and comply with the provisions of the Technical Volumes concerning Emergencies, Incident Response, safety and security, including implementing all procedures, plans, protocols and requirements set forth in Section 4 of Division II.

9. Port of Miami Tunnel

6.8.2 Security and Incident Response

6.8.2.1 Concessionaire is responsible for the safety and security of the Project and the workers and public thereon during all the construction and operation phases.

6.8.2.2 Concessionaire shall comply with all rules, directives and guidance of the U.S. Department of Homeland Security and comparable State agency and FDOT shall do the same to the extent applicable to the Project, and shall coordinate and cooperate with all Governmental Entities providing security, first responder and other public emergency response services.

6.8.2.3 Concessionaire shall perform and comply with the provisions of the Technical Volumes concerning Incident response, safety and security.

6.8.2.4 Concessionaire shall implement all Incident response, safety and security procedures, protocols and requirements set forth in the O&M Plan.

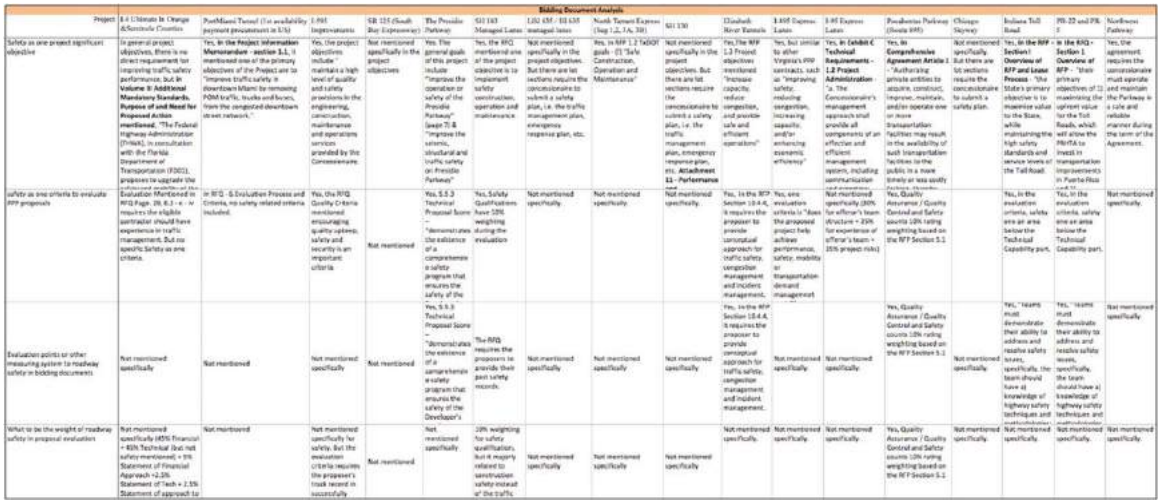
(b) Prior to commencement of the Construction Work, Concessionaire shall develop and submit for FDOT's approval an Emergency Response Plan. The Emergency Response Plan shall be coordinated with the Port and describe, among other things, the process by which Concessionaire will track weather reporting services for indications of upcoming Named Windstorms likely to affect the general locale of the Project. The Emergency Response Plan shall elaborate upon the pre-storm mitigation and demobilization measures the Concessionaire will take in advance of a predicted Named Windstorm. The Emergency Response Plan shall also describe the means by which Concessionaire will identify, track and document costs expended in the repair of tangible property damage arising out of an FDOT-Insured Force Majeure Event. Notwithstanding the existence of an FDOT-approved Emergency Response Plan, Concessionaire shall comply with all directives issued by the Port and other Governmental Entity to secure the Project due

to the occurrence or anticipated occurrence of a Force Majeure Event including, by way of example, closure of permanent or temporary storm doors to protect the Work, closure of tunnel access ramps, signage modifications and other measures as set forth in the approved Emergency Response Plan. Concessionaire shall be responsible for all costs of mitigation and demobilization as set forth in this Section 17.1.2.11, whether or not the anticipated event actually occurs, including the cost of compliance with related directives of the State or any other Governmental entity. Notwithstanding the foregoing, FDOT will provide Concessionaire with limited compensation during the period in which Construction Work is underway for "safe up" activities in accordance with FDOT's standard practice as described in the Technical Volumes.

Appendix E The Review Table of PPP Procurement Documents

This appendix contains the whole detailed review of contract documents of each PPP Project and the results are presented by Excel.

1. Bidding Document Analysis



Bidding Document Analysis																	
Project	I-4 Ultimate In Orange &Seminole Counties	PortMiami Tunnel (1st availability payment procurement in US)	I-595 Improvements	SR 125 (South Bay Expressway)	The Presidio Parkway	SH 130 Managed Lanes	LBJ 635 - SH 635 managed lanes	North Tarrant Express (Segs 1,2,3A, 3B)	SH 130	Elizabeth River Tunnels	I-495 Express Lanes	I-95 Express Lanes	Pocahontas Parkway (Route 895)	Chicago Skyway	Indiana Toll Road	PPA-22 and PPA-8	Northwest Parkway
Safety as one project significant objective	In general project objectives, there is no direct requirement for improving traffic safety performance, but in **Volume II Additional Mandatory Standards. Purpose of and Need for Proposed Action mentioned**, "The Federal Highway Administration (FHWA), in consultation with the Florida Department of Transportation (FDOT), proposes to upgrade the	**Yes, in the Project Information Memorandum - section 1.1,** it mentioned one of the primary objectives of the Project are to "improve traffic safety in downtown Miami by removing POM traffic, trucks and buses, from the congested downtown street network."	Yes, the project objectives include" maintain a high level of quality and safety provisions in the engineering, construction, maintenance and operations services provided by the Concessionaire.	Not mentioned specifically in the project objectives	Yes. The general goals of this project include "improve the operation or safety of the Presidio Parkway" (page 7) & "improve the seismic, structural and traffic safety on Presidio Parkway"	Yes, the RFQ mentioned one of the project objective is to implement safety construction, operation and maintenance	Not mentioned specifically in the project objectives. But there are let sections require the concessionaire to submit a safety plan, i.e. the traffic management plan, emergency response plan, etc.	Yes, in RFP 1.2 TxDOT goals - (1) "Safe Construction, Operation and Maintenance"	Not mentioned specifically in the project objectives. But there are let sections require the concessionaire to submit a safety plan, i.e. the traffic management plan, emergency response plan, etc. **Attachment 11 - Performance**	Yes,The RFP 1.2 Project objectives mentioned "Increase capacity, reduce congestion, improve safety, and/or enhancing economic efficiency"	Yes, but similar to other Virginia's PPP contracts, such as "improving safety, reducing congestion, increasing capacity, and/or enhancing economic efficiency"	Yes, **in Exhibit C Technical Requirements - 1.2 Project Administration** - "a. The Concessionaire's management approach shall provide all components of an effective and efficient management system, including communication	Yes, **in Comprehensive Agreement Article 1** - "Authorizing private entities to acquire, construct, improve, maintain, and/or operate one or more transportation facilities may result in the availability of such transportation facilities to the public in a more timely or less costly	Not mentioned specifically. But there are let sections require the concessionaire to submit a safety plan.	Yes, **in the RFP - Section I Overview of RFP and Lease Process** - "the State's primary objective is to maximize value to the State, while maintaining the high safety standards and service levels of the Toll Road.	**In the RFQ - Section 1 Overview of RFP** - "their primary objectives of 1) maximizing the upfront value for the Toll Roads, which will allow the PPHTA to invest in transportation improvements in Puerto Rico	Yes, the agreement requires the concessionaire must operate and maintain the Parkway in a safe and reliable manner during the term of the Agreement.
safety as one criteria to evaluate RFP proposals	Evaluation Mentioned in RFQ Page. 28, 6.1 - v - iv requires the eligible contractor should have experience in traffic management. But no specific Safety as one criteria.	In RFQ - 6.Evaluation Process and Criteria, no safety related criteria included.	Yes, the RFQ Quality Criteria mentioned encouraging quality upkeep, safety and security is an important criteria	Not mentioned	Yes, 5.5.3 Technical Proposal Score – "demonstrates the existence of a comprehensive safety program that ensures the safety of the	Yes, Safety Qualifications have 10% weighting during the evaluation	Not mentioned specifically	Not mentioned specifically	Not mentioned specifically.	Yes, in the RFP Section 18.4.4, it requires the proposer to provide conceptual approach for traffic safety, congestion management and incident management.	Yes, one evaluation criteria is "does the proposed project help achieve performance, safety, mobility or transportation demand management	Not mentioned specifically (30% for offeror's team structure + 25% for experience of offeror's team + 15% project risks)	Yes, Quality Assurance / Quality Control and Safety counts 10% rating weighting based on the RFP Section 5.1		Yes, in the evaluation criteria, safety are an area below the Technical Capability part.	Yes, in the evaluation criteria, safety one an area below the Technical Capability part.	Not mentioned specifically.
Evaluation points or other measuring system to roadway safety in bidding documents	Not mentioned specifically	Not mentioned	Not mentioned specifically	Not mentioned	Yes, 5.5.3 Technical Proposal Score – "demonstrates the existence of a comprehensive safety program that ensures the safety of the Developer's	The RFQ requires the proposers to provide their past safety records.	Not mentioned specifically	Not mentioned specifically	Not mentioned specifically	Yes, in the RFP Section 18.4.4, it requires the proposer to provide conceptual approach for traffic safety, congestion management and incident management.	Not mentioned specifically	Not mentioned specifically	Yes, Quality Assurance / Quality Control and Safety counts 10% rating weighting based on the RFP Section 5.1	Not mentioned specifically	Yes, "teams must demonstrate their ability to address and resolve safety issues, specifically, the team should have a) knowledge of highway safety techniques and	Yes, "teams must demonstrate their ability to address and resolve safety issues, specifically, the team should have a) knowledge of highway safety techniques and	Not mentioned specifically
What to be the weight of roadway safety in proposal evaluation	Not mentioned specifically (45% financial + 45% Technical (but not safety mentioned) + 5% Statement of Financial Approach +2.5% Statement of "Tech + 2.5% Statement of approach to	Not mentioned	Not mentioned specifically for safety. But the evaluation criteria requires the proposer's track record in successfully	Not mentioned	Not mentioned specifically	10% weighting for safety qualification, but it majorly related to construction safety instead of the traffic	Not mentioned specifically	Not mentioned specifically	Not mentioned specifically	Not mentioned specifically.	Not mentioned specifically	Not mentioned specifically	Yes, Quality Assurance / Quality Control and Safety counts 10% rating weighting based on the RFP Section 5.1	Not mentioned specifically	Not mentioned specifically	Not mentioned specifically	Not mentioned specifically

2. Contract Document – Part I Design & Operation

Contract Document - Part I Design & Operation																	
	I-4 Ultimate In Orange &Seminole Counties	PortMiami Tunnel (1st availability payment procurement in US)	I-595 Improvements	SR 125 (South Bay Expressway)	The Presidio Parkway	SH 130 Managed Lanes	LBJ 635 - SH 635 managed lanes	North Tarrant Express (Segs 1,2, 3A, 3B)	SH 130	Elizabeth River Tunnels	I-495 Express Lanes	I-95 Express Lanes	Pocahontas Parkway (Route 895)	Chicago Skyway	Indiana Toll Road	PPA-22 and PPA-8	Northwest Parkway
Containing Special structural design or extra roadway elements to improve roadway safety	This Technical Requirement includes specific requirements for D&OM but there is no terms with regards to improve traffic safety performance particularly.	Yes, In section two of the RFP - Actual project description is mentioned "The specifications will mandate such terms as minimum maintenance, health, safety, environmental and security levels, e.g. defined levels for lighting and air quality in the tunnels, sufficient surface friction and acceptable tracking depth, integration with POM security, safety equipment in place and established evacuation plans. In addition, the Concessionaire will also be obliged to regularly inspect the O&M Segments and to report to FDOT all conditions that have or can have relevance for road availability and safety. FDOT and the HOM must also be apprised of traffic conditions, safety and security issues on an integrated, real-time basis.	Yes, generally, it mentioned in RFP that a custom design shall meet or exceed all of the operational, aesthetic, safety, and access for all maintenance personnel requirements provided by the standard signature parties. **In the Design Element, the rolling site location should support safe access of maintenance vehicles and personnel**	Not mentioned specifically	The Presidio Parkway Concession Agreement Article 8 Mandatory technology enhancements and safety compliance requires general safety standards but not extra or special requirements mentioned.	**Traditional - Developer** shall design, construct, operate and maintain the project, in conformance with the requirements stated in this section 18, to provide for the safe and efficient movement of people, goods, and services, through and around the project, while minimizing negative impacts to users, residents, and businesses."	Yes, Technical Provision requires "The geotechnical instrumentation program shall monitor the safety and adequacy of the design and construction approach, and shall permit appropriate modifications or remedial action if necessary"	Not mentioned specifically	**In Technical requirement - 11 Roadway Design** All roadside safety devices such as metal beam guard fence, concrete traffic rail, bridge rails, sign supports, light poles, and crash cushions shall at a minimum meet Test Level 3 (TL-3) crash test criteria of the National Cooperative Highway Research Program (NCHRP) report on evaluating the safety performance of highway features entitled NCHRP	No **traditionally,** it requires the minimum factors of safety; i.e. soil cut or fill slopes.	Not mentioned specifically	Yes, the technical requirement mentioned a reliability assessment shall be made for safety purpose, i.e. evaluating the slope design. Furthermore, an operational analysis shall demonstrate the concessionaire's revised design does not have a significant adverse impact on the safety and operation of the existing facility based on an analysis of current and future traffic.	Not mentioned specifically	Toll Plaza Crash/Impact Attenuators Systems are required to install, repair and replace.	one of the objectives is to accelerate completion of important capital improvement works (known as the Accelerated Safety Upgrades"), to improve the performance and safety conditions.	Not mentioned specifically
Containing Extra or special operational requirements to improve roadway safety	In Volume 2 Technical Requirement, Section 4 – Operations and Maintenance Requirements, 3.3 Traffic Operations, it mentioned, "FDOT will be responsible for monitoring safety and operations issues on the project. Concessionaire shall conduct awareness meetings with traffic operations staff every 3 months to review any safety or operations issues on the project. FDOT will conduct traffic safety studies, review crash data annually and identify crash patterns. Concessionaire should coordinate with FDOT and also shall request approval from FDOT for revisions and modifications to speed limits." (Page 351)	Yes, it mentioned in Volume 2 "The Concessionaire shall furnish safety equipment, test equipment, safety apparel and instructions for the Work and shall enforce the use of such equipment and instructions by its employees and the employees of any of its Contractors for all Work conducted on Site." - **Concessionaire shall provide sufficient levels of properly trained personnel, on site and off site facilities, storage areas, garages, fleet vehicles, computer hardware and software, tools, Customer Relations Unit, and other items as required to operate and maintain safe, reliable roadways and facilities with the main objectives to maximize public safety, reliability and roadway availability**	No, in the technical provision, it mentioned the general and traditional requirements for achieving safety purpose, but no extra or special requirements for roadway safety improvement.	Not mentioned specifically	Yes, Technical proposal Executive Summary "An overview of Proposer's approach to operating and maintaining the project to the highest standards of safety and service quality in accordance with the requirements of the Agreement and including provision for renewals, replacements and eventual hand back." - **Technical Requirement 3.4 O&M**	Yes, i.e. the Technical Provisions inlude safety management plan to require concessionaire providing a fulltime on-the-job D&C and O&M safety manager. But all terms is in terms of general safety instead of roadway safety specifically.	Yes, the technical Provision requires "the Developer shall appoint a traffic safety officer and one or more deputies to make all arrangements necessary for safety and traffic control including the provision and operation of recovery vehicles 'for breakdowns'." a **Highway Condition report system "The Developer is required to report highway and weather conditions every workday morning by 6:00 a.m. and update the information as needed to TxDOT and include this**	Not mentioned specifically	Safety Committee holds quarterly meeting to review safety history, and devise and implement new safety improvement measures.	Yes, the Technical Requirements mentioned a comprehensive safety inspection needs to be conducted before open to the public in **Technical Requirement, 1.18.19 Traffic Monitoring Sensors should be installed**	Not mentioned specifically	Yes,it requires an analysis of vehicular accident patterns to identify safety issues	Not mentioned specifically	Yes, the technical Provision requires "the Developer shall appoint a traffic safety officer and one or more deputies to make all arrangements necessary for safety and traffic control including the provision and operation of recovery vehicles 'for breakdowns'."	Yes, in the Operation Requirements, it asked the contractor to submit annual safety plan. Also during the winter storm, it requires concessionaire's priority shall be snow removal and ice control in order to keep project traffic safety. **-The If A or its designee will periodically monitor and measure the pavement surface for the tire friction capabilities of the pavement**	In the Concession agreement, schedule 13, accelerated safety upgrades, it requires "removal and replace ment of existing signage"	Yes, the agreement 3.6 Inspection Requirements mentioned "the concessionaire shall implement a program of inspection of the Parkway that provides for the safety of all users, staff, and contractors." Additionally, it designed a very detailed operation standards contract and require the concessionaire to follow this contract carefully.
Containing request of installation of any devices to collect roadway safety data	CCTV is required but not mentioned for roadway safety data collection	"The Concessionaire will be responsible for installation of required safety equipment in addition to incorporating emergency provisions as will be defined in the RFP into the final design."	Not mentioned specifically.	Not mentioned specifically	Not mentioned specifically.	Yes, CCTV is required to collect incidents	Yes, CCTV is required to collect incidents	Not mentioned specifically	Not mentioned specifically	Yes, in Technical Requirement, 1.18.19 Traffic Monitoring Sensors should be installed	CCTV is required but not mentioned for roadway safety data collection	Yes, in Technical Requirement, 8.4.2 Data collection, it mentioned traffic data should be stored by concessionaire	Not mentioned specifically	Yes, CCTV is required to collect incidents	It requires toll collection consent to record traffic counting but no safety data directly required.	Not mentioned specifically	Not mentioned specifically

3. Contract Document – Part II Safety Incentives and Payments

Contract Document - Part II Safety Incentives and Payments

	I-4 Ultimate In Orange &Seminole Counties	PortMiami Tunnel (1st availability payment procurement in US)	I-595 Improvements	SR 125 (South Bay Expressway)	The Presidio Parkway	SH 183 Managed Lanes	LBJ 635 / IH 635 managed lanes	North Tarrant Express (Seg 1,2, 3A, 3B)	SH 130	Elizabeth River Tunnels	I-495 Express Lanes	I-95 Express Lanes	Pocahontas Parkway (Route 895)	Chicago Skyway	Indiana Toll Road	PR-22 and PR-5	Northwest Parkway
Containing Incentive payments to improve safety	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned
Containing Safety payment	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned	Not Mentioned
Including traditional section for general roadway safety precaution - that potentially related to compensations or deductions for safety issues	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, this contract includes the health and safety section and other safety plan. Also, remedies for Failure to Meet Safety Standards are included	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards	Yes, the contract includes Safety Compliance plan, the emergency management plan, and Remedies for Failure to Meet Safety Standards
Have the contract documents provided historical safety records/data of the project or the locality of the project?	Yes, in Volume III Additional Mandatory Standards, Section 1.3.7 Safety, it mentioned crash data were used to identify the dangerous areas. But it traditionally provided by FDOT, and there is no specific terms requiring project company to collect safety data.	Yes, the contract uses AADT to establish a revised traffic operational analysis evaluation. But it is majorly used for the congestion management not specifically mentioned for improving traffic safety.	Not Mentioned	Not Mentioned	Not Mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned

4. Contract Document – Part III Safety Incidents and Accidents

Contract Document - Part III Safety Incidents and Accidents

I-4 Ultimate In Orange PortMiami Tunnel (1st availability I-595 SR 125 (South The Presidio SH 183 LBJ 635 / IH 635 North Tarrant Express Elizabeth River I-495 Express Pocahontas Parkway Chicago Indiana Toll PR-22 and PR- Northwest
SH 130 I-95 Express Lanes
&Seminole Counties payment procurement in US) Improvements Bay Expressway) Parkway Managed Lanes managed lanes (Seg 1,2, 3A, 3B) Tunnels Lanes (Route 895) Skyway Road 5 Parkway

Did the contract documents require In Volume III Additional Not mentioned Not mentioned Not mentioned yes, Technical Not mentioned Yes, in 17.2.3 it The contract requires Yes, the Not mentioned Not mentioned Yes, 4.4.2 Data
Not mentioned The contract Yes, the Not mentioned Not mentioned the project company to collect Mandatory Standards, Provision mentioned the CCTV the concessionaire to documents Collection requires requires the documents (record and keep)
roadway safety Section 1.3.7 Safety, it Section 4 should be provided estable Intelligent require the "a process of data concessionaire require the
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traditionally provided by a self- regional data and and video minimum, traffic systesm the toll FDOT, and there is no monitoring video communications
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requiring to not specific the main Entities. the agreement. record safety data objective of roadway safety required to be maximizing data. collected public safety,
reliability and roadway
availability

Did the contract documents require Incident Management Incident Management Plan 22.1 requires the Not mentioned Incident Incident Yes, similar to above Incident Management Incident Incident Incident The collected data Incident Incident The collected Incident Incident the project company to report Plan required the required the concessionaire to concessionaire Management Management Plan required the Management Management Management minimum Management Plan Management data minimum Management Management roadway safety data concessionaire to report report the incident immediately. should keep the Plan required Plan required concessionaire to Plan required the Plan required Plan required requirement required the Plan required requirement Plan required Plan required
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should report shall promptly incident/injurie incident operating performance. incident monitoring highway through report in incidents to notify the IFA of s. immediately. immediately.
program in agency. incident writing any highway all emergencies, order to reports, safety-related agency. and promptly ensure a safe noncompliance injury, loss, notify the IFA of and reliable
reports, and damage or all accidents roadway traffic reports accident arising and incidents system with to address from the occurring on or the main quality Work". But not at the Toll objective of
improvement. specifical road."
maximizing requirement on public safety, roadway safety. reliability and roadway
availability

Did the contract documents No, the contract requires Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned Not mentioned
Not mentioned Not mentioned provide for independent agency or concessinoaire to provide 24/7 third party to record and report Not mentioned monitoring of the incident areas roadway safety incidents/accidents?

Did the contract documents require Yes, in Volume I Yes, in concession page.21 it Yes, 6.8.2.2 Yes, the Yes, the Yes, mentioend Yes, the Yes, the Yes, mentioend in Yes, the Yes, in Yes, the Yes, the incident Yes, the Yes, the Yes, the Yes, the
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shall perform and comply Team with required special all rules, their emergency their Incident emergency emergency Incident section 9.03 "the their emergency concessionaire to section 9.03 requires the requires the their with the provisions of the equipment". directives and management emergency Management management plan management plan Management requires "the management management plan manage the incident requires "the concessionaire concessionaire emergency Technical Volumes guidance of the plan and traffic management and traffic control and traffic control management and control of and traffic control immediately. management to manage the to manage the management concerning Emergencies, US department control plan to plan and traffic plan to consider plan to consider and control of traffic on the plan to consider and control of incident incident plan and traffic Incident Response, safety of Homeland consider incident control plan to incident responses. incident responses. traffic on the HOT lanes, incident traffic on the immediately. immediately. control plan to and security. Security and responses. consider Project Asset, including but responses. Project Asset, consider comparable State incident including, but not limited to, including, but incident agency and shall responses. not limited to, incident not limited to, responses.
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governmental closures of the entities providing HOT lanes. security, first
responder and other public emergency response services in accordance with
the Contract Document.

Did the contract documents require Yes, In Section 4 of the Not for all maintenance Yes, in Yes, the incident Yes, the Yes, the Yes, the emergency Not mentioned Not mentioned Yes, the Yes, the Yes, the Yes, the emergency Yes, the Yes, the Yes, the Yes, the the PPP project company to carry Technical Requirements responsibility. Emergency Concession 6.2.7 and emergency emergency incident and response plan emergency emergency emergency management plan emergency emergency emergency emergency out roadway emergency and the Emergency response procedure will be Emergency management response plan emergency section requires the management management management plan and the incident response plan management management management maintenance after accidents management plan, it developed by the parties in Repair Work. section requires section management concessionaire to plan and the plan and the and the incident response plan. section plan and the plan and the plan and the requires project company conjunction with the government. the requires the section requires develop procedures incident incident response plan. requires
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responses.

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entitled to Extra Work estimates, cost charge incident concessionaire requires the to charge to charge fee but the charges and fees Costs, Delay Costs and records and fee but the
shall maintain concessionaire incident fee incident fee but amount of any incident"
compensation related to supporting amount of any estimates, cost shall pay for but the the amount of such other emergency management. - documentation such other records and emergency amount of any any such other incidental fees and -When an in accordance incidental fees supporting responses. such other incidental fees charges will not incident/emergency with such Laws and charges will documentation incidental fees and charges exceed the causes damage to any and in a form not exceed the in accordance and charges will not exceed amount element within the and content to amount with such Laws will not exceed the amount reasonably applicable O&M Limits, enable FODT to reasonably and in a form the amount reasonably necessary for the FDOT authorizes seek necessary for the and content to reasonably necessary for Concessionaire to Concessionaire to pursue reimbursement Concessionaire to enable FODT necessary for the revocer its claims against any for eligible costs revocer its to seek the Concessionaire reasonable out-ofresponsible third party for from FHWA or reasonable out-of-reimbursemen Concessionaire to revocer its pocket and reimbursement of FEMA. pocket and t for eligible to revocer its reasonable out- documented costs expenses incurred. documented costs from reasonable out- of-pocket and and expenses...
costs and FHWA or of-pocket and documented
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