GEORGIA DOT RESEARCH PROJECT RP 1301

FINAL REPORT

Innovative Project Delivery Using Alternative Financing Mechanisms: Assessment of Benefits, Costs, and Risks

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Final Report

INNOVATIVE PROJECT DELIVERY USING ALTERNATIVE FINANCING MECHANISMS: ASSESSMENT OF BENEFITS, COSTS, AND RISKS

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The U.S. Department of Transportation (U.S. DOT) and state DOTs across the nation seek private investments to leverage their shrinking financial resources and fulfill their growing funding shortfalls. Involvement of the private sector in financing highway projects is subject to various limitations and challenges that affect state DOTs' project planning and development, and limit the expansion of private financing for highway projects. Private sector involvement in highway financing across the U.S. is subject to various limitations. State DOTs face different kinds of financial, political, legal, management, and organizational issues affecting their ability to attract private investments in highway projects. The main purpose of this project is to enhance the understanding of GDOT regarding the complexity of incorporating financing into the innovative project delivery process. Particularly, the objective of this study is to capture the underpinnings of private financing in highway projects in the following areas: (1) The latest developments and trends in utilizing innovative financing mechanisms for highway projects; (2) main objectives and major concerns of state DOTs in the decision-making processes; (3) deal-breaker issues and major concerns of private sector participants; and (4) recommended best practices to enhance adoption of private financing for highway projects. A comprehensive review of academic and professional literature was conducted in order to analyze and document the latest developments and trends in utilizing private financing for highway projects. In order to document the current state of private financing for highway projects a survey was conducted from state DOTs. Following the nationwide survey of state DOTs' practices for incorporating private financing in highway projects, this study identified a list of deal-breaker issues and major challenges that hinder private sector involvement in financing highway projects through conducting interviews with the industry experts in private financing.</td></tr>
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LIST OF ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
AP	Availability Payment
ATC	Alternative Technical Concepts
CDOT	Colorado Department of Transportation
BF	Build-Finance
DBF	Design-Build-Finance
DBFOM	Design-Build-Finance-Operate-Maintain
DBIA	Design-Build Institute of America
DOT	Department of Transportation
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
GDOT	Georgia Department of Transportation
ISTEA	Intermodal Surface Transportation Efficiency Act
ITP	Instructions to Proposers
ITS	Intelligent Transportation System
LOI	Letters of Interest
LOS	Level of Service
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
P3	Public-Private Partnership
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
RFP	Request for Proposals
RFQ	Request for Qualifications
ROW	Right-of-Way
SAFETEALU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SEP	Special Experimental Project
SOQ	Statement of Qualifications
STIP	Statewide Transportation Improvement Program
TEA	Transportation Equity Act
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIP	Transportation Improvement Program
TxDOT	Texas Department of Transportation
VDOT	Virginia Department of Transportation
VfM	Value for Money

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EXECUTIVE SUMMARY

Overview

The U.S. Department of Transportation (U.S. DOT) and state DOTs across the nation seek private investments to leverage their shrinking financial resources and fulfill their growing funding shortfalls. Involvement of the private sector in financing highway projects is subject to various limitations and challenges that affect state DOTs' project planning and development, and limit the expansion of private financing for highway projects. The decision to involve the private sector in financing highway projects varies from state to state in several aspects. State DOTs pursue different objectives when they utilize private financing for highway projects. Private sector involvement in highway financing across the U.S. is subject to various limitations. State DOTs face different kinds of financial, political, legal, management, and organizational issues affecting their ability to attract private investments in highway projects. Various strategies have been utilized by state DOTs to facilitate adoption of private financing in their highway projects. In addition, the industry has faced several challenges in effectively playing a positive role in private financing market. It is equally useful to study the experience of the private sector in the highway financing market and capture its ideas for improving the current state of practices in private financing.

Study Purpose

The main purpose of this project is to enhance the understanding of GDOT regarding the complexity of incorporating financing into the innovative project delivery process. Particularly, the objective of this study is to capture the underpinnings of private financing in highway projects in the following areas: (1) The latest developments and trends in utilizing innovative financing mechanisms for highway projects; (2) main objectives and major concerns of state DOTs in the decision-making processes; (3) deal-breaker issues and major concerns of private sector participants; and (4) recommended best practices to enhance adoption of private financing for highway projects.

Brief Statement of Primary Findings

State of Practice of Private Sector Involvement in Financing Highway Projects across the U.S.

A comprehensive review of academic and professional literature was conducted in order to analyze and document the latest developments and trends in utilizing private financing for highway projects. Alternative funding sources and innovative financing mechanisms for surface transportation were identified and described in details. A scanning process was conducted on state DOTs' websites regarding documented state of practice, manuals, and guidelines related to the use of private financing in highway projects. In addition to performing a broad scanning exercise on several state DOTs, detailed follow-up interviews were conducted with Florida, Texas, and Virginia DOTs to understand their specific solutions to handle private financing issues. It is found that there are significant efforts around the country to enhance the adoption of private financing for highway projects.

Survey of State DOTs' Decision-Making for Involving Private Sector in Financing Highway Projects

In order to document the current state of private financing for highway projects, a survey was conducted with state DOTs. The results of the survey indicate that only some state DOTs have established mature private financing programs and private financing will remain a viable alternative for highway project development in these State DOTs. It was found out that state DOTs typically think of private financing more as an instrument to bridge their funding gaps and financing shortfalls and less as an innovative solution to gain life cycle cost efficiencies, encourage competition, and transfer critical project risks to the private sector. Table 1 presents the list of main objectives and Table 2 presents the list of major concerns with respect to decision-making for private financing based on their order of importance as indicated by the survey respondents.

Table 1. Main Objectives of State DOTs for Utilizing Private Financing in Development of Highway Projects (in order of importance)

Main Objectives of State DOTs for Utilizing Private Financing in Development of Highway Projects
Develop projects that otherwise would be delayed
Enable the agency to expedite the award of the contract to avoid future cost escalation
Enable the agency to start project procurement despite funding shortfalls for the project
Incentivize project teams to accelerate the completion of projects
Enhance agency's ability to overcome cash flow constraints
Encourage project teams to develop high-quality projects to ensure timely compensation
Provide opportunity for the agency to defer payment
Decrease project life cycle costs as a result of competitive proposed finance plans
Enhance the agency's image by accelerated opening of the project to the public through efficient use of private financial resources
Maximize the use of available funding through private financing (financing the gap in project costs)
Motivate project teams to propose innovative design & construction solutions to save on financing charges
Leverage available funding (to deliver more projects) with capability of private sector financing
Award the contract early to utilize available federal and state funding
Obtain finance services beyond in-house capabilities/expertise
Incentivize contractor to reduce project cost in spite of financing charges
Transfer interest rate risk (or other financing risks) to the private sector
Encourage price competition through accepting alternative cash flows from project teams
Enhance the capacity of agency financing without hitting the agency's debt ceiling
Reduce financing charges due to availability of deferred payment mechanism
Accelerate start of the project revenue (when road-pricing is used)
Raise financing for construction of emergency projects

Table 2. Major Concerns of State DOTs for Utilizing Private Financing in Development of Highway Projects (in order of importance)

Major Concerns of State DOTs for Utilizing Private Financing in Development of Highway Projects
Statutory and legislative constraints for incorporating financing in public procurement
Higher financing costs compared to conventional financing mechanisms
Time-consuming and complex procurement processes for proposal evaluation
High risk premiums and inflated bids as a result of private sector's involvement in project financing
Public concerns and political opposition about including private sector financing in project delivery
Difficulty in defining a proper approach for evaluating proposed finance plans
Difficulty in establishing an easy-to-understand approach for financial evaluation of proposed finance plans
Difficulty in establishing transparent and systematic procurement processes
Significant proposal development costs for the industry
Concerns about potential excessive rates of return to private investors
Lack of adequate interest in the transportation industry to engage in financing projects
Inability of the agency to ensure that funds for partial payment shown in cash availability schedule are prioritized ahead of funding in its tentative program
Challenge in getting early commitment to project price in volatile market conditions
Creation of any improper financial obligation or legal right for the agency
Difficulty in estimating project cost and establishing an appropriate lump sum contract
Inability of the agency to include partial payments for the project in the legislative budget request prepared annually for the state legislature and the governor
Limited potential for receiving price-competitive proposals due to lack of adequate qualified contractors with financing capacity
Limited technical skills for evaluating proposed finance plans
Increased chance of litigation due to deferred payment mechanism
Lack of leadership support to incorporate financing in project delivery services
Difficulty in qualifications evaluation and short-listing most qualified project teams
Unavailability of private financing in squeezed credit market

Stringent organizational policies and inefficient project development processes were found to be among the major concerns of state DOTs in effective utilization of private financing. Statutory limitations and inefficient frameworks for project financing and procurement method in the public sector were recognized as major barriers for private sector involvement in financing highway projects. Table 3 presents the list of the most critical barriers to adoption of private financing ranked in order of importance based on the responses provided by survey participants.

Table 3. Barriers to Adoption of Private Financing for Highway Projects (in order of importance)

Barriers to Adoption of Private Financing for Highway Projects
Legislative and statutory limitations
Inadequate leadership support and commitment
Procurement constraints and complexities in contract management
Fiscal restraints of governments
Turbulent market conditions
Complexities in Project Financing
Inefficient coordination and communication between the agency and other local, state, and federal government entities
Bankruptcy of project financiers
Inefficient risk allocation
Inefficient coordination and communication between the public and private sectors
Inadequate federal government support
Negative public perceptions and local public opposition
Regulatory uncertainty
Tenure and stability of elected officials
Lack of best practices and available training
Difficulty in preparing project cost and life-cycle cost estimates
Inefficient organizational frameworks
Desire not to try new procurement methods
Poor prospects for economic growth
Labor relation issues

With respect to improvement areas, legislative flexibility for engaging private financing and commitment of key project stakeholders and top state officials were identified as critical factors that significantly enhance the adoption of private financing in highway project development. Table 4 presents the list of these improvement areas in order of importance based on the responses provided by survey participants.

Table 4. Improvement Areas that Can Enhance the Adoption of Private Financing for Highway Projects (in order of importance)

Improvement Areas that Can Enhance the Adoption of Private Financing for Highway Projects
Enhanced partnering between public and private sectors
Leadership commitment and support from political authorities
Proper allocation of project financing risks
Legislative flexibility to allow innovative project financing
Industry outreach and training
Proper use of financial service advisors
Effective project organization structure
Enhanced public awareness regarding transportation investment needs
Efficient negotiation procedures
Performance-based payment schedule
Flexible procurement processes
Rigorous financial risk assessment
Early involvement of project financiers
Standard and customizable contracts to properly describe project financing services
State-of-the-art financial analysis tools

Deal-Breaker Issues, Major Challenges, and Recommended Best Practices Regarding Private Sector Involvement in Financing Highway Projects

Following the nationwide survey of state DOTs' practices for incorporating private financing in highway projects, this study identified a list of deal-breaker issues and major challenges that hinder private sector involvement in financing highway projects through conducting interviews with the industry experts in private financing. Table 5 presents the list of deal-breaker issues and Table 6 presents major challenges that are of great concern for the industry for incorporating financing into project delivery.

Table 5. Deal-Breaker Issues for Incorporating Financing into Project Delivery

Deal-Breaker Issues	
1. Legislative Issues	➢ Lack of alternative payment authorization under the state legislative framework
2. Agency-Related Issues	➢ Lack of political stability ➢ Lack of consistency in decision-making ➢ Lack of a programmatic approach in the state DOTs to incorporate private financing as a strategic means to develop projects (i.e., treating private financing as a one-time deal)
3. Issues Related to Project Readiness	➢ Lack of determination in the state DOTs to build the project in a specific timetable ➢ Major NEPA, ROW, and other critical permitting risks that must be resolved prior to soliciting bids
4. Project Cancelation	➢ Devastating consequences of project cancelation on the continuity of private sector involvement in private financing business with the state DOT
5. Creditworthy Counterparty and Payment Security	➢ Inadequacy in public sector creditworthiness that can risk payment security for the private sector
6. Opportunities to Introduce Innovation	➢ Limited opportunities in offering innovative design and construction solutions ➢ Limited opportunities to differentiate the firm's proposal in DBF projects compared to DBFOM projects (i.e., relatively wider competition field in DBF projects compared to DBFOM projects)
7. Short-Listing Process and Odds of Winning	➢ Low odds of winning

Table 6. Major Challenges for Incorporating Financing into Project Delivery

Major Challenges	
1. Legislative Challenges	➢ A wide range of variations in the state enabling legislations for private financing ➢ Inability of private sector to be involved in the predevelopment phases of transportation projects
2. Agency-Related Challenges	➢ Long lead times in decision-making ➢ Failure of delegating decision-making authority to the responsible parties ➢ Lack of clarity and transparency in procurement processes
3. Transaction Costs for DBF and DBFOM Projects	➢ High transaction costs for DBF and DBFOM projects ➢ Issues related to the recoverability of transaction costs for relatively small DBF projects comparted to that for large DBFOM projects
4. Balance Sheet and Surety-Contractor Relationship	➢ Adverse effect of private financing (using either the firm's own equity or the lender's financial resources) on the firm's balance sheet and its ability to secure performance bonds
5. Timing and Conditionality of Payment	➢ Lack of fixed and unconditional payment schedules for the deferred payment component
6. Risk of Significant Change in the Interest Rate	➢ Lack of government support with respect to significant change in the interest rate (market rate) that has negative impacts on the private sector's financing capabilities
7. Differences between DBF and DBFOM project delivery systems in treating Operations & Maintenance and Life Cycle Cost issues	➢ Lack of incentive clauses in DBF contracts that encourage contractors for considering life cycle cost efficiency in the project
8. Differences in Return on Investment of DBF and DBFOM projects	➢ Relatively higher targets for return on investment (ROI) in DBFOM projects compared to ROI targets in DBF projects

A set of recommended best practices for enhancing private sector involvement in financing highway projects was identified through conducting interviews with the industry experts in private financing. Table 7 presents the list of recommended best practices for the development of design-build-finance projects retrieved from the industry participants.

Table 7. Recommended Best Practices for the Development of Design-Build-Finance Projects

Recommended Best Practices	
1. Program Organization	➢ Establishing a dedicated group or program for projects that involve private financing with adequate organizational resources ➢ Delegating authority to the dedicated private financing program
2. Transportation Project Planning and Programming	➢ Incorporating alternative funding sources and innovative financing mechanisms consideration in the development of the TIP and the STIP ➢ Utilizing private sector expertise in project planning and NEPA studies ➢ Educating policy decision-makers, legislatures, and other stakeholders about private financing ➢ Using appropriate consultants (legal, financial, and technical) with specific expertise in private financing
3. Development of Project Portfolios	➢ Bundling smaller projects to reduce the transaction costs and make private financing a more attractive alternative for the portfolio of the projects
4. Procurement Process	➢ Shortlisting a maximum of 3 teams to incentivize qualified developers to bid for the project and minimize transition costs ➢ Providing comprehensive debriefing for unsuccessful teams in both shortlisting and final proposal phases ➢ Paying appropriate stipends to unsuccessful shortlisted teams ➢ Utilizing performance criteria for evaluating design solutions and allowing for ATCs ➢ Avoiding over usage of technical or qualification pass/fail criteria in proposal evaluation ➢ Focusing more on evaluation of proposed innovative design solutions and less on past experience of the project team members
5. Accounts Receivable Purchase Agreements or Factoring Construction Invoices	➢ Utilizing factoring design and construction invoices as a solution to enhance the flexibility of the project team's balance sheet ➢ Not binding the schedule of payments and the repayment of certified accounts receivables to the final completion of the project (i.e., fixed schedule of repayment) ➢ Creating deferred payment certificates that are not subject to set-off or recourse against the contractor

Table 7 (Continued).

6. Asset-Based Financing and Securitization through Conduit Bond Issuers	➢ Using conduit bond issuing entities, such as counties, cities, or other local entities, to issue Private Activity Bonds (PABs) for project financing ➢ Executing contracts directly with state DOTs with repayment obligations subject to appropriation
7. Escrow Accounts	➢ Establishing an escrow account, controlled by lenders to indirectly repay the lenders and financiers
8. Customary Interest Rate Protection	➢ Protecting the project development team from significant changes in customary interest rate as a result of delay in the financial close of the contract or in the event of delay due to the contracting party's inaction or supervening events
9. Surety and Performance Bonds	➢ Utilizing an appropriate performance bond to protect both public and private sector's interests during the construction phase of the project ➢ Utilizing an appropriate payment bond to protect the suppliers and sub-contractors in DBF or DBFOM projects
10. O&M Services	➢ Signing an additional O&M services contract with the DBF project development team to encourage the development of innovative design and construction solutions with potential life cycle cost savings
11. Flexibility for Buy-Back and Revenue Sharing Provisions in the Contract	➢ Incorporating flexible financing terms and conditions to possibly modify the financing structure of the contract throughout various phases of project development ➢ Incorporating sharing clauses in the contract in case of refinancing ➢ Requesting the right to assess and approve any changes in the project financier
12. Commitment to a Quality Management Plan	➢ Requiring and evaluating a QMP in the RFQ and RFP process to ensure that the project has sufficient quality in case of contractor default

CHAPTER 1

INTRODUCTION

The U.S. surface transportation infrastructure system is in financial crisis. According to the report card for America's infrastructure, in order to maintain and improve the nation's highways between 2008 and 2028, the current $91 billion annual investments need to rise to $170 billion (ASCE 2013). Bridging investment shortfalls is a hurdle for the government due to a variety of reasons, such as changing economic conditions, delayed federal transportation re-authorization bills, and declining value of fuel taxes (CBPP 2012; Rall et al. 2010). Therefore, the U.S. Department of Transportation (U.S. DOT) and state DOTs across the nation seek private investments to leverage their shrinking financial resources and fulfill their growing funding shortfalls (Istrate and Puentes 2011; NSTIFC 2009). Since 1989, the private sector has been involved in financing 56 U.S. highway projects roughly worth $46 billion (PWF 2014).

The federal government's assistance through the Transportation Infrastructure Finance and Innovation Act (TIFIA) of 1998 and later SAFETEA-LU of 2005, expanded the capacity of the federal-aid program to encourage private sector participation in delivery of transportation projects (FHWA 2010). Involvement of the private sector in financing highway projects can take various forms. Unlike the conventional "pay-as-you-go" method, this involvement is often integrated with an array of "bond and debt financing" and "loans and credit assistance" methods on the project finance spectrum, defined by the Federal Highway Administration (FHWA), Office of Innovative Program Delivery (IPD) as the following: "…*specially designed techniques and tools that supplement traditional highway financing methods, improving governments' ability to deliver transportation projects*…[and]…*is typically used for large capital projects in cases where using 'pay-as-you-go' does not make good planning and programming sense*…" (FHWA 2014a).

The decision to involve the private sector in financing highway projects varies from state to state in several aspects. State DOTs pursue different objectives when they utilize private financing for highway projects (Buxbaum and Ortiz 2009). These objectives may involve accelerating project development, utilizing deferred payment mechanisms, and leveraging private capital in project development (Papajohn et al. 2011; Abdel Aziz 2007). State DOTs utilize different procurement methods for project financing and use different approaches to evaluate financial qualifications and proposals. Different critical factors, such as financial plan credibility and proposed financing costs have been used by state DOTs to evaluate financial proposals submitted by project teams (Caltrans 2013; TxDOT 2012).

Private sector involvement in highway financing across the U.S. is subject to various limitations. State DOTs face different kinds of financial, political, legal, management, and organizational issues affecting their abilities to attract private investments in highway projects. For instance, complexities in project financing (Mallet 2008), negative public perception and local opposition (Kwak et al. 2009), and inefficient legal and organizational frameworks for investment (Angelides and Xenidis 2009) adversely impact private investments in highway projects. Various strategies have been utilized by state DOTs to facilitate adoption of private financing in their highway projects. These strategies are generally focused on programmatic improvements, required organizational skills, and better project planning and development frameworks (Zhang 2005c). Studies show that standardizing procurement processes and contracts (Garvin 2010), educating public agencies at all levels (Kwak et al. 2009), sharing knowledge between the public and private sector (Klijn and Teisman 2003), and involving financial institutions at the early stage of project development (Demirag et al. 2011) contribute to a robust project financing framework.

1.1. Research Objectives

The overarching objective of this project is to enhance the understanding of GDOT regarding the complexity of incorporating financing into the innovative project delivery process. Especially, the goal of this research is to identify and analyze major opportunities, risks, and best practices for utilizing innovative financing mechanisms in developing surface transportation projects through nonconventional project delivery systems. The specific research objectives are:

1. Identify and analyze the latest developments and trends in utilizing innovative financing mechanisms (e.g., enabling legislations, major characteristics of the projects that are prime candidates for each financing mechanism, institutional capabilities, risk allocation strategies, etc.)
2. Identify and analyze the decision-making process for integrating private financing in delivery of highway projects around the U.S.
3. Identify and analyze the deal-breaker issues and major challenges of incorporating private financing and devise recommended best practices to enhance private sector involvement in project financing

1.2. Overview of the Research Process

To achieve the research objectives, a combinatory research method is utilized that involves comprehensive literature review and content analysis, survey questionnaires, and structured interviews. Specific research tasks are designed in order to achieve the research objectives as follows:

- Conduct a comprehensive literature review regarding innovative financing mechanisms, alternative funding sources, and private sector involvement in highway project financing
- Develop and distribute a survey questionnaire regarding the current state of private sector involvement in highway project financing across the U.S. and analyze the results
    - Describe state DOTs' decision-making process for incorporating private financing in delivery of highway projects
- Scan and interview design-build programs in 3 State DOTs: Florida, Texas, and Virginia
- Develop and conduct structured interviews with private sector professionals who are experienced on highway project financing and analyze the interview results
    - Identify and analyze deal-breaker issues and major challenges regarding private sector involvement in highway project financing
    - Identify and analyze recommended best practices that enhance private sector involvement in highway project financing
    - Perform follow-up interviews with both public and private sector professionals to validate the challenges and recommended best practices

The findings and products of these research tasks are presented in the following order. Chapter 2 provides a review of funding sources, financing mechanisms, and innovative project delivery systems used for development of highway projects in the U.S. Chapter 3 presents the findings of in-depth study of private financing programs in 3 state DOTs (Florida, Texas, and Virginia DOTs). Chapter 4 presents the results of the survey questionnaire from state DOTs across the U.S. Chapter 5 describes the interviews conducted with private sector participants. Finally, Chapter 6 presents the conclusions of this research.

1.3. Research Significance

This research builds upon the goals and objectives defined in the Moving Ahead for Progress in the 21st Century Act (MAP-21) to enhance private sector involvement in project financing and efficiently use the resources for the public benefit. The design-build-finance project delivery system, when selected appropriately and conducted effectively, can provide state DOTs with a time- and cost-efficient alternative for delivery of transportation projects. The MAP-21 legislation and the FHWA recommend that state DOTs should "develop and advance" the use of innovative financing best practices to enhance project financing and accelerate project delivery. Several state DOTs, such as the Georgia Department of Transportation (GDOT), have used design-build-finance to mitigate funding challenges, expedite project delivery, and facilitate innovation in their respective states. While design-build-finance is a relatively new concept for some state DOTs, those DOTs with mature public-private-partnership (P3) programs have been seeking new ways to and optimize their private financing business processes.

Considering the challenges and issues associated with private sector involvement in financing highway projects, this research provides useful knowledge in several areas: (1) Identifying and analyzing main objectives and major concerns of state DOTs for incorporating private financing in highway projects; (2) Identifying deal-breaker issues and major challenges that disrupt private sector involvement in project financing; and (3) Recommend best practices that can enhance private sector involvement in project financing.

Chapter 2

RESEARCH BACKGROUND

In this chapter, we provide a review of literature on surface transportation funding sources and financing mechanisms. Further, we discuss the traditional and innovative project delivery systems that are available for use by state DOTs across the nation.

2.1. Surface Transportation Funding Sources

There are several sources of revenue that contribute to federal, state, and local surface transportation funding as summarized in Table 2.1 and Table 2.2. Notably, of the approximately $205 billion available to transportation in 2010, the vast majority was provided not by the Federal government, but instead by state and local governments – 98 percent in total. Also, within the federal, state, and local categories of funding, the contributions from types of revenue differ significantly. The excise taxes on motor fuels and vehicle taxes make up 84% of the federal funding, whereas these sources are small contributors for the local funding sources. Most local transportation funding is provided by property taxes and general fund appropriations. At the state level, motor fuel taxes are significant, but current income and bond proceeds also play important roles.

Table 2.1. Revenue Sources for Surface Transportation Funding ($ Millions 2010) (Source: FHWA Highway Statistics 2010)

Item	Federal Government			State Agencies and D.C.	Local Governments	Total	Total as % of Total Disbursements
	Highway Trust Fund & Other Account	Other Funds & Accounts	Total Federal				
Highway User Revenues:							
Motor-Fuel & Vehicle Taxes	28,743	–	28,743	53,038	2,472	84,253	41.04%
Tolls	–	–	–	7,918	1,658	9,576	4.66%
Subtotal	28,743	–	28,743	60,956	4,131	93,830	45.70%
Other Taxes & Fees:							
Property Taxes & Assessments	–	–	–	–	9,402	9,402	4.58%
General Fund Appropriations	14,700	14,852	29,552	7,229	21,824	58,605	28.54%
Other Taxes & Fees	–	625	625	6,648	4,940	12,213	5.95%
Subtotal	14,700	15,477	30,177	13,877	36,166	80,220	39.07%
Investment Income & Other Receipts	30	–	30	8,250	5,631	13,910	6.78%
Total Current Income	43,473	15,477	58,950	83,083	45,927	187,960	91.55%
Bond Issue Proceeds	–	–	–	25,877	7,139	33,017	16.08%
Grand Total Receipts	43,473	15,477	58,950	108,961	53,066	220,977	107.63%

Table 2.2. Revenue Sources for Surface Transportation Funding (Continued) ($ Millions 2010) (Source: FHWA Highway Statistics 2010)

Item	Federal Government			State Agencies and D.C.	Local Governments	Total	Total as % of Total Disbursements
	Highway Trust Fund & Other Account	Other Funds & Accounts	Total Federal				
Highway User Revenues:							
Intergovernmental Payments:							
Federal Government:							
Highway Trust Fund	(28,617)	–	(28,617)	28,617	–	–	–
All Other Funds	–	(14,905)	(14,905)	13,526	1,379	–	–
State Agencies:							
Highway-User Imposts	–	–	–	(18,388)	18,388	–	–
All Other Funds	–	–	–	(5,032)	5,032	–	–
Local Governments	–	–	–	3,111	(3,111)	–	–
Subtotal	(28,617)	(14,905)	(43,522)	21,834	21,688	–	–
Funds Drawn from or Placed in Reserves	(11,850)	(1)	(11,851)	(3,679)	(134)	(15,664)	-7.63%
Total Funds Available	3,006	571	3,577	127,116	74,621	205,313	100.00%

Surface transportation funding sources can be classified into two general categories: non-road pricing revenue and road pricing revenue. Each category consists of conventional and alternative funding sources as shown in Figure 2.1.

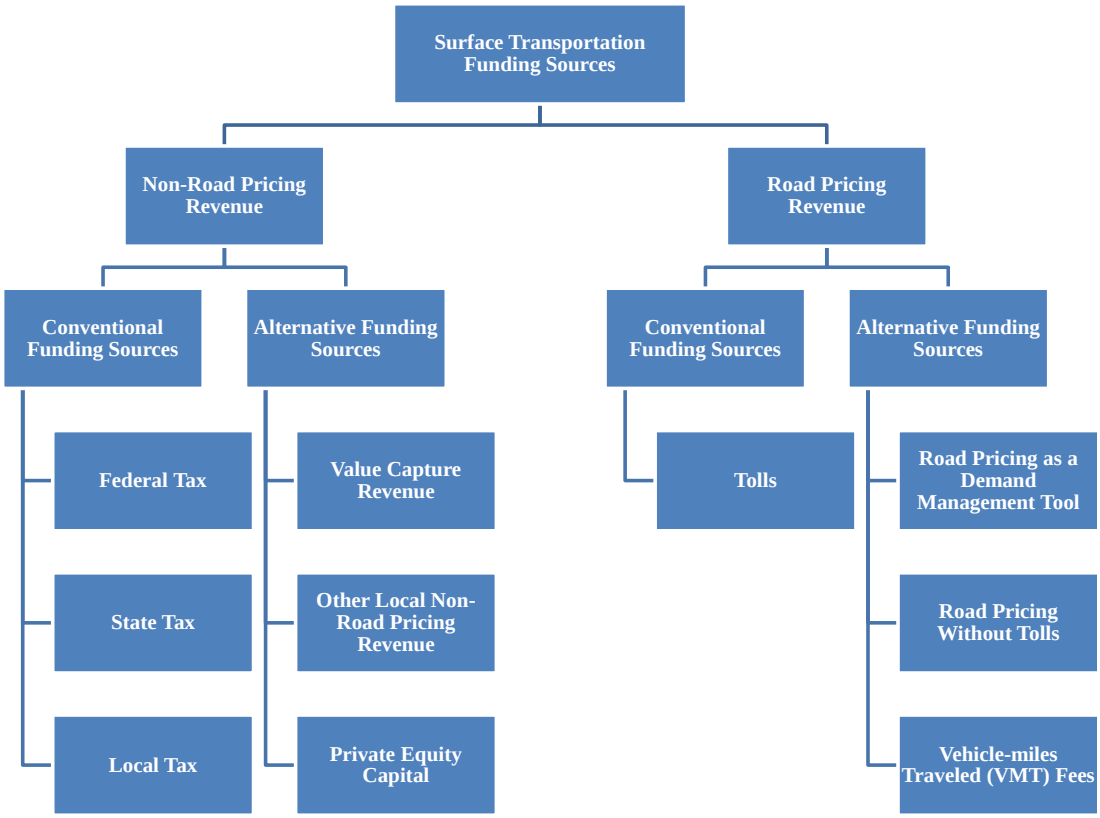

Figure 2.1. Surface Transportation Funding Sources

2.1.1. Non-Road Pricing Revenue Overview

There are a variety of sources beyond roadway pricing available to generate revenue for transportation projects. These include a broad assortment of fees or taxes levied on defined groups of beneficiaries expected to benefit from the provision of a particular transportation project. Such strategies can be used to help pay for non-tolled improvements, such as transit, by leveraging localized benefits ranging from increased land values to a broader tax base. Value capture strategies, however, may also be applied to toll roads to take advantage of the increased property values and other economic benefits produced by such improvements as is the case for the San Joaquin Toll Road in southern California and E-470 outside Denver, Colorado. Some non-pricing revenue sources are derived from state or local programs or private sources which are the new

revenue sources to address funding shortfalls. In addition, traditional sources of Federal and state revenue, such as motor fuel taxes, are non-road pricing revenue sources.

There are three conventional sources for non-road pricing revenue as the following:

1) ***Federal Tax***: Federal motor fuel taxes account for approximately 91 percent of the revenues deposited into the Highway Trust Fund (HTF) of the Federal government. The large majority of these taxes are motor fuel excise taxes levied on gasoline, diesel, and other special fuels. The motor fuel taxes on gasoline and diesel are 18.4¢ per gallon and 24.4¢ per gallon, respectively. These rates have remained unchanged since 1993 and all but 0.1¢ per gallon is dedicated to the HTF. In addition to motor fuel taxes, the Federal government also collects truck and truck trailer excise taxes, a truck tires sales tax, and a heavy vehicle use tax. These taxes represent the remaining 9 percent of revenue deposited in the HTF.
2) ***State Tax***: Traditional state revenue sources for transportation, which account for the majority of state transportation spending, include motor fuel taxes, vehicle registration fees and taxes, other taxes and fees, and general fund revenues. These funding sources are primarily dedicated to highways but vary by state and may also fund bridges, rail, and ports.
3) ***Local Tax***: Local non-road sources of revenue have been playing an increasingly important role in funding transportation improvements (representing nearly 38 percent of all funds spent on highway improvements in 2007). Traditional sources of local revenue include property taxes and use of the general fund. A variety of local funding sources involving taxes or fees are often options that are either authorized at the state level or approved by voters and levied at the county or municipal level. The local option taxes and fees include: local option fuel taxes, local option sales taxes, vehicle registration fees, income/payroll/employer taxes, local severance taxes, and hotel taxes.

There are three alternative sources for non-road pricing revenue as the following:

1) ***Value Capture Revenue***: Value capture refers to cases where the public sector is able to capture some of the increased value, usually property value, which results from public investment. Some transportation investments, such as a new freeway or interchange, increase the value of adjacent properties by improving access. Alternately, traffic calming investments on a local street may boost residential property values by reducing through traffic. Using value capture mechanisms, a part of this created land value can be captured in the form of revenue. The revenue generated can help finance the transportation improvement, or it can go toward further transportation investment, spurring a new round of increased accessibility and land value. Among the menu of options for implementing value capture, the following mechanisms are most widely utilized in the U.S.: special assessments, tax increment financing, development impact fees, developer contributions, and joint development as briefly described below.
    a) ***Special Assessments***: Special assessments is a tax assessed on parcels identified as receiving a direct and unique benefit as a result of the public improvement. The tax levied typically represents some fraction of the estimated benefit per development unit. The use of special assessments (also known as benefit assessments or special taxes) is the most prominent form of value capture in the U.S. Route 28 Phase II expansion project, Virginia, most funded by the special assessment district's tax revenues.
    b) ***Tax Increment Financing***: Tax increment financing is a special provision in state law that allows the diversion of the property tax increment derived from the increase in property value over a base year to a fund used to pay off capital bonds for public improvements within a tax increment financing (TIF) district. Tax increment financing levies taxes on the future increment in property value within a development (or redevelopment) project to finance development-related costs, including infrastructure improvements. TIF districts can be expanded beyond the site of an improvement to

encompass a small district. The strategy is commonly used by local governments to promote housing, economic development, and redevelopment in established neighborhoods. Although TIF has not been used extensively to fund transportation infrastructure, some state laws specifically authorize the use of TIF for transportation purposes. In the New Jersey Atlantic City Brigantine Connector project, the state-run Casino Reinvestment Development Authority provided funding through the tax increment financing.

c) ***Development Impact Fees***: Development impact fees (DIFs) are one-time charges levied on new development. They are charged primarily to new development to help recover growth-related public service costs, but differ in that impact fees can be levied for off-site services such as local roads, schools, or parks. Development impact fees are typically determined through a formulaic process, rather than through negotiations as done for developer contributions. Transportation related DIFs are used by numerous public entities throughout the U.S. For example, DIF contributed to the funding on the California Toll Roads project.

d) ***Developer Contributions***: The promise of capturing value from transportation investments also extends to private developers and investors. Under the right conditions, the gains that result from a public improvement can be used to attract private equity capital to the project. Developer contributions can take the form of up-front contributions or as periodic contributions paid over the duration of a project. For example, developer agreement was established to pay for a significant portion of the Virginia Alexandria's Potomac Yard Metrorail Station project.

e) ***Joint Development***: Joint development is a form of transit oriented development (TOD) that is project-specific and takes place on or adjacent to transit-agency land. Joint development projects involve the direct participation of a public entity, often a transit agency, in revenue streams and sometimes ownership. The public agency

typically takes on direct financial risk for a commercial development as part of a joint development agreement. For example, owners of Resurgens Plaza, a luxurious office building adjacent to Atlanta MARTA's Lenox station, pays to MARTA $100,000 in lease revenues annually on the Lenox Station project.

2) ***Other Local Non-Road Pricing Revenue***: Other local non-road sources of funding for transportation improvement projects include fares, advertising, naming rights, shared resources, concessions, and transportation utility fees.

   a) *Fares*: Fares are user charges for public transit exclusively collected at the local level. As a revenue source, they are primarily used to fund the ongoing operations and maintenance of the transit system. To leverage future collections of transit fares, revenue bonds are often issued as a finance mechanism against fare box receipts.

   b) *Advertising*: Advertising revenue can be derived by selling space on transportation facility assets; for example, on billboards along highways.

   c) *Naming Rights*: Revenue from naming rights is derived from selling to the private sector the right to name a transportation facility, such as a toll road.

   d) *Shared Resources*: Shared resources are private donations of telecommunications technology (principally fiber optic communications), and sometimes cash, granted in exchange for access to public right-of-way. The use of shared resources is an invaluable tool for states seeking to build a technological backbone for intelligent transportation systems (ITS). In addition to obtaining increased access to telecommunications technology, states can credit the value of the private donations toward their matching share of project costs associated with the deployment of ITS projects utilizing the donated technologies.

   e) *Concessions*: Transportation system assets provide several opportunities for leasing real estate to private sector businesses that operate concessions.

f) *Transportation Utility Fees*: Transportation utility fees (TUF) treat transportation networks like a utility, similar to other local services, such as water and wastewater treatment that are financed primarily from user charges. TUF rates can be set using a number of different bases that are more closely related to transportation demand than the property tax, including fees that apply per unit of housing or per parking space, fees based on square footage or gross floor area, and fees that vary with the trip generation rate for a given property type. This strategy has faced legal challenges in the U.S., most often on the grounds that it represents a tax, thus triggering referendum requirements in some local jurisdictions.

3) Private Equity Capital: The introduction of private equity into transportation funding is the most significant change in the U.S. transportation markets. Long-term equity allows increased debt coverage for any given level of revenue. This increased coverage improves the credit worthiness of project debt. This is especially important during the early years of operations for a new facility when traffic patterns are yet to be established. Sources of these equity funds include overseas companies in the specific business of owning and operating transportation assets, or U.S. and international financial firms which have the ability to raise and manage large amounts of equity capital. For example, private freight railroad equity partners (BNSF Railway, Canadian Pacific Railway, CN, CSX Transportation, Norfolk Southern Corporation, and Union Pacific Railroad) contributed $212 million on the Chicago Region Environmental and Transportation Efficiency Program (CREATE) project.

2.1.2. Road Pricing Revenue

Road pricing refers to a fee related to the use of a roadway facility. Revenue from these fees can be reinvested in capacity expansion or used to pay for operations and maintenance. Toll revenue, specifically, is also the primary source of repayment for long-term debt issued to finance a toll

facility itself. Tolling generally involves the imposition of a per-use fee on motorists for a given highway facility. Historically, these fees have been flat tolls that may vary by number of axles and distance driven, but not by time of day. Their primary purpose is to generate revenue.

The term pricing, as applied to road usage, entails fees or tolls that vary by level of vehicle demand on the facility. This type of road pricing is also called congestion pricing, value pricing, variable pricing, peak-period pricing, or market-based pricing. This pricing strategy follows those pricing strategies in other industries to account for and manage demand, for instance, airline tickets, cell phone rates, and electricity rates. While pricing generates revenue, as do flat tolls, this strategy also seeks to reduce congestion, environmental impacts, or other external costs caused by road users. Road pricing imposes a price on a vehicle's use of the road based on time of day, location, type of vehicle, number of occupants, or other factors. Aside from the generation of revenues, proponents of road pricing cite the potential of fees to reduce the wasted time, fuel, and emissions associated with traffic congestion.

Tolls are the primary conventional source for road pricing revenue. Tolling involves the imposition of a per-use fee on motorists for a given highway facility. Historically, these fees have been flat tolls that may vary by number of axles and distance driven, but not by time of day. Their primary purpose is to generate revenue. Public funding constraints have generated new interest in tolls as a revenue source to support transportation investment. Public-private partnership development of toll roads has been the focus of most state DOT activities in privatization. Federal support for tolling has also expanded through TEA-21, which continued ISTEA's Congestion Pricing Pilot Program as the Value Pricing Pilot Program and established the Interstate System Reconstruction and Rehabilitation Toll Pilot Program. SAFETEA-LU has also continued to fund these programs and established the Interstate System Construction Toll Pilot Program and the Express Lanes Demonstration Program.

On the other hand, there are three alternative sources for road pricing revenue as the following:

1) ***Road Pricing as a Demand Management Tool***: In addition to serving as a revenue source for transportation, road pricing in the form of congestion pricing can act as a tool for demand management. The variability of pricing depending on traffic conditions and policies capitalizes on market forces to manage the utility of finite roadway capacity. Some facilities may experience sufficient demand to act as a source of revenue generation beyond pricing's ability to manage demand. However, there are several facilities that do not generate excess revenue beyond that to cover operations and debt service payments, if applicable. In fact, the funding of these facilities often involves revenue sources or financing beyond which the funding can be achieved through tolls alone.

   a) ***Priced Lanes***: Priced lanes are "partial facility" pricing involving one or more lanes on a roadway facility. Rather than an entire facility's capacity be priced, a certain number of lanes (often one or two in both directions) can be priced and operate next to un-priced, general purpose lane capacity. These facilities offer a reliable alternative to frequently congested roadway corridors and comprise of two forms: (a) HOT lanes, which combine variable pricing for lower occupancy vehicles with free travel for higher occupancy vehicles; and (b) Express Toll Lanes, which charge the same variable toll for all vehicles or a variable toll for lower occupancy vehicles with a discounted toll for higher occupancy vehicles. An example is the HOT Lanes I-15 Express Lanes in San Diego, California.

   b) ***Priced Highway***: Priced highway is "full facility" pricing of all lanes on a roadway facility. These facilities charge tolls that vary by time of day or congestion level such that peak period travel is more expensive than off-peak travel, encouraging some trips to move to off-peak periods or other travel modes, such as transit. The major benefits are (a) reducing or eliminating duration of peak-period congestion, (b) increasing the reliability of a user's trip; and (c) allowing for more efficient use of system capacity

from a time-of-day and physical (lane-mile) standpoint. An example is variable pricing on existing toll facilities – Bridges in Lee County, Florida.

2) ***Road Pricing Without Tolls***: An emerging form of congestion pricing that does not involve tolls includes several concepts and strategies as the following:

   a) *Pay-as-you-drive Car Insurance*: PAYDAYS insurance assesses individualized premiums based on miles driven instead of the calendar year and provides motorists a new option to save money by reducing their risk exposure through driving less.

   b) *Car Sharing*: Car sharing that substitutes for car ownership is an innovative, voluntary transportation-pricing measure that converts virtually all fixed-vehicle ownership costs to usage-based fees. Car sharing allows households to get by without owning a car or with owning fewer cars than they would otherwise need.

   c) *Parking Cash-Out*: Parking cash-out is an especially good parking-pricing strategy to realign existing employer commute benefits so as to reward employees for using alternative transportation. Parking cash-out allows employers to offer their employees the option of receiving taxable cash in lieu of a parking subsidy, providing employees an incentive to find alternatives to drive-alone peak-period commuting.

   d) *Variably Priced Metered Parking*: Variably Priced Metered Parking adjusts the parking prices to achieve a particular occupancy standard; thus, at least a few spaces will always be readily available.

   e) *Pricing of Off-Street Parking*: Pricing of Off-Street Parking places a surcharge on entering or leaving a parking facility during and near the rush hour.

   f) *Variable Port Access Charges for Trucks*: Variable Port Access Charges for Trucks provides a financial incentive for cargo movements to shift away from peak-traffic periods into nights and weekends to reduce the congestion.

3) ***Vehicle-miles Traveled (VMT) Fees***: VMT fees are distance-based fees levied on a vehicle user for use of a roadway system. As opposed to tolls, which are facility specific and not necessarily levied strictly on a per-mile basis, these fees are based on the distance driven on a defined network of roadways. To date, this method of revenue generation has been implemented only for trucks (e.g., in Germany and on a limited basis in Illinois) and only exists as a proposal for all vehicles to replace or supplement the motor fuel tax.

Along with revenue generation sources, surface transportation financing mechanisms should be understood by state DOTs, in order to effectively develop much-needed transportation infrastructure.

2.2. Surface Transportation Financing Mechanisms

State and local governments typically use debt issuance to help finance surface transportation infrastructure development. Over the past two decades, in addition to the traditional debt issuance through capital markets, an array of finance programs and policy initiatives have been introduced, in order to facilitate access to capital markets and encourage the participation of the private sector in transportation project development. Some of these innovative financing mechanisms fall entirely within the realm of either public or private sectors, but most of them involve some form of partnership between public and private sectors (RITA 2008). Surface transportation financing mechanisms can be classified into two general categories: conventional financing mechanisms and innovative financing mechanisms. Innovative financing mechanisms category consists of several mechanisms as identified in Figure 2.2.

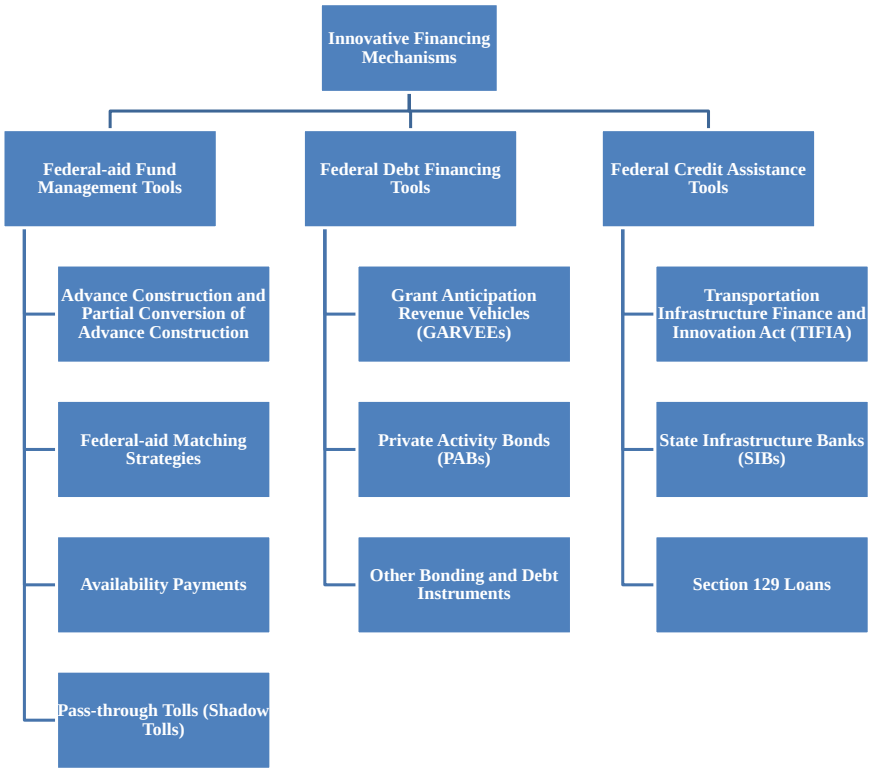

Figure 2.2. Innovative financing mechanisms for surface transportation

2.2.1. Innovative Surface Transportation Financing

Over the last two decades, as revenues have lagged behind investment requirements, the Congress and states have sought ways to expand the capacity of the federal-aid program to deliver transportation projects. Today, states and other project sponsors have access to an array of project financing mechanisms to facilitate project development. Tolls, user fees, and other project-based revenue sources, in combination with new financing mechanisms, can substantially increase the ability of state and local governments to deliver transportation projects. Innovative financing mechanisms available to project sponsors include:

- *Federal-aid Fund Management Tools*: These tools increase the flexibility of states to provide the required match for federal-aid programs and advance the timing of federal-aid fund reimbursement.
- *Federal Debt Financing Tools*: These tools allow state and local entities to borrow against future expected revenues and federal aid to better manage and accelerate project delivery.
- *Federal Credit Assistance Tools*: These tools improve the access of project sponsors to credit through loans and credit enhancements to better manage and accelerate project delivery.

2.2.2. Federal-aid Fund Management Tools

Federal-aid fund management tools are designed to provide states with greater flexibility in managing federal-aid highway funds. Typically, state and local governments must provide 20 percent of the funding for projects benefiting from the federal aid. The principal objective of these management tools is to ease restrictions on the timing of obligations and reimbursements and create a broader range of options for meeting matching requirements. While finding money for projects is always a challenge, states and other project sponsors also have to align the flow of projects with the availability of local funding. These cash flow tools help state and local governments to leverage

federal funding and expedite the implementation of projects. The main federal-aid fund management tools are the following:

1) ***Advance Construction and Partial Conversion of Advance Construction***: These are cash flow management tools that allow the FHWA to authorize a project without obligating federal funds (ASSHTO and HSCG 2011). Under an advance construction authorization, FHWA approves a project as being eligible for federal funding but does not commit to fund the project. Therefore, advance construction allows a state to receive approval to construct federal-aid projects in advance of the apportionment of authorized federal-aid funds. Under partial conversion, a state may obligate funds for advance-construction of projects in several stages (FHWA 2011). Up to 2010, Florida DOT has approximately 2.7 billion advance construction balance used in multiple surface transportation projects delivery by innovative project delivery systems (ASSHTO and HSCG 2011).
2) ***Federal-aid Matching Strategies***: These are fund management tools, which are designed to provide more flexibility to states in their management of federal funds, increase investment, and accelerate projects (FWHA 2012). For most Federal-aid projects, the federal law requires that 20 percent of the costs be derived from a non-federal source (ASSHTO 2012). These matching strategies provide flexibility in the nonfederal match such that federal-aid dollars can be leveraged more effectively.
3) ***Availability Payments (APs)***: These represent a way of compensating a private entity for its responsibility to design, construct, operate, and/or maintain a transportation project for pre-specified period of time (ASSHTO 2012). These payments are made by the public sector based on particular project milestones or facility performance standards. For example, availability payments have been used in the bridge replacement of $7.3 million I-75/M-21 design-build-finance project in Michigan (MDOT 2009). MDOT repaid the funds to contractor in yearly installments through 2012.

4) ***Pass-through Tolls (Shadow Tolls)***: These are per-vehicle or per-vehicle-mile fees measured by the number of vehicles using a highway (ASSHTO 2012). It is not paid by motorists in the traditional sense of a toll, but rather by a state or local agency to a private entity as reimbursement for particular services. The payment of pass-through tolls is made in exchange for the private entity's responsibility to design, build, maintain, and/or operate a roadway for an agreed period of time. For example, Texas DOT used the pass-through toll mechanism to finance SPUR 601 design-build project in which they reimbursed a private contractor a fixed dollar amount per vehicle that drives on the road (TxDOT 2007).

2.2.3. Federal Debt Financing Tools

Transportation projects are often so large that their costs exceed currently available grant funding and tax receipts, or would consume so much of these funding sources as to delay many other planned projects. Therefore, states and local agencies often look to finance the projects through issuing municipal bonds when they consider ways to pay for these large projects. The bond issuance yields an immediate cash flow in the form of bond proceeds. The state or local agency then retires its obligation by making principal and interest payments to the investors over time. More recently, two innovative debt instrument tools, Grant Anticipation Revenue Vehicles (GARVEEs) and Private Activity Bonds (PABs), provide further opportunities to issue debt. USDOT and FHWA have the authority to approve projects for GARVEE financing and administer the allocation of PABs.

1) ***Grant Anticipation Revenue Vehicles (GARVEEs)***: These are debt-financing instruments authorized to receive federal reimbursement of debt service and related financing costs under Section 122 of Title 23, United States code (FHWA 2010). It generates up-front capital for major highway projects. GARVEEs can be issued by a state, a political subdivision of a state, or a public authority. For instance, Commonwealth of Virginia issued $120.625 million in its 2012B GARVEE series to raise funding for the I-95

HOV/HOT lanes design-build-finance-operate-maintain project and the downtown tunnel/midtown tunnel/Martin Luther King freeway extension design-build-finance-operate-maintain project (FHWA 2010). The bonds will be paid off over a 15 year period expiring in September 2027.

2) ***Private Activity Bonds (PABs)***: These are issued by a public, conduit issuer on behalf of a private entity for highway and freight transfer projects, allowing a private entity to benefit from the lower financing costs of tax-exempt municipal bonds (Maguire 2006). The Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (Public Law 109-59; SAFETEA-LU) authorizes the Secretary of Transportation to allocate $15 billion in PABs among qualified highway and freight transfer facilities. As of November 6, 2012, PAB allocations approved by the U.S. DOT are total over $5.3 billion supporting eight projects. $3.15 billion in PABs have been issued to date for seven projects. For example, $589 million PABs have been issued to finance the I-495 Capital Beltway design-build-finance-operate-maintain project (FHWA 2012).

3) ***Other Bonding and Debt Instruments***: USDOT and FHWA participate in several other types of bonding and debt instrument tools administered at the state and local level. State and local government entities often issue municipal bonds to finance their various projects and expenses. In addition, stimulus fund, such as Build America Bonds (BABs), have been used for surface transportation with certain economic impacts. For instance, $94.9 million Florida SR 9B design-build project was partially funded using the federal stimulus money (Florida DOT 2011).

2.2.4. Federal Credit Assistance Tools

USDOT has developed a number of financial tools to help project sponsors access credit to expedite the implementation of needed transportation improvements. Federal credit assistance can take one of two forms: (a) loans, where project sponsors borrow federal highway funds directly from a state

DOT or the federal government; and (b) credit enhancements, where a state DOT or the federal government makes federal funds available on a contingent (or standby) basis. Credit enhancement helps reduce risk for investors and thus, allows project sponsors to borrow at lower interest rates. The main federal credit assistance tools are the following:

1) ***Transportation Infrastructure Finance and Innovation Act (TIFIA)***: The TIFIA program provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance (NCSL 2010). A TIFIA project must pledge repayment in whole or in part with dedicated revenue sources such as tolls, user fees, special assessments (taxes), or other non-federal sources. TIFIA credit assistance provides improved access to capital markets, flexible repayment terms, and potentially more favorable interest rates than can be found in the private capital market for similar instruments. TIFIA can help advance expensive projects that otherwise might be delayed or deferred because of the size, complexity, and uncertainty over the timing of revenues. Twenty-seven projects have received $9.2 billion in credit assistance with $36.4 billion in total project cost. Recently, the U.S. Transportation Secretary Ray LaHood has issued a $300 million TIFIA loan to the Virginia I-95 HOV/HOT lanes design-build-finance-operate-maintain project (NCSL 2010).
2) ***State Infrastructure Banks (SIBs)***: These are state-run revolving funds that make loans to provide credit enhancements and other forms of non-grant assistance to surface transportation projects (NCSL 2010). SIBs enable states to use their federal apportionments to establish a revolving fund that, much like a bank, can offer low-cost loans and other credit assistance to help finance highway and transit projects. Since passage of SAFETEA-LU, all states are now authorized to enter into agreements with the Secretary of Transportation to establish infrastructure revolving funds. As of September 2012, 32 states and territories had entered into an estimated 700 SIB loan agreements for a total of $6.5

billion. For example, $144 million SIB Loan was issued to the Texas President George Bush Turnpike design-build project (NTTA 2011).

3) ***Section 129 Loans***: Section 129 (a)(7) of Title 23 commonly referred to as Section 129 loans allows states to lend apportioned federal-aid highway funds to toll and non-toll projects generating dedicated revenue streams (NCSL 2010). Revenue sources can include, but not limited to, tolls, excise taxes, sales taxes, real property taxes, incremental property taxes, and motor vehicle taxes. The President George Bush Turnpike Project in Texas was the first design-build project advanced with a $135 million Section 129 loan (NTTA 2011). This loan facilitated the financing by expanding the bonding capacity for this project and enhancing the creditworthiness of the bonds issued for the project.

2.3. Traditional and Innovative Project Delivery Systems

2.3.1. Traditional Project Delivery

The traditional design-bid-build project delivery system involves competitively bid construction contracts that are based on complete and prescriptive contract documents prepared by the owners' architects and engineers and/or design consultants (AGC 2011). Design-bid-build projects by nature are delivered through a sequential approach that starts with planning and scope development, which later forms the final project design, and continues with design development and finalization along with permit acquisition and several other responsibilities. In design-bid-build, the state DOT assigns the responsibility of design and construction to separate parties as shown in Figure 2.3.

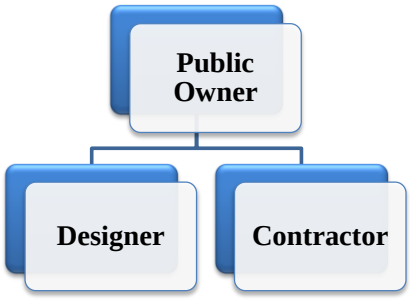

Figure 2.3. Organizational Structure of Design-Bid-Build

The state DOT and the designer are responsible for the accuracy and the validity of the project design. The procurement of the contractor in this project delivery system is mainly based on the total construction cost. Since most of the required responsibilities in design-bid-build project delivery should happen in sequence, delivery of these projects is associated with longer overall schedule and possible changes in total project costs, not to mention claims and disputes resulting from change orders and design errors and omissions. State DOTs, the FHWA, the federal government, and other stakeholders have recognized that the slow pace of project delivery leads to increased costs, inefficient resource allocation and risks to overall economic vitality and quality of life. Conventional approaches to project delivery have proven to be insufficient in dealing with the

emerging challenges to streamlined project delivery. Since state DOTs have significant backlogs of needed projects but little financial means to advance them to the next step, innovative project delivery has become an active tool for state DOTs that can mitigate the effects of construction cost increase, which is escalating at rates higher than those of the inflation.

2.3.2. Innovative Project Delivery

In the mid-1800s, many states adopted the "low-bid" requirements to protect tax payers from improper practices by agencies. The "low-bid" requirements on public projects also ensured that the public money was invested at the best possible way. In 1938, the Federal Aid Highway Act set the stage for the interstate highway system and required the use of "competitive bidding process" for construction and major reconstruction projects. The 1968 Federal Aid Highway Act required that construction contracts be awarded competitively to the contractor which submits the lowest responsive bid. The mandate to award the contracts only on the basis of "lowest responsive bid" was set forth in 23 U.S.C. 112 of the 1968 Federal Aid Highway Act. In 1990, the FHWA established the Special Experimental Project Number 14 (SEP-14) – Innovative Contracting. This act allowed state DOTs to test and evaluate a variety of approved innovative project delivery systems, such as design-build and design-build-finance-operate-maintain. In 1998, the Transportation Equity Act for the 21st Century (TEA-21) became the new authorization legislation for the nation's surface transportation programs. Included in TEA-21 was Section 1307 (c), which required FHWA to develop and issue regulations describing the approval criteria and procedures of the agency. The "Design-Build Contracting: Final Rule" was published in the federal register on December 10, 2002 and became effective on January 9, 2003.

Since 1990, a number of transportation agencies (as owners, sponsors, or contracting agencies of highway projects) have been experimenting with a wide range of innovative project delivery systems aimed at lowering cost and time to develop highway construction and rehabilitation projects, while maintaining or improving the quality of delivered projects. By placing increasing

functional responsibilities (e.g., design, financing, operations, and maintenance) under a single contract, innovative project delivery systems can take several forms that differ in the degree to which the private sector assumes responsibility along with the associated risks. Figure 2.4 summarizes innovative project deliveries into 5 project delivery systems, construction manager/general contractor (CM/GC), design-build, design-build-operate-maintain, design-build-finance, and design-build-finance-operate-maintain.

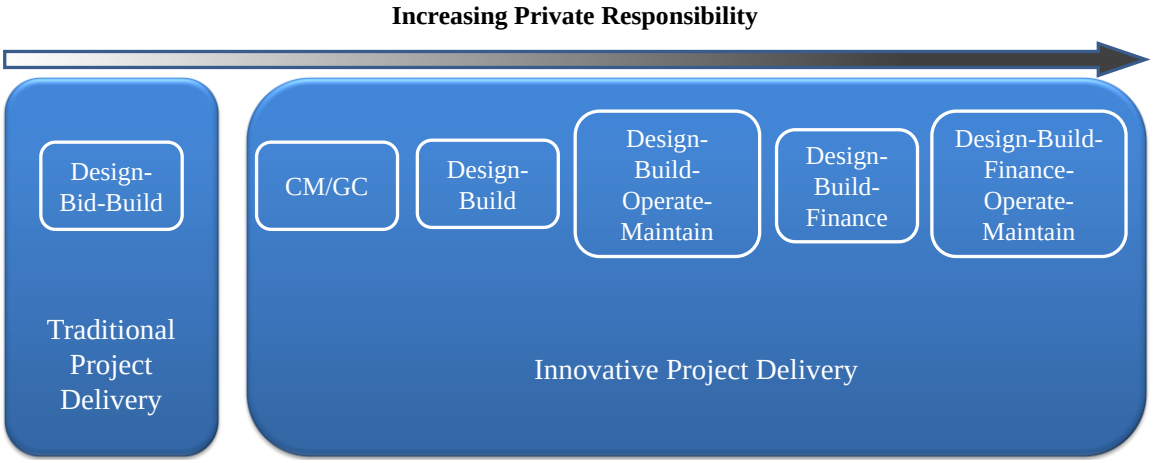

Figure 2.4. Continuum of Private Sector Involvement in Project Delivery Systems

2.3.1.1. Design-Build Project Delivery System

Design-build is a relatively new project delivery system that is growingly applied or considered by state DOTs. Procurement consists of selecting a design-build contractor that is responsible for both design and construction (FHWA, IPD 2013). As shown in Figure 2.5, the public owner only signs a single contract with the design-build team who is responsible for the both design and construction activities. In the design-build process, state DOT identifies what it wants to be constructed, accepts proposals, and selects the design-build team to assume the risk and responsibility for design and construction tasks.

The design-build team is involved early in the design process, so the designer can tailor plans to design-build team's capabilities from the onset. This provides the design-build team with increased flexibility to be innovative, along with greater responsibility and risk for the majority of the design work and all construction activities. On the other hand, the owner takes the responsibility for financing, operating, and maintaining the project. Table 2.3 summarizes the allocation of responsibilities in a typical design-build contract.

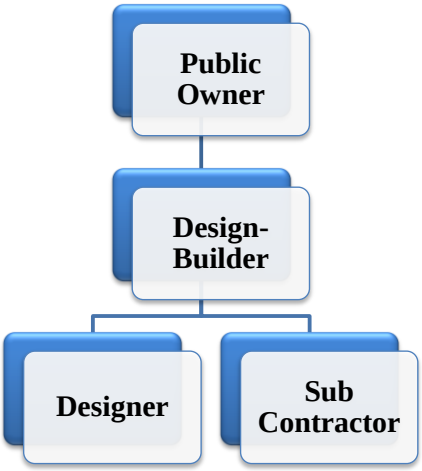

Figure 2.5. Organizational Structure of Design-Build

Table 2.3. Design-Build Roles and Responsibilities

	Own	Design	Build	O&M	Financial Responsibility
Design-Build	Public	Private	Private	Public	Public

Design-build provides opportunities for significant cost savings and safety improvement. For example, shortened project durations reduce labor costs and safety risk associated with the maintenance of traffic or work zones. As of May 2012, there are only three State DOTs (Oklahoma, Nebraska, and Iowa) that have not received legislative approval to use the design-build project

delivery system for transportation projects (DBIA 2013). Figure 2.6 illustrates the current design-build state laws for transportation projects.

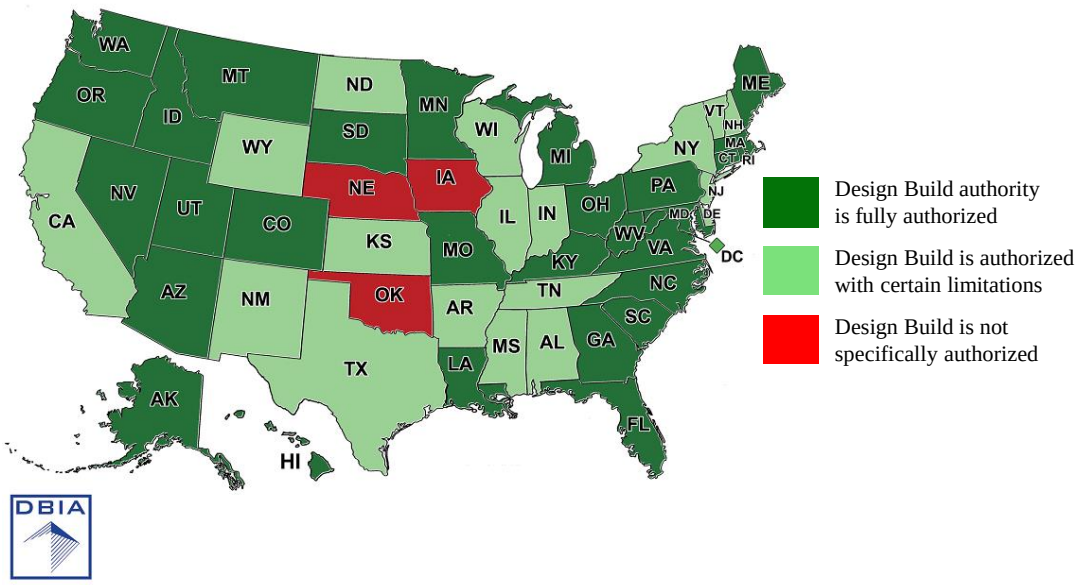

Figure 2.6. Design-Build State Laws for Transportation Projects in 2012
(Copyright of DBIA 2013)

2.2.3. Design-Build-Operate-Maintain Project Delivery System

Design-build-operate-maintain is a project delivery system that combines the design and construction responsibilities of the design-build project delivery system with operations and maintenance (FHWA, IPD 2013). Procurement consists of selecting a design-build contractor that is responsible for design, construction, operation, and maintenance of the project. As shown in Figure 2.7, the public owner only signs a single contract with the design-build team who is responsible for all design and construction and long-term operation and maintenance activities.

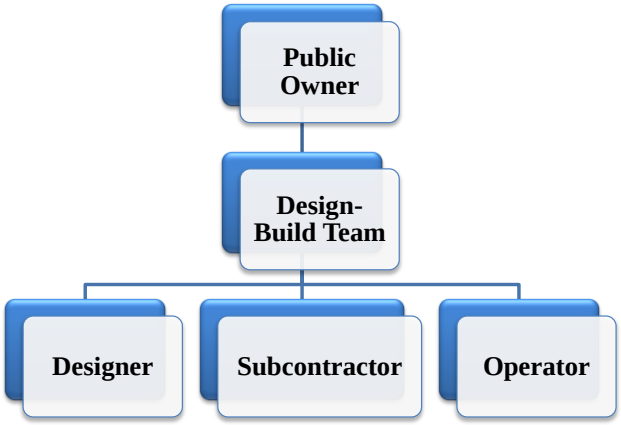

Figure 2.7. Organizational Structure of Design-Build-Operate-Maintain

In the design-build-operate-maintain process, the state DOT identifies what it wants to be constructed, defines how it would like to see the facility being operated and maintained (e.g., level of service and acceptable performance), accepts proposals, and selects the design-build team to assume the risk and responsibility for not only design and construction service but also long-term operation and maintenance activities. The design-build team, who is also responsible for operations and maintenance, is involved early in the design process in order to provide an opportunity for the designer to tailor plans to the capability of the design-build team from the operations and maintenance standpoint. Therefore, the design-build-operate-maintain team should consider the long-term operations and maintenance requirements during the process of design and construction. The major difference between design-build and design-build-operate-maintain is the consideration of long-term performance requirements. The design-build-operate-maintain-team has also the flexibility to be innovative, along with the greater responsibility and risk for the majority of the design and construction activities and all the operation and maintenance responsibilities. The owner, however, still keeps the responsibility for financing the project. Table 2.4 summarizes the allocation of responsibilities in a typical design-build-operate-maintain contract.

Table 2.4. Roles and Responsibilities in Design-Build-Operate-Maintain

	Own	Design	Build	Operate & Maintain	Finance
Design-Build-Operate-Maintain	Public	Private	Private	Private	Public

2.2.4. Design-Build-Finance Project Delivery System

In design-build-finance (DBF), one contract is awarded for design, construction, and full or partial financing of a facility (FHWA, IPD 2013). As shown in Figure 2.8, organization structure is similar to that of design-build with additional short-term financing functionality.

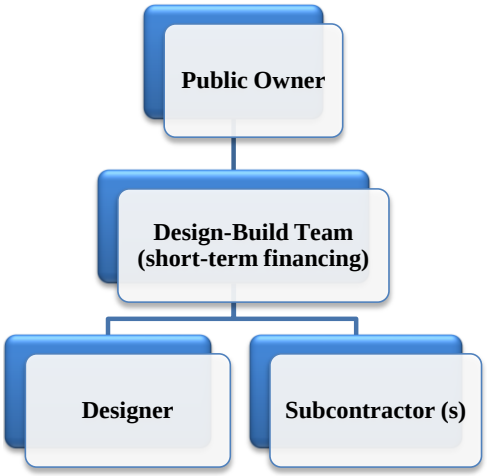

Figure 2.8

Organizational Structure of Design-Build-Finance

In design-build-finance, the responsibility for long-term maintenance and operations of the facility remain with the public owner. This approach takes advantage of the efficiencies of design-build, while allowing the public owner to completely or partially defer financing during the construction phase of the project. Table 2.5 summarizes the allocation of responsibilities in a typical design-build-finance contract.

Table 2.5. Roles and Responsibilities in Design-Build-Finance

	Own	Design	Build	Operate & Maintain	Finance
Design-Build-Finance	Public	Private	Private	Public	Public/Private

Design-build-finance can be motivated by the owner's cash flow constraints or the owner's desire to defer payment for the project. In case of cash flow constraints, the public owner identifies what level of funding is available for the project at the time the procurement is released, and requires the design-build team to finance any development cost in excess of that amount over a specified period of time. In case of the desire to defer payment, the public owner issues a procurement asking the design-build team to provide the cost for developing the project today, with the payment of that amount promised at a later time. The design-build team may use different approaches to finance the cost of project development. In some cases, the design-build team provides self-financing to cover design and construction costs until the public owner is able to repay them. In the other approaches, the design-build team finances the costs through existing commercial credit lines or uses a combination of self-financing and borrowing. Whenever there is a need for substantially large financing amount over a long period of time, the design-build team may arrange project-specific financing tools.

The benefits of design-build-finance are similar to those of design-build, in that the public owner can capitalize on the efficiencies of having the design-build team undertake both design and construction activities. In design-build-finance, short-term financing of all or a portion of the project is assumed by the private sector. This allows the public owner to advance the construction of the project prior to assembling all the funding required for the project. The design-build-finance model is particularly beneficial when there is a short-term gap in financing that can be overcome by the design-build team. Therefore, the public owner can expedite project delivery despite its short-term shortage in financing capacity. Table 2.6 presents the list of highway DBF projects procured in the U.S. from 2000 to 2014.

Table 2.6. List of Highway Design-Build-Finance Projects Procured in the U.S. from 2000-2014

ID	Project Title	Agency	Contract Type	Financial Close Year	Contract Value ($M)	Developer
	SH-183	TxDOT	DBF	2014	$847	Kiewit
	I-75/575 NWC Managed Lanes	GDOT	DBF	2013	$840	Archer Western (Walsh)/ Hubbard Group Parsons Transportation Co.
	SR 79 Widening Washington County	FDOT	DBF	2013	$98	Anderson Columbia Co./ Ajax Paving Industries
	I-75, SR 80 to SR 78	FDOT	DBF	2012	$72	De Moya/Leware Joint Venture
	I-95 Widening, South of SR 406 to North of SR 44	FDOT	DBF	2012	$118	Lane Construction
	Florida, SR 9B-Phase 2, Jacksonville, Duval County	FDOT	DBF	2012	$118	Deutsche Bank/ Superior Construction Joint Venture
	I-485, Charlotte Loop	North Carolina DOT	DBF	2010	$140	Blythe Construction
	I-4/Crosstown Connector	FDOT	BF[1]	2010	$404	PCL Civil Constructors/Archer Western Contractors
	Palmetto Expressway Improvement, Section 5 - SR 826/836 Interchange	FDOT	DBF	2009	$564	Community Ashpalt/ Condotte/ de Moya
	Florida, U.S. 19, Clearwater, Pinellas County	FDOT	DBF	2009	$111	Hubbard Construction Co.
	M-21 Bridge over I-75	Michigan DOT	DBF	2008	$7.3	Dan's Excavating Company
	I-69 Reconstruction	Michigan DOT	DBF	2008	$38	Interstate Highway Construction
	I-95 Widening/Pineda Causeway	FDOT	DBF	2008	$199	Community Asphalt
	Palmetto Expressway Improvement, Section 2	FDOT	DBF	2008	$192	Condotte/De Moya Joint Venture
	US 1 Highway Safety Improvements	FDOT	DBF	2008	$111	Community Asphalt
	I-95 Express Lanes	FDOT	DBF	2008	$139	C3TS (FL)/ MCM (FL)/ FCC Construction Co.
	I-75, Collier and Lee Counties	FDOT	DBF	2007	$458	Anderson Columbia Co. (ACCI), and Ajax Paving Industries (API)
	IROX I-75	FDOT	DBF	2007	$461	Anderson Columbia/Ajax Paving/HDR/Metric Engineering
	Route 3 North	Massachusetts DOT	DBF	2000	$385	Modern Continental/Roy Jorgenson

[1] Build-Finance is a variation of P3 that involves only transferring the construction and financing responsibilities to the private sector.

2.2.5. Design-Build-Finance-Operate-Maintain Project Delivery System

In design-build-finance-operate-maintain, one contract is awarded for design, construction, operation, maintenance, and full or partial financing of a facility (FHWA, IPD 2013). As shown in Figure 2.9, the organization structure is similar to that of design-build-operate-maintain with additional financing (short-term or long-term) functionality.

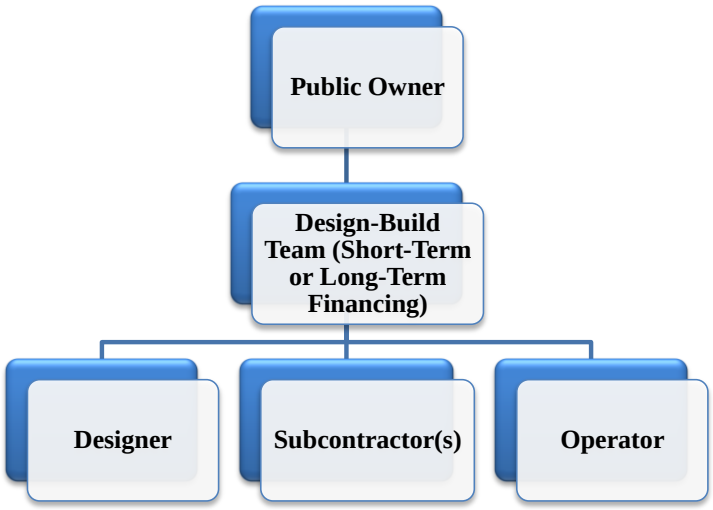

Figure 2.9. Organizational Structure of Design-Build-Finance-Operate-Maintain

Similar to the design-build-operate-maintain project delivery system, in the design-build-finance-operate-maintain project delivery system, the design-build team is responsible for long-term operations and maintenance of the facility. This approach takes advantage of the efficiencies of design-build-operate-maintain, while allowing the public owner to completely or partially defer financing of the project. The public sector takes advantage of the financial resource of the design-build team to finance the project. Financing can be complete or partial and short-term or long-term. Therefore, design-build-finance-operate-maintain project delivery system attempts to combine the advantages of both design-build-operate-maintain and design-build-finance project delivery systems. Table 2.7 summarizes the allocation of responsibilities in a typical design-build-finance-operate-maintain contract.

Table 2.7. Roles and Responsibilities in Design-Build-Finance-Operate-Maintain

	Own	Design	Build	Operate & Maintain	Finance
Design-Build-Finance-Operate-Maintain	Public	Private	Private	Private	Public/Private

CHAPTER 3

STATE DOT SCANNING

In this chapter, we present a review of private financing programs in three state DOTs: Florida, Texas, and Virginia. The scanning process includes review of several critical issues in the respective sate DOTs in the following areas:

1. State Statutes
2. Project Selection Process
3. Unsolicited Proposals
4. Organization and Responsibilities
5. Project Information

3.1. Florida DOT

3.1.1. State Statutes

Florida state legislature has enacted the P3 enabling legislation for transportation projects under Title XXVI: Public Transportation of the Florida Administrative Codes. Chapters 334.30 and 339.139 of Title XXVI, which describe the "Transportation Administration" and "Transportation Finance and Planning" respectively, are the essential statutes that authorize the use of P3s and private financing for transportation projects.

3.1.1.1. Chapter 334.30 Public-Private Transportation Facilities (Enabling Legislation)

Chapter 334.30 authorizes Florida DOT (FDOT) to use P3 for the development of highway projects due to the significant public need of the rapid construction of additional safe, convenient, economic, and efficient transportation facilities for the purpose of traveling within the state. According to the statute, "*FDOT may develop new toll facilities or increase capacity on existing toll facilities through P3s … [that ensure] …the toll facility is properly operated, maintained, and renewed in accordance with department standards. However, according to the statute, toll revenues shall be regulated by the department… [and] …future increase of toll or fare revenues shall be included in the public-private partnership agreement*." FDOT may use innovative finance techniques under Chapter 334.30, which include federal loans (CFR 23 & 49), commercial bank loans, and hedges against inflation from commercial banks or other sources.

The statute enforces several restrictions on the duration and total dollar value of P3 agreements. Under this chapter of Florida statutes, P3 agreements shall be limited to a term not exceeding 50 years. However, if authorized by the secretary of transportation, P3 agreements may exceed up to 75 years and if authorized by the state legislature and governor, P3 agreements may exceed 75 years. With regard to the dollar value limits, FDOT is allowed to spend up to 15 percent of total federal and state funding in any given year on P3 projects.

3.1.1.2. Chapter 339.139 Transportation Debt Assessment

This chapter requires FDOT to provide a debt and debt-like contractual obligations load report on department commitments payable from the State Transportation Trust Fund. The debt obligation load report should contain the following items:

- Debt service payments that are required to be made under any resolution for the issuance of bonds secured by a lien on federal highway aid reimbursements or motor fuel and diesel fuel taxes
- Commitments of the department to pay the costs of operating, maintaining, repairing, and rehabilitating expressway and bridge systems under the terms of lease-purchase agreements which are enforceable by the holders of bonds
- Availability, milestone, and final acceptance payments that are required by public-private partnerships pursuant to Chapter 334.30 and that are not payments for the cost of operation or maintenance of a facility
- Agreed-on payments to a department contractor for work performed in the current fiscal year for which payment is deferred to a later fiscal year pursuant to Chapter 334.30
- Loan repayments on state infrastructure bank loans extended to a department district pursuant to Chapter 334.30

The Florida DOT is required to manage all levels of debt to ensure that by the beginning of the 2017–2018 fiscal year, not more than 20 percent of total projected available state and federal revenues from the State Transportation Trust Fund, together with any local funds committed to department projects, are committed to the debt and debt-like contractual obligations.

3.1.2. Project Selection

The Florida DOT does not have any published guidelines for selection and procurement of P3 projects. To facilitate the development of major P3 projects, FDOT may exercise any power possessed by it, including eminent domain, for development and construction of state transportation

projects. Because the legislation requires toll regulation by the department, P3 projects in Florida are design-build-finance-operate-maintain agreements with availability payment mechanism. The statutes do not authorize P3s with tolling on the Florida turnpike system as well. Before FDOT can start project procurement, a summary of the proposed P3 project should be provided to the office of the Governor, the chair of each legislative appropriations committee, the President of the Senate, and the Speaker of the House of Representatives with the following components:

- Description of any anticipated commitment by the department for the years outside the adopted work program
- Description of the anticipated impacts on the department's overall debt load
- Sufficient information to demonstrate that the project will not cause the department to exceed the overall debt limitation provided in Chapter 339.139

Figure 3.1 presents the map of FDOT P3 project pipeline as of 2007.

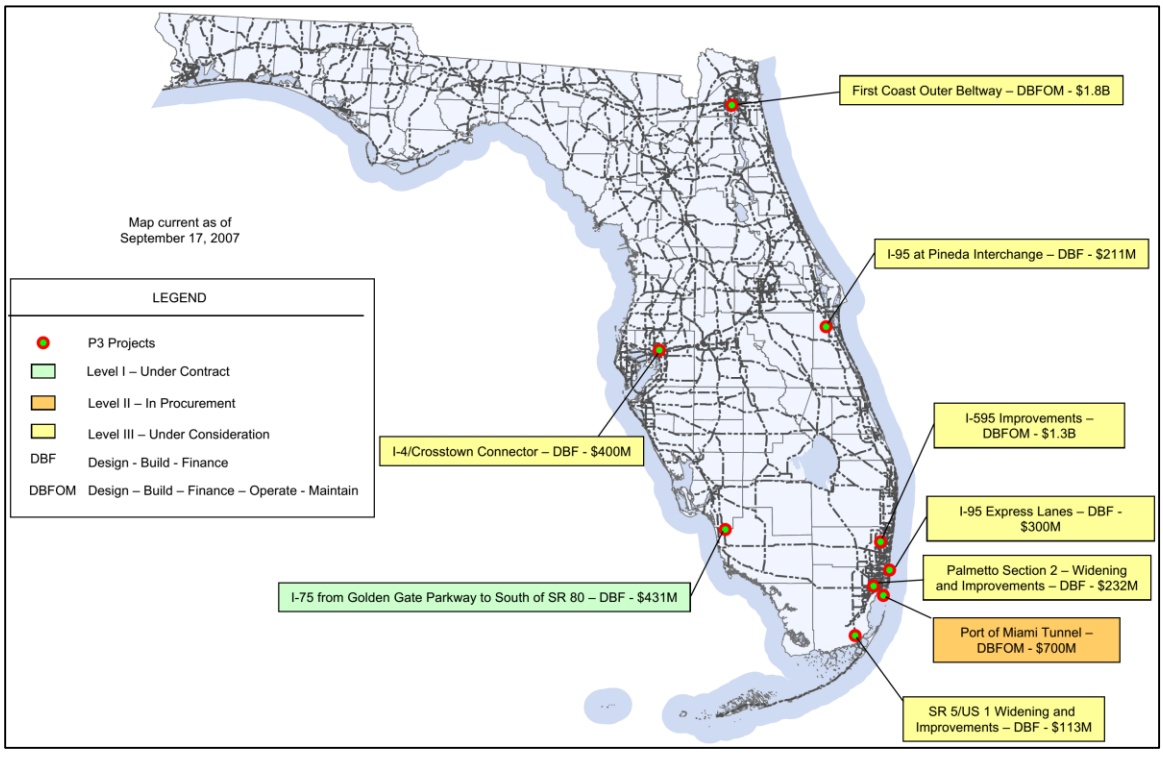

Figure 3.1. Map of FDOT P3 Project Pipeline as of 2007 (Adopted from FDOT 2014)

Selection of P3 projects that involve a form of private financing is performed considering statewide financial and program impacts and ability of FDOT to ensure compliance with applicable laws. If it is determined the project is a high priority and the need to advance the project outweighs the project's impacts on future district funding decisions and commitments, the project may be submitted as a P3 in the state transportation improvement plan.

3.1.3. Unsolicited Projects

Because of the significant public need, Chapter 334.30 of Title XXVI allows FDOT to accept unsolicited proposals from private entities:

> "…*The department may advance projects programmed in the adopted 5-year work program or projects increasing transportation capacity and greater than $500 million in the 10-year Strategic Intermodal Plan using funds provided by public-private partnerships or private entities to be reimbursed from department funds for the project as programmed in the adopted work program*."

FDOT is required to evaluate that whether the project meets the following requirements:

1. It is in the public's best interest
2. Would not require state funds to be used unless the project is on the State Highway System
3. Would have adequate safeguards in place to ensure that no additional costs or service disruptions would be realized…in the event of default or cancellation of the agreement by the department
4. Would have adequate safeguards in place to ensure that the department or the private entity has the opportunity to add capacity to the proposed project and other… [competing] …facilities
5. Would be owned by the department upon completion or termination of the agreement

Unsolicited proposals, which can be brief concept statements, should be accompanied by a $50,000 deposit for review of the proposal. If acceptable, and within executive direction, a 120-day

advertisement period begins that allows submission of potential competing proposals. Followed by the advertisement period, FDOT performs a best-value evaluation procurement and awards the contract to the responsible and responsive bidder or proposer.

3.1.4. Project Procurement

Procurement of P3 projects by FDOT follows a competitive best-value process that is based on generally accepted business practices. Prior to submitting proposals, private teams are evaluated based on their qualifications. The interested private teams should meet at least the minimum FDOT standards for qualification rule for professional engineering services and road and bridge contracting prior to submitting a proposal. The qualified private teams will be invited to submit proposals. In ranking proposals, FDOT may consider factors such as: professional qualifications, general business terms, innovative engineering or cost-reduction terms, finance plans, and the need for state funds to deliver the project. If only one proposal is received, FDOT reserves the right to negotiate or terminate the procurement. The private entities submitting proposals are required to provide an investment grade traffic and revenue study prepared by an internationally recognized traffic and revenue expert that is accepted by the national bond rating agencies. Accompanied by P3 proposals is a finance plan that identifies the project cost, revenues by source, financing, major assumptions, internal rate of return on private investments, and whether any government funds are assumed to deliver a cost-feasible project, and a total cash flow analysis beginning with implementation of the project and extending for the term of the agreement.

3.1.5. Organization and Responsibilities

The FDOT project finance office, which is a division of the office of comptroller, oversees the P3 program. The FDOT project finance office provides strategic financial solutions, analysis and reporting that ensures the advancement of transportation projects and consistency and accountability for the department. The goal of the project finance office is to achieve the following:

- Serve internal and external customers with innovative, timely financial solutions
- Maintain a customer-driven mentality
- Uphold integrity and seek innovation to the benefit of the people of Florida

The project finance office has several dedicated full-time staff members and whenever required, outside consultants (financial, technical, and legal) are regularly used to assist in the valuation of P3 projects. The project finance office has three major roles and responsibilities:

1. Provides support, coordination and oversight in the areas of P3s, the state infrastructure bank, and toll finance and facilities
2. Oversees the application and approval process for solicited and unsolicited proposals
3. Ensures compliance with Florida legislation

The project finance office at FDOT is an example of a mature project finance program that facilitates development of P3 projects and provides FDOT district offices with financial, technical, and legal support for project development and procurement.

3.1.6. Project Information

The Florida DOT has procured 16 P3 projects that involve private financing with a total dollar value of $8,008 million. Of this total, 13 projects were design-build-finance agreements and 3 were DBFOM agreements. Table 3.1 presents the detailed statistics of these projects.

Table 3.1. DBF and DBFOM Project Information Procured by FDOT

ID	Project Title	Contract Type	Financial Close Year	Contract Value ($M)	Developer
1	SR 79 Widening Washington County	DBF	2013	$98	Anderson Columbia Co./ Ajax Paving Industries
2	I-75, SR 80 to SR 78	DBF	2012	$72	De Moya/Leware Joint Venture
3	I-95 Widening, South of SR 406 to North of SR 44	DBF	2012	$118	Lane Construction
4	Florida, SR 9B-Phase 2, Jacksonville, Duval County	DBF	2012	$118	Deutsche Bank/ Superior Construction Joint Venture
5	Palmetto Expressway Improvement, Section 5 - SR 826/836 Interchange	DBF	2009	$564	Community Ashpalt/ Condotte/ de Moya
6	Florida, U.S. 19, Clearwater, Pinellas County	DBF	2009	$111	Hubbard Construction Co.
7	I-95 Widening/Pineda Causeway, Brevard County	DBF	2008	$199	Community Asphalt
8	Palmetto Expressway Improvement, Section 2, Miami-Dade County	DBF	2008	$192	Condotte/De Moya Joint Venture
9	US 1 Highway Safety Improvements	DBF	2008	$111	Community Asphalt
10	I-95 Express Lanes, Miami-Dade	DBF	2008	$139	C3TS (FL)/ MCM (FL)/ FCC Construction Co. (Spain)
11	I-75, Collier and Lee Counties	DBF	2007	$458	Anderson Columbia Co. (ACCI), and Ajax Paving Industries (API)
12	IROX I-75	DBF	2007	$461	Anderson Columbia/Ajax Paving/HDR/Metric Engineering
13	I-4/Crosstown Connector	BF	2010	$404	PCL Civil Constructors/Archer Western Contractors
14	I-4 Ultimate Improvements	DBFOM (AP)	2014	$2,014	John Laing Investments/ Skanska-Granite-Lane-HDR/Jacobs
15	Port of Miami Tunnel	DBFOM (AP)	2009	$1,113	Meridiam (90%)/ Bouygues (10%)
16	I-595 Managed Lanes	DBFOM (AP)	2009	$1,833	ACS (50%)/ TIAA-CREF (50%)

Figure 3.2 presents number of P3 projects procured by FDOT:

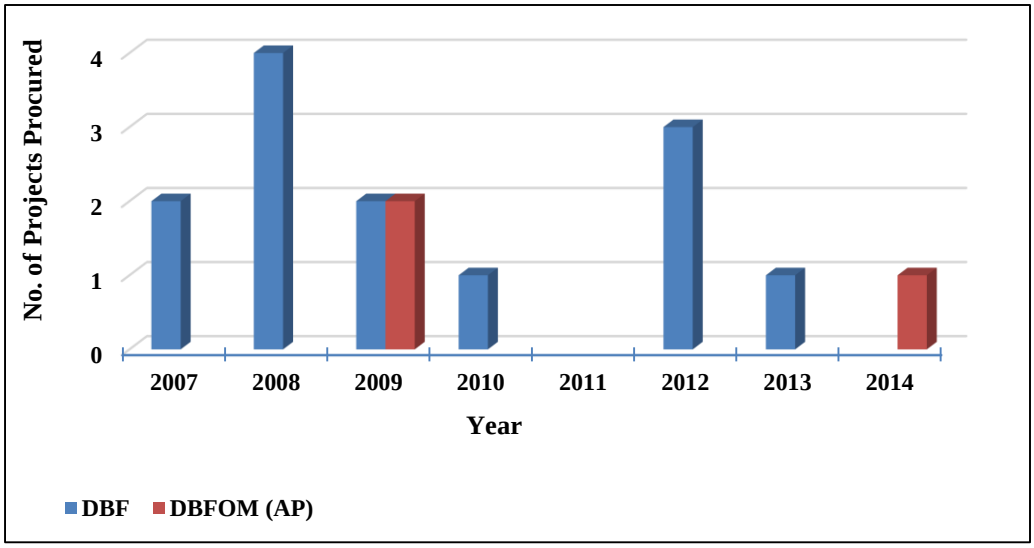

Figure 3.2. No. of P3 Projects Procured by FDOT

Figure 3.3 presents dollar value of projects procured by FDOT:

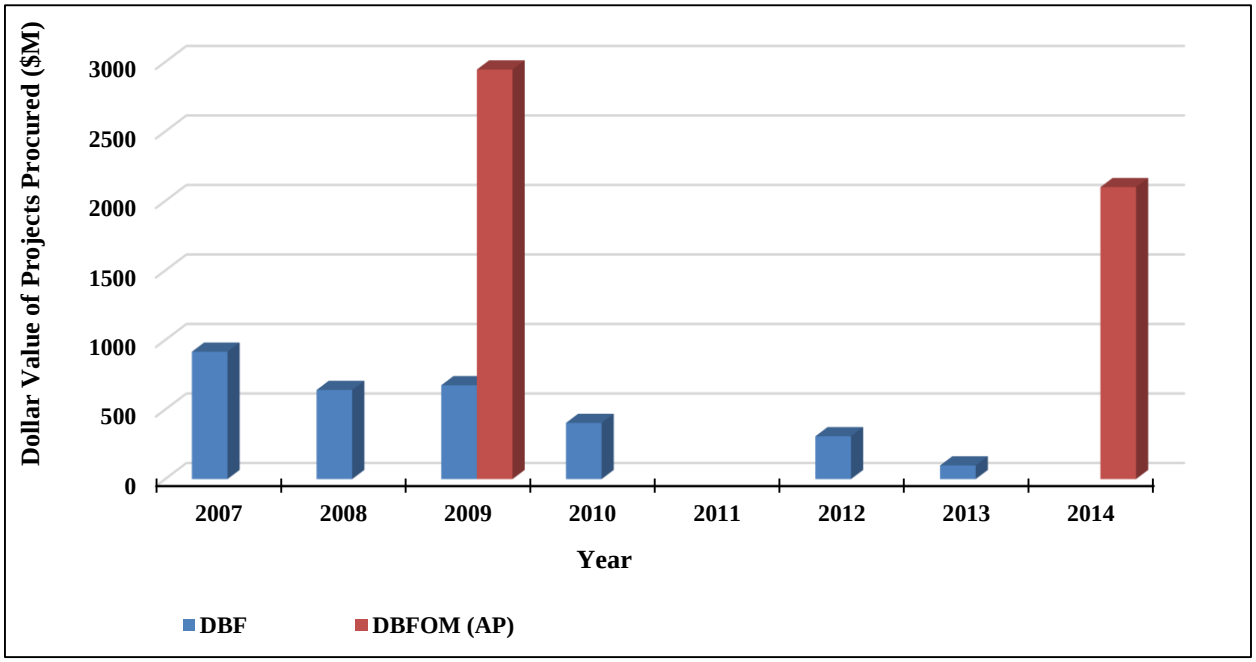

Figure 3.3. Dollar Value of Projects Procured by FDOT

3.2. Texas DOT

3.2.1. State Statutes

Development and procurement of highway projects in Texas is governed by the Texas Transportation Code, Title 6: Roadways. Chapter 223 of Title 6 is the P3 enabling legislation that authorizes Texas DOT (TxDOT) as well as regional toll-way or mobility authorities or a county to enter into P3 agreements with private entities. Chapters 223, 362, and 371 describe the required procedures for development and procurement of highway P3 projects in Texas, which can be developed only under comprehensive development agreements (CDAs).

3.2.1.1. Chapter 223: Bids and Contracts for Highway Projects (Enabling Legislation)

Chapter 223 of Title 6 describes highway contracts and bidding provisions. Subchapter E, comprehensive development agreements, is the enabling legislation that authorizes TxDOT to enter into a comprehensive development agreement (CDA) with a private entity to design, develop, finance, construct, maintain, repair, operate, extend, or expand the following:

- Toll project
- Project that includes both tolled and non-tolled lanes and may include non-tolled pertinent facilities
- Project in which the private entity has an interest in the project
- Project financed wholly or partly with the proceeds of private activity bonds
- Non-tolled state highway improvement project authorized by the legislature

According to Chapter 223, CDA means an agreement that, at a minimum, provides for the design and construction, reconstruction, rehabilitation, expansion, or improvement of the above mentioned projects. CDA may also provide for the financing, acquisition, maintenance, or operation of a project as defined in Chapter 223. Therefore, CDAs, same as P3s, allow TxDOT to utilize private financing for highway project development.

Chapter 223 enforces restriction on the authority to use CDAs as well as the total annual dollar value disbursed for CDAs. The authority to use CDAs expires on August 31, 2017. The authority remains viable for "SH 99 (Grand Parkway)" as an exception but expires for "SH 183 managed lanes" project on August 31, 2015. The annual amount of money disbursed from the state highway fund and the Texas mobility fund to CDAs may not exceed 40% of the dedicated federal-aid highway program in that fiscal year. TxDOT may not also enter into more than three contracts in each fiscal year prior to 2015.

3.2.2. Project Selection

Texas statutes recognize the need for investment in the Texas highway system. Chapter 223 of the Texas transportation code clearly identifies the projects that are authorized to be developed through CDAs in detail. However, TxDOT is authorized to enter into a CDA for a project that is identified in TxDOT unified transportation program or the statewide transportation plan. TxDOT is also required to prepare a list of projects considered feasible and eligible for tolling in the unified state transportation program. Projects that are considered suitable candidates for tolling require approval from the Texas transportation commission[2]. Selection of CDAs or other P3 agreements for toll-financed projects requires an evaluation based on:

- Oversight of the toll project
- Maintenance and operations costs of the toll project
- The structure and rates of tolls
- Economic development impacts of the toll project
- Social and environmental benefits and impacts of the toll project

Once projects are approved, TxDOT performs procurement to enter into a CDA with a private entity.

[2] The Texas transportation commission consists of five commissioners appointed by the governor with the advice and consent of the senate to govern TxDOT.

3.2.3. Unsolicited Proposals

Texas statutes allow for submission of unsolicited proposals for CDAs by private entities. Unsolicited proposals are required to include the following:

- Information regarding the proposed project location, scope, and limits
- Information regarding the private entity's qualifications, experience, technical competence, and capability to develop the project
- Any other information the TxDOT considers relevant or necessary

If TxDOT decides to issue a RFQ or authorizes further evaluation of an unsolicited proposal, a request for competing proposals and qualifications will be published in the Texas Register. The request for competing proposals and qualification will include the proposal evaluation criteria, the relative criteria weights, and a deadline by which proposals must be received. Unsolicited proposals are required to be accompanied by a nonrefundable fee sufficient to cover all or part of its cost to review the proposal. If TxDOT finds the unsolicited proposal responsive, the proposal may go through a legal and budget review by the state, which is explained in the next section.

3.2.4. Project Procurement

TxDOT performs a competitive two-step procurement to determine the best-value proposal for CDAs. The first step of this procurement process results in a short-list of qualified bidders that will be invited to submit their proposals. TxDOT allows significant level of flexibly with respect to CDA proposals. Private entities may submit alternative proposals based on CDAs having different terms, with the alternative terms in multiples of 10 years, ranging from 10 years to 50 years. However, a CDA that includes toll collection by a private entity may not exceed a total term of 52 years from the start of revenue operations. Once deemed responsive, proposals will be evaluated by the division director of the Texas Turnpike Association (TTA) based on a best-value formula that must allocate at least 70 percent of the weighting to the cost proposal. Figure 3.4 presents the CDA evaluation process.

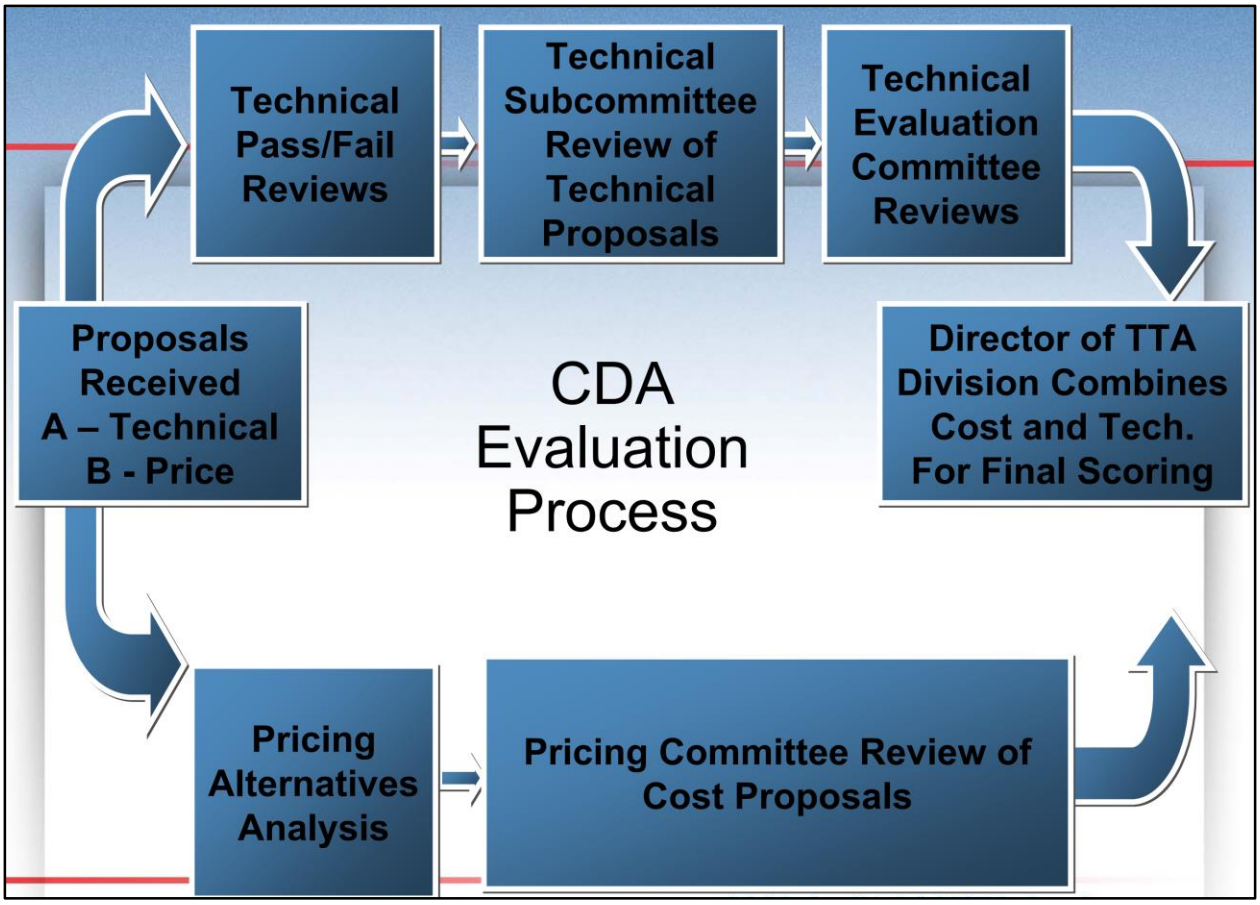

Figure 3.4. Texas CDA Evaluation Process (Adopted from TxDOT 2008)

The best-value proposals have to go through a legal review by the office of the state attorney general. TxDOT or other eligible project entities are required to pay an examination fee, which they may later seek reimbursement for from the private entity that submitted the CDA to the state attorney general. In addition to the legal evaluation of CDAs prior to contract execution, TxDOT should provide the Texas legislative budget board with:

- The proposed CDA to be executed
- The proposal submitted by the apparent best-value proposer
- A financial forecast the includes the following:
    - Projected toll revenues during the planned term of agreement
    - Estimated construction and operation costs
    - Projected income of the private entity during the planned term of agreement

3.2.5. Organization and Responsibilities

The office of planning and projects at TxDOT is responsible with oversight on planning activities as well as development of a new enterprise project management system, and leading CDA and P3 programs. The planning and projects office has three divisions: (1) Planning and Environment; (2) Project Management; and (3) Strategic Projects. The division of strategic projects oversees procurement policies, right of way acquisition, and support activities for P3s, known as CDAs. The division completes feasibility studies of candidate CDA projects and assists TxDOT districts during project design and construction. The division also oversees turnpike corridor system planning, performs toll feasibility planning, and provides coordination of regional mobility authorities. The organizational structure of the strategic project division requires formation of project teams and appointment of project managers for individual CDAs based on the location and requirements of the project. Development of P3 projects by TxDOT is on a project by project basis that requires higher level of integration with private entities through CDAs. Following contract execution, projects are viewed as independent CDAs that allow future expansion or execution of options as set forth in the agreement.

3.2.6. Project Information

The Texas DOT has procured 9 P3 projects that involve private financing with a total dollar value of $8,640. Of this total, 1 project was a design-build-finance agreement and 8 others were DBFOM agreements. Table 3.2 presents the detailed statistics of these projects.

Table 3.2. DBF and DBFOM Project Information Procured by TxDOT

ID	Project Title	Contract Type	Financial Close Year	Contract Value ($M)	Developer
1	SH-601	DBF	2012	$370	JD Abrams
2	SH 99	DBFOM (AP)	-	$1,000	RFP to be released in 2014
3	SH 288 Toll Lanes	DBFOM (Toll)	-	$600	RFP to be released in 2014
4	SH 183	DBFOM (DBF Gap Financing + O&M)	2014	$850	Kiewit Development/ Parsons/ Austin Bridge/ Plenary Group/Infrastructure Corp.of America
5	N Tarrant Express Phase 2, Seg 3, I-35W	DBFOM (Toll)	2013	$1,400	NTE Mobility Partners Segments 3 LLC: Cintra (Ferrovial)/ Meridiam
6	I-635	DBFOM (Toll)	2010	$2,615	Cintra (Ferrovial) (51%)/Meridiam Infrastructure (29.1%)/APG (13.3%)/ Dallas Police and Fire Pension System (6.6%)
7	SH-130 Seg 5 and 6	DBFOM (Toll)	2008	$1,358	Cintra (Ferrovial) (65%)/ Hastings Fund Management and Zachry American/Utilities Trust of Australia (35%)
8	N Tarrant Express Phase 1	DBFOM (Toll)	1993	$2,047	Cintra/Meridiam/Dallas Police and Fire Pension Fund
9	Camino Colombia	DBFOM (Toll)	1999	$85	Camino-Colombia Inc./Granite

Figure 3.5 presents number of DBF and DBFOM projects procured by TxDOT:

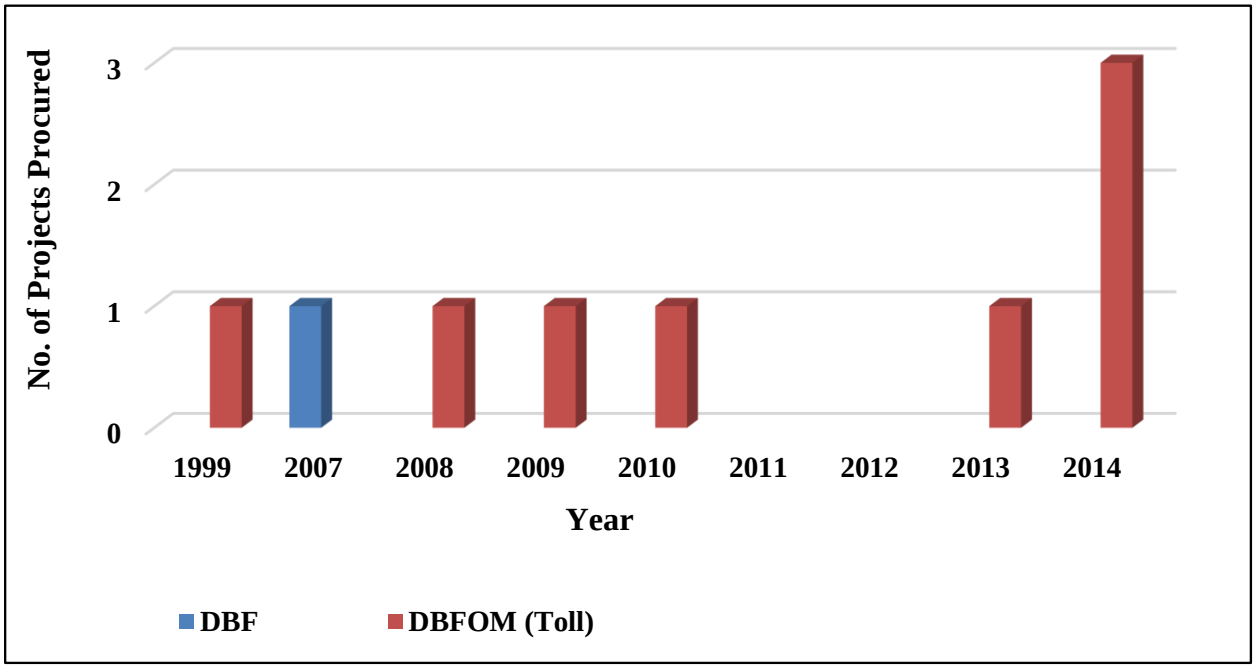

Figure 3.5. No. of DBF and DBFOM Projects Procured by TxDOT

Figure 3.6 presents dollar value of projects procured by TxDOT:

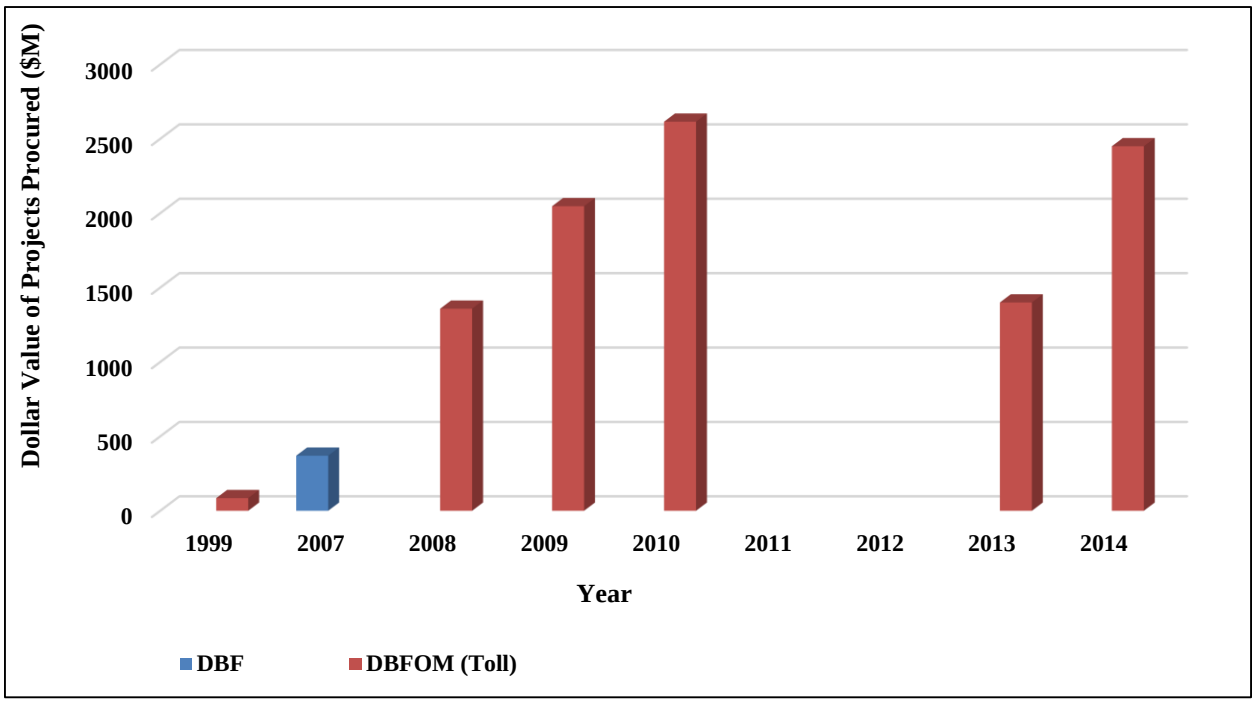

Figure 3.6. Dollar Value of DBF and DBFOM Projects Procured by TxDOT

3.3. Virginia DOT

3.3.1. State Statutes

The "Public-Private Transportation Act of 1995" (Chapter 22, Title 56 of the code of Virginia), as amended (PPTA), is the legislative framework enabling the Commonwealth of Virginia, local governments, and certain other public entities as defined in the PPTA, to enter into agreements authorizing private entities to develop and/or operate qualifying transportation facilities. The PPTA recognizes the Commonwealth of Virginia's Office of Transportation Public-Private Partnerships (OTP3) as the responsible entity for developing and implementing a statewide program for project delivery via PPTA. PPTA constitutes guidelines set forth in the "PPTA Implementation Manual" regarding project development and implementation for PPTA projects. Development of P3 projects by Virginia's transportation agencies (Virginia DOT, The Virginia Port Authority, The Department of Rail and Public Transportation, The Department of Aviation, The Virginia Commercial Space Flight Authority, and The Department of Motor Vehicles) should follow the "PPTA Implementation Manual".

3.3.2. Project Selection and Development

3.3.2.1. Project Delivery Framework

The PPTA project delivery framework, which is an important section of the PPTA implementation manual, is intended to streamline and standardize the PPTA process in order to enhance the delivery of transportation infrastructure projects in Virginia. The project delivery framework establishes a step by step project development process for both planned and unsolicited projects.

Figure 3.7 presents the PPTA project delivery framework.

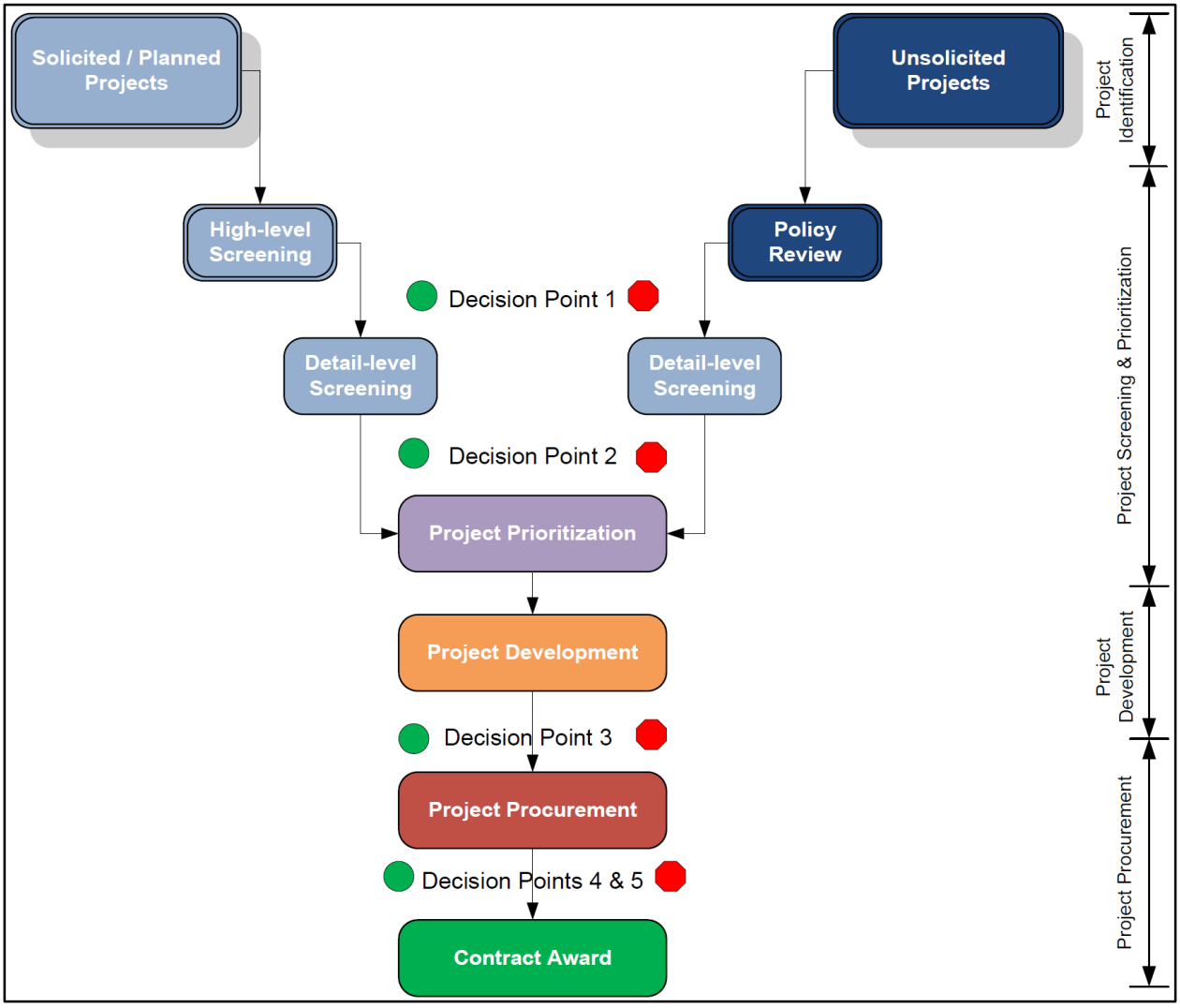

Figure 3.7. Virginia PPTA Project Delivery Framework

3.3.2.2. Project Identification

Project identification for the PPTA program is performed either through the solicited/planned projects' list or unsolicited proposals. The potential sources of planned projects include PPTA priority of the governor, legislative mandate, statewide transportation improvement program, and six-year improvement program. The planning staff across all state transportation agencies and metropolitan planning organizations (MPOs) are encouraged to identify projects for PPTA

consideration. The OTP3 is permitted to receive and evaluate unsolicited proposals from private entities. If approved for further evaluation, unsolicited proposals will be analyzed in further detail and may be considered for prioritization or procurement.

3.3.2.3. Project Screening and Prioritization

Once projects are identified for PPTA consideration, they have to go through a screening process before prior to being prioritized for development and procurement. The project screening methodology used by PPTA is "…*a means of systematically and consistently applying evaluation criteria to solicited projects and unsolicited proposals submitted as candidates for PPTA consideration.*" (PPTA 2014) The project screening process for both solicited projects and unsolicited proposals is organized in two phases:

1. High-level analysis
2. Detail-level analysis

High-level screening for solicited projects is performed by OTP3 using specific criteria as follows:

- Project Complexity
- Accelerating Project Development
- Transportation Priorities
- Project Efficiencies
- Ability to Transfer Risk
- Funding Requirement
- Ability to Raise Capital

Projects that pass the high-level analysis will advance to the detail-level analysis phase. The detail-level analysis is performed by OTP3 on the basis of project desirability and feasibility for both planned/unsolicited projects. The evaluation criteria for detail-level analysis are as follows:

- Desirability of the Project:
    - Public Need
        - Congestion relief, safety, new capacity and preservation of existing assets
    - Public Benefits
        - Benefits to the community, the region, and/or the commonwealth

        - Achieve performance, safety, mobility or demand management goals
    - Economic Development
        - Enhance the commonwealth's economic development
        - Attract or maintain competitive industries and businesses to the region
    - Market Demand for PPTA Delivery (Not required for unsolicited proposals)
    - Stakeholder Support
        - Public and Business Community Support
        - Public Involvement Strategy
    - Legislative Considerations
- Feasibility of the Project:
    - Technical Feasibility
        - Project Approach
        - Proposed Project Schedule
        - Operation
        - Meets/Exceeds Environmental Standards
        - Right-of-way (ROW), Utilities, Maintenance, etc.
    - System Interface and Compatibility
        - Land Use Impacts
        - Compatibility with existing multimodal transportation facilities
    - Financial Feasibility
        - Source of public funds and their use
        - Financial plan feasibility (obtaining reasonable funding and financing)
    - Legal/Legislative Feasibility
    - Project Risks
    - Concession Term
    - End of Term Arrangement

Once projects are approved in the screening phase, the PPTA steering committee will perform project categorization. Projects are categorized into short-term, medium-term and long-term priorities using the following project prioritization criteria:

- Commonwealth policy, priorities and objectives
- OTP3 recommendations
- Public funding requirement
- Availability of human resources
- Market timing
- Current level of project development

The OTP3 is responsible with conducting project screening at least every two years and will monitor and update the priority list as necessary. Figure 3.8 presents Virginia's prioritized project pipeline.

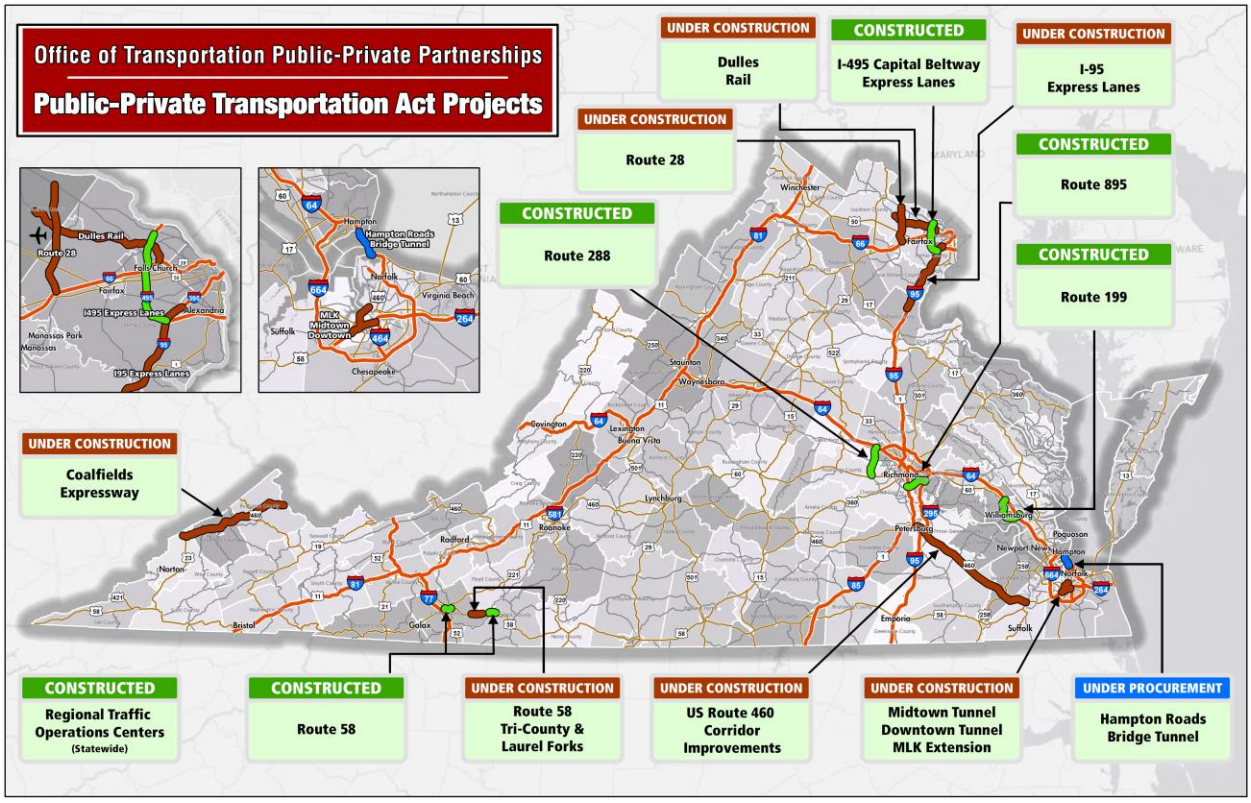

Figure 3.8. Virginia PPTA Project Pipeline

3.3.2.4. Project Development

During the project development phase, critical project activities, such as further defining project scope, analyzing compliance with environmental requirements, and performing value-for-money analysis will advance. The OTP3 is required to conduct a value for money (VfM) analysis to determine the project benefits to the public. Value for money analysis outputs provide the OTP3 and PPTA steering committee with useful information for project decision-making. The PPTA guidelines require that the procurement of a PPTA project represent a better combination of lifecycle costs and quality in terms of VFM when compared with the most likely alternative delivery method.

3.3.3. Unsolicited Proposals

Private entities interested in submitting an unsolicited proposal are required to pay a non-refundable, nonnegotiable Proposal Review Fee of $50,000 to the Treasurer of Virginia. Unsolicited proposals that pass initial evaluation will go through the policy review process that requires evaluation using the following criteria:

- The project conforms to Virginia's transportation goals and the policy objectives of the administration
- The project satisfies a public need for timely development and/or operation of a transportation facility
- The project addresses a demonstrated need as identified in a state, regional, and/or local transportation plan
- The project interfaces with existing and planned transportation systems
- The project is at a sufficient level of development that a procurement process can be run that includes an element of price competition
- The project would make the transportation facility available to the public in a more efficient and/or less costly fashion

- The project is consistent with federal requirements and potential agreements for federal funding and/or approval (PPTA federal financial constraints)
- The project is not currently on the list of proposed Solicited Projects

Unsolicited proposals that pass the policy review process have to go through the same detail-level analysis as planned projects.

3.3.4. Project Procurement

Procurement of PPTA projects is conducted under a competitive two-phase process. The main objective of the OTP3 is to define a pool of qualified potential proposers. The qualified prospers will be invited to submit a proposal. The OTP3 may hold proprietary one-on-one meetings with project teams to solicit feedbacks on the proposed RFP. Figure 3.9 presents the PPTA project procurement process.

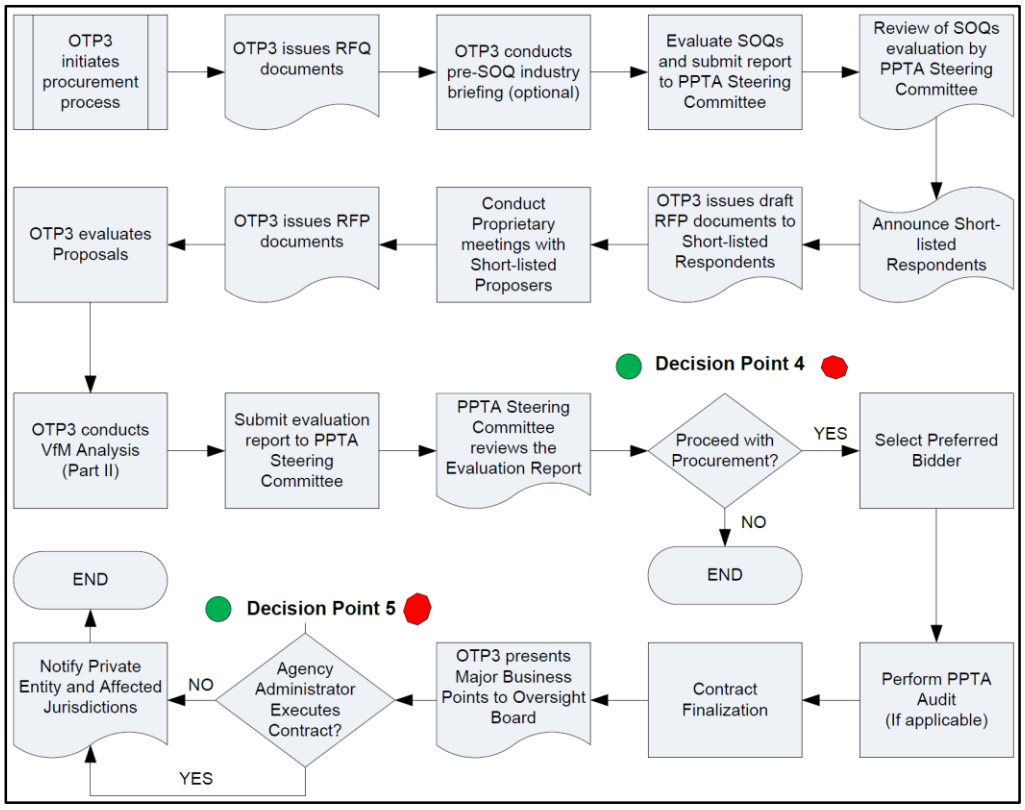

Figure 3.9. PPTA Two-Phase Procurement Process

3.3.5. Organization and Responsibilities

Development of PPTA projects in Virginia follows a centralized approach unlike any other U.S. state. The PPTA steering committee and OTP3 are the two responsible entities that oversee and manage the statewide PPTA program. Figure 3.10 presents the organizational structure of Virginia's PPTA program.

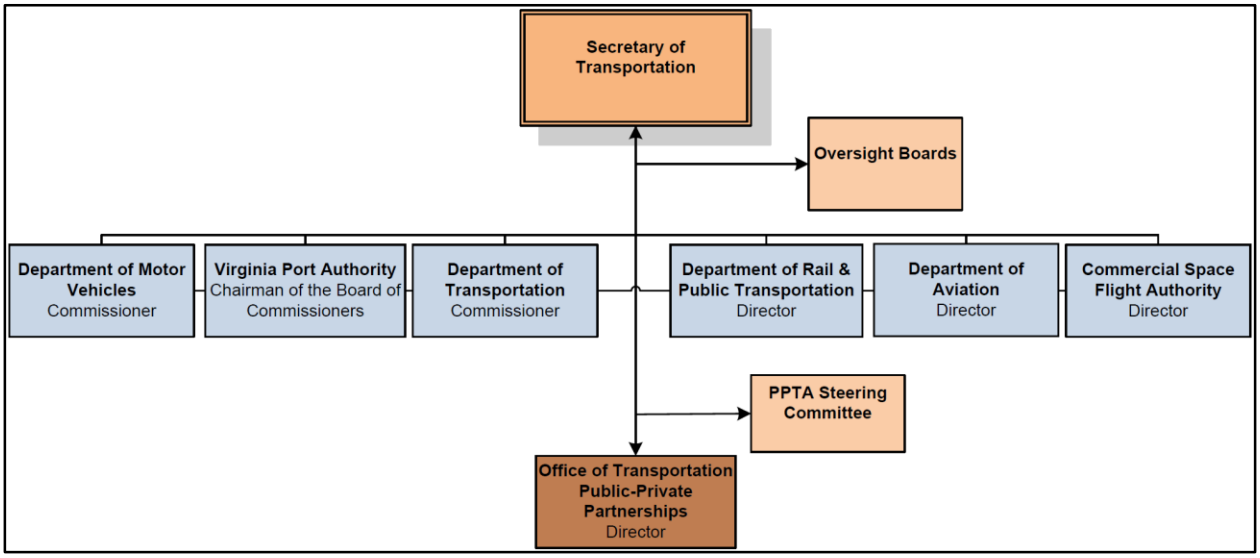

Figure 3.10. Virginia PPTA Structure

3.4.5.1. PPTA Steering Committee

The PPTA Steering Committee is the major oversight entity that determines project priorities for those projects that have passed the detail-level analysis phase. The PPTA steering committee provides policy recommendation to the Secretary of Transportation regarding unsolicited proposals based on the OTP3's policy review and comments received from affected jurisdictions and/or the general public. During project procurement, the committee reviews OTP3's recommendation for evaluation of SOQs and proposals. PPTA steering committee is chaired by the transportation commissioner and is comprised of mainly VDOT and other state transportation agency directors.

3.4.5.2. OTP3

The OTP3 has a director and a deputy director that are appointed by Virginia's secretary of transportation. The OTP3 also has a communications/business development manager, 4 program managers and 2 deputy program managers. The OTP3 works directly with the respective agency administrator for each PPTA project that corresponds within that particular mode. The organizational structure allows for flexibility in leveraging resources and expertise from other disciplines, such as planning, right-of-way acquisition, environmental and utilities, among others, within the relevant agency at various stages of the project identification, screening and prioritization, development, procurement, construction and maintenance phases.

3.3.6. Project Information

The Virginia DOT has procured 7 P3 projects that involve private financing with a total dollar value of $7,514M. Of this total, 1 project was a design-build-finance agreement and 6 others were DBFOM agreements. Table 3.3 presents the detailed statistics of these projects.

Table 3.3. DBF and DBFOM (Toll) Project Information Procured by VDOT

ID	Project Title	Contract Type	Financial Close Year	Contract Value ($M)	Developer
1	Route 460 Corridor Improvements Project	DBF	2012	$1,396	Ferrovial Agroman, S.A./ American Infrastructure
2	Midtown Tunnel	DBFOM (Toll)	2012	$2,100	Skanska 50%/Macquarie 50%
3	I-95 Express HOT Lanes	DBFOM (Toll)	2012	$940	Transurban 67.5%/ Fluor 32.5%
4	Route 58 Widening	DBFOM (Toll)	2009	$119	Branch Highways Inc.
5	I-495 Capital Beltway HOT Lanes	DBFOM (Toll)	2007	$1,998	Transurban 67.5%/ Fluor 32.5%
6	Pocahontas Parkway Lease	DBFOM (Toll)	2006	$611	Transurban/Fluor/URS
7	Dulles Greenway	DBFOM (Toll)	1993	$350	TRIP II and AIE/ Franklin Haney (Concession was sold to Macquiarie Group on 2005)

Figure 3.11 presents number of DBF and DBFOM (Toll) projects procured by VDOT:

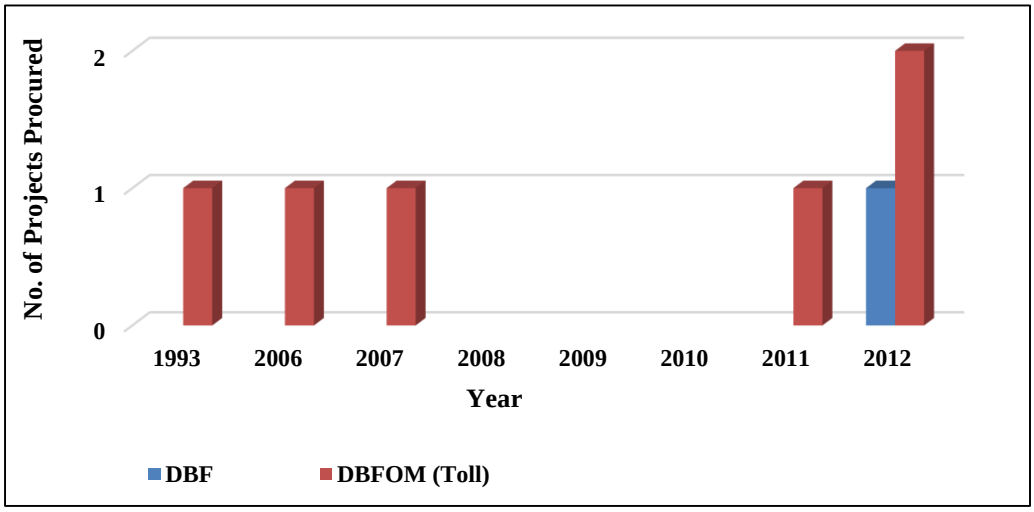

Figure 3.11. No. of DBF and DBFOM (Toll) Projects Procured by VDOT

Figure 3.12 presents dollar value of DBF and DBFOM (Toll) projects procured by VDOT:

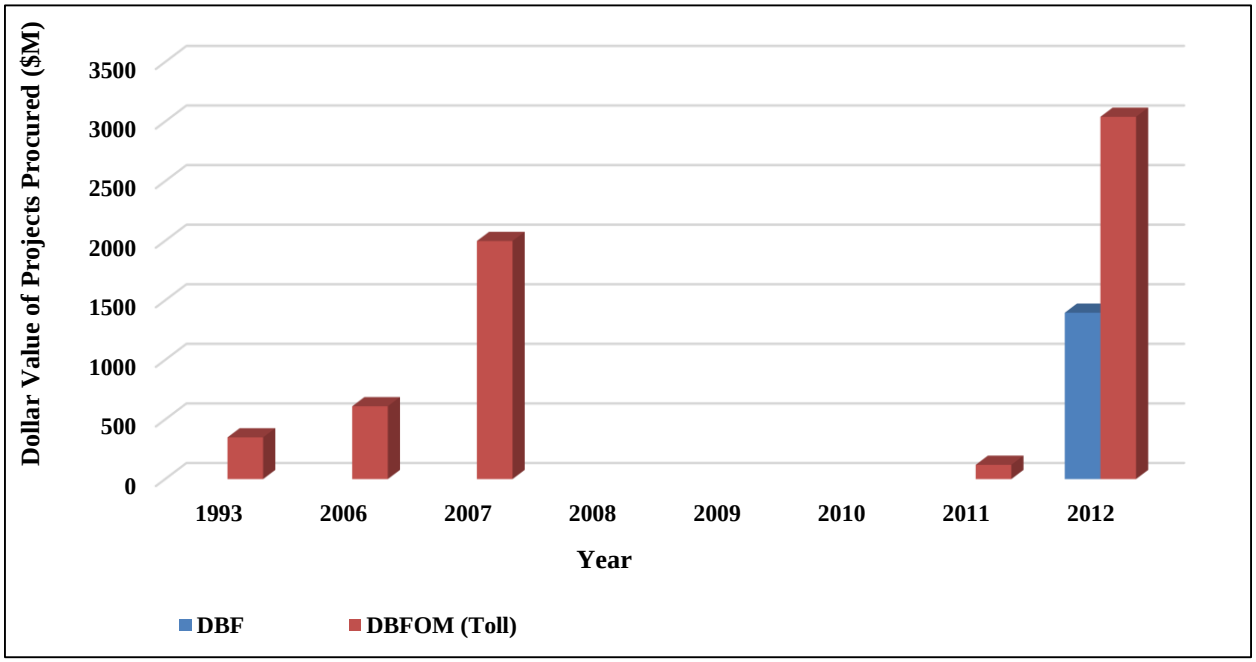

Figure 3.12. Dollar Value of Projects Procured by VDOT

CHAPTER 4

THE DECISION-MAKING PROCESS FOR INCORPORATING PRIVATE FINANCING IN PROJECT DELIVERY

In this chapter, we discuss the survey questionnaire process that was used to perform a review of state-of-practice with respect to private financing in state DOTs across the U.S. We then present the survey results and discuss the findings in subsequent sections.

4.1. Survey Design

The survey questionnaire research method was used to perform a review of state-of-practice with respect to private financing in state DOTs across the U.S. Considering the objectives of this study, a survey questionnaire was designed to understand differences among state DOTs in the following areas of highway project finance: (1) Main objectives and major concerns of state DOTs for decision-making to involve private financing in highway project development; (2) Critical factors in evaluation of financial qualifications and proposals during project procurement; (3) Barriers to adoption of private financing for highway projects; (4) Improvement areas, and required organizational and institutional skills that enhance the adoption of private financing for highway projects. Within each section, the survey respondents were required to identify and rate statements based on their importance and expand responses if it was deemed appropriate. We employed unipolar rating scales and labeled scales with words for better response quality (Schaeffer and Presser 2003). The main goal of the authors in the survey design was to achieve a sufficient level of rigor. Thus, every attempt was made to avoid general arguments and include well-explained statements that had grounds in the academic or professional project finance literature.

The developed survey, entitled "Private Financing Practices for Delivery of Highway Projects," was pilot tested by five industry professionals who are knowledgeable about highway project financing. Based on the feedbacks from these individuals, minor modifications were made to the survey terminology or statements with the potential to deviate the respondents from the survey objectives. The final survey was distributed in an online format through e-mail to experts in 50 state DOTs from September 1st to October 31st, 2013. Due to the interdisciplinary nature of the survey, the main target audience included chief financial officers, innovative contracting program managers, and state construction engineers within the 50 state DOTs. In total, representatives from 35 state DOTs responded to the survey. The average professional experience of the respondents

was in excess of 20 years. In the case of incomplete responses, we only used the portion of the survey that was answered completely. The next section presents the survey results and analysis.

4.2. Analysis of Survey Results

4.2.1. Descriptive Information of the Responding Agencies

In the first section of the survey, information was gathered about the latest statutory authorization regarding the use of private financing for delivery of transportation projects. Table 4.1 presents the current status of legislative authorizations for using private financing in the states that responded to the survey. Most of the state DOTs that did not respond to the survey, lack the statutory authorization for involving the private sector in financing transportation projects. State DOTs practice private financing under diverse enabling legislation frameworks. These results are consistent with the findings of the national scanning conducted by the National Conference of State Legislatures (NCSL) that shows statutes in 35 states allow use of private financing for highway projects (FHWA 2014b).

Table 4.1. Latest Authorization Status, and Number and $ Value of Highway Projects Procured Using Private Financing for the Responding State DOTs

State DOT	Private Financing Authorized	No. of Projects	Value of Projects ($M)	State DOT	Private Financing Authorized	No. of Projects	Value of Projects ($M)
Alabama	Yes	-	-	Montana	No	-	-
Arkansas	Yes	-	-	Nebraska	No	-	-
California	Yes	4	2,788	Nevada	Yes	2	1,800
Colorado	Yes	2	735	New Jersey	No	-	-
Connecticut	Yes	-	-	New York	No	-	-
Florida	Yes	17	8,507	North Carolina	Yes	3	1,391
Georgia	Yes	1	840	Ohio	Yes	1	819
Hawaii	No	-	-	Oklahoma	No	-	-
Idaho	No	-	-	Oregon	Yes	1	375
Illinois	Yes	1	1,000	South Carolina	No	-	-
Iowa	No	-	-	South Dakota	No	-	-
Kansas	No	-	-	Texas	Yes	5	6,313
Kentucky	No	-	-	Utah	Yes	-	-
Louisiana	Yes	-	-	Vermont	No	-	-
Maine	Yes	-	-	Virginia	Yes	7	7,514
Michigan	Yes	2	45.3	Washington	Yes	-	-
Missouri	Yes	-	-	Wyoming	No	-	-
Minnesota	Yes	-	-	**Total**		**46**	**32,127**

State DOTs utilize private financing on various project types. The responding state DOTs indicated that private financing is more suitable for new construction and widening of existing roads, and construction and modification of managed lanes. Figure 4.1 presents various project types that are developed by the responding state DOTs using private financing. It can be seen that private financing is considered suitable for all project types except road resurfacing and renewal projects that are typically considered simple projects without major financing challenges and may suit fast-track nature of the design-build project delivery system (Golder Associates Inc. et al. 2011).

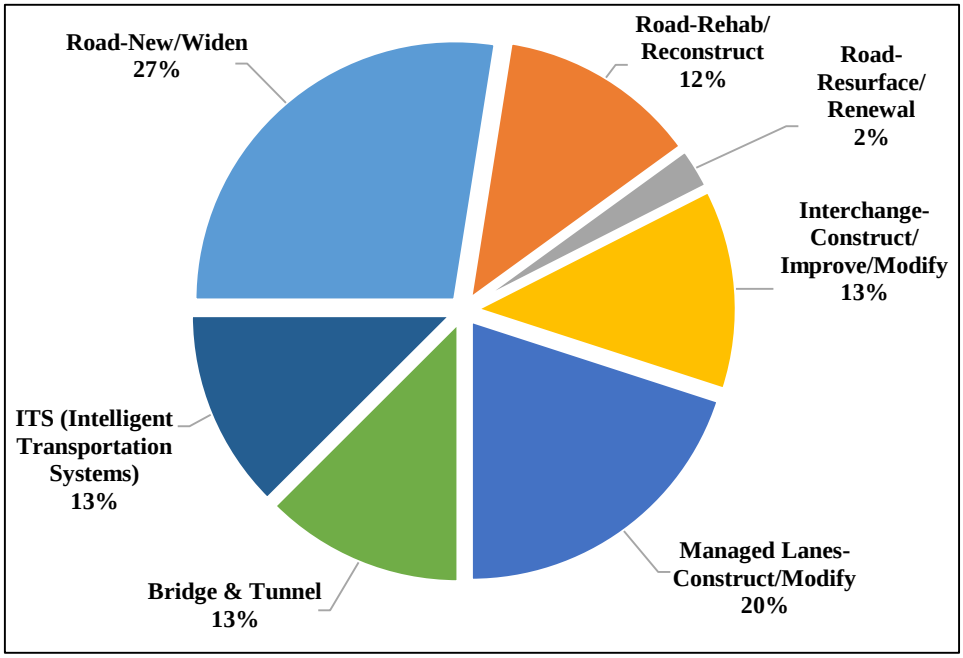

Figure 4.1. Highway Project Types Developed Using Private Financing

Most of the responding state DOTs indicated that they proceed with the decision of involving private financing in projects prior to the start of the preliminary design phase. However, some state DOTs consider private financing alternatives for their projects later at the final design or even at the right-of-way (ROW) acquisition phase. This lack of consistency in responses may be attributed to non-standard transportation planning and project development processes across metropolitan

planning organizations (MPOs) and state DOTs (FHWA 2007), unique challenges of mega-projects (Shane et al. 2012), and delay in funding authorizations (CBPP 2011). As it can be seen in Figure 4.2, in most agencies, financing decisions are made in the concept development or earlier phases.

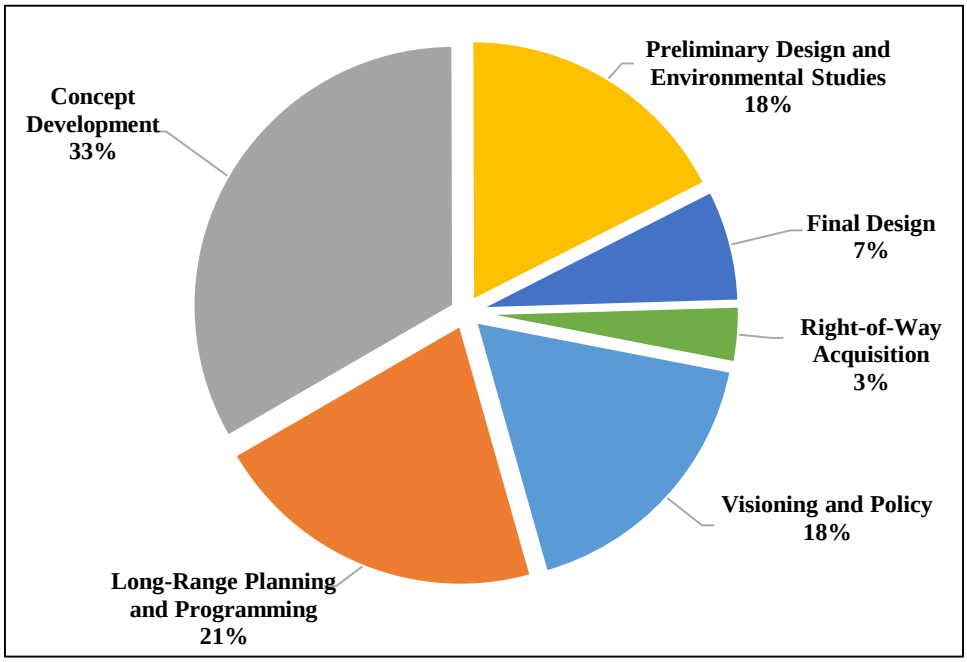

Figure 4.2. Project Development Stage for Private Financing Consideration in Highway Projects

Results of the first section of the survey indicated that most of the responding state DOTs are in favor of engaging private financing in almost all project types to deliver the backlog of projects. When state DOTs were asked about governing policies and guidelines regarding the use of innovative financing mechanism in transportation projects, 30 agencies (85% of respondents) indicated lack of such policies or guidelines. Furthermore, more than half (55%) of the respondents noted that their agencies do not conduct any industry outreach activities for procurement of projects that involve private financing.

4.2.2. Main Objectives and Major Concerns of State DOTs for Decision-Making to Involve Private Financing in Highway Project Development

It is critical to understand the main objectives of agencies for utilizing private financing in highway projects. Although state DOTs show considerable interest in private sector involvement in financing highway projects, development and planning for such pojects involves a myriad of issues that can affect successful project delivery. The respondents were asked about the relative importance of main objectives and critical issues that affect the decision-making process for incorporating financing in project delivery services. Each respondent described the relative significance of each main objective and each critical issue in his/her response to the survey question.

As depicted in Figure 4.3, the most important objectives of state DOTs in using private financing for development of highway projects include development of delayed projects, expediting contract award to avoid future cost escalation, starting project procurement in lieu of funding shortfalls, accelerating project completion, development of high quality projects by the private teams to ensure timely compensation, payment deferrals to the future, and overcoming cash flow constraints. State DOTs pursue these objectives to develop the backlog of their delayed projects and use deferred payment mechanisms in anticipation of future funding. On the other hand, objectives, such as obtaining financing services beyond in-house capabilities, transferring financing and interest rate risks to the private sector, and encouraging competition and innovation are ranked relatively lower in the list of major objectives. The relative ranking of objectives provided by the survey respondents shows that state DOTs typically think of private financing more as an instrument to bridge their funding gaps and financing shortfalls and less as an innovative solution to gain life cycle cost efficiencies, encourage competition, and transfer critical project risks to the private sector.

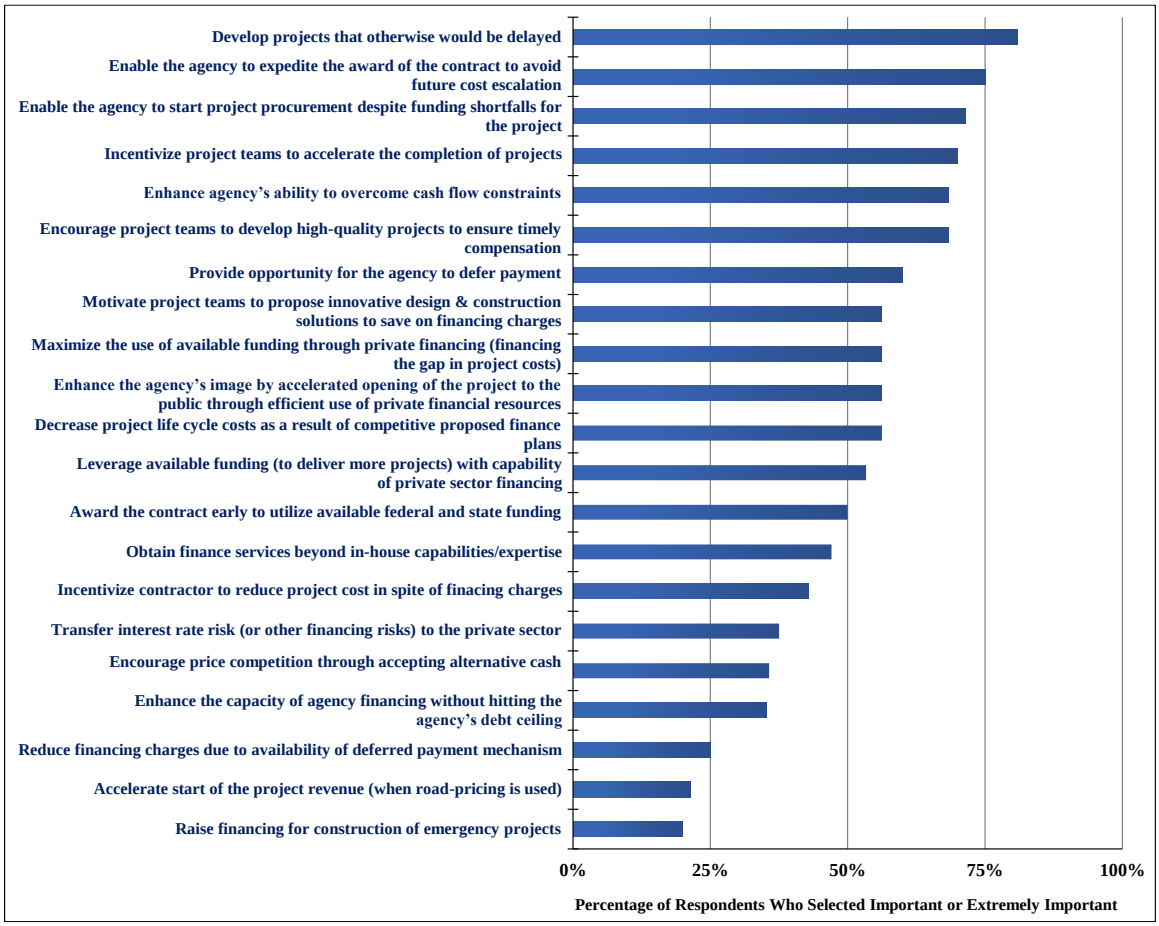

Figure 4.3. Main Objectives of State DOTs for Utilizing Private Financing in Development of Highway Projects

Figure 4.4 presents the major concerns that affect the decision of utilizing private financing in highway projects. According to the survey respondents, statutory constraints for incorporating financing in public procurement, higher financing costs compared to conventional financing mechanisms, time-consuming and complex procurement processes, higher risk premiums and inflated bids, public concerns and political opposition, and difficulty in evaluation of financial proposals are among the main concerns of state DOTs when utilizing private financing in highway projects. It can be seen that procurement-related issues, such as statutory limitations for utilizing flexible procurement methods, and lack of adequate resources and expertise for procurement of projects with complex financial structures are major concerns for state DOTs.

These procurement-related concerns are agency-specific issues that have roots in the conventional project delivery processes that have inherent limitations to cope with complex needs of highway projects developed by private financing. State DOTs are also concerned with higher risk premiums and inflated bids, excessive returns for the private sector, and creation of improper financial obligation for the agency. However, these perceptions may not be supported by empirical evidences. For instance, Monk et al. (2013) showed that private financing can be less costly than public financing. Engel et al. (2010) also showed that the realized benefits of expedited delivery to the public can offset higher financing costs and risk premiums.

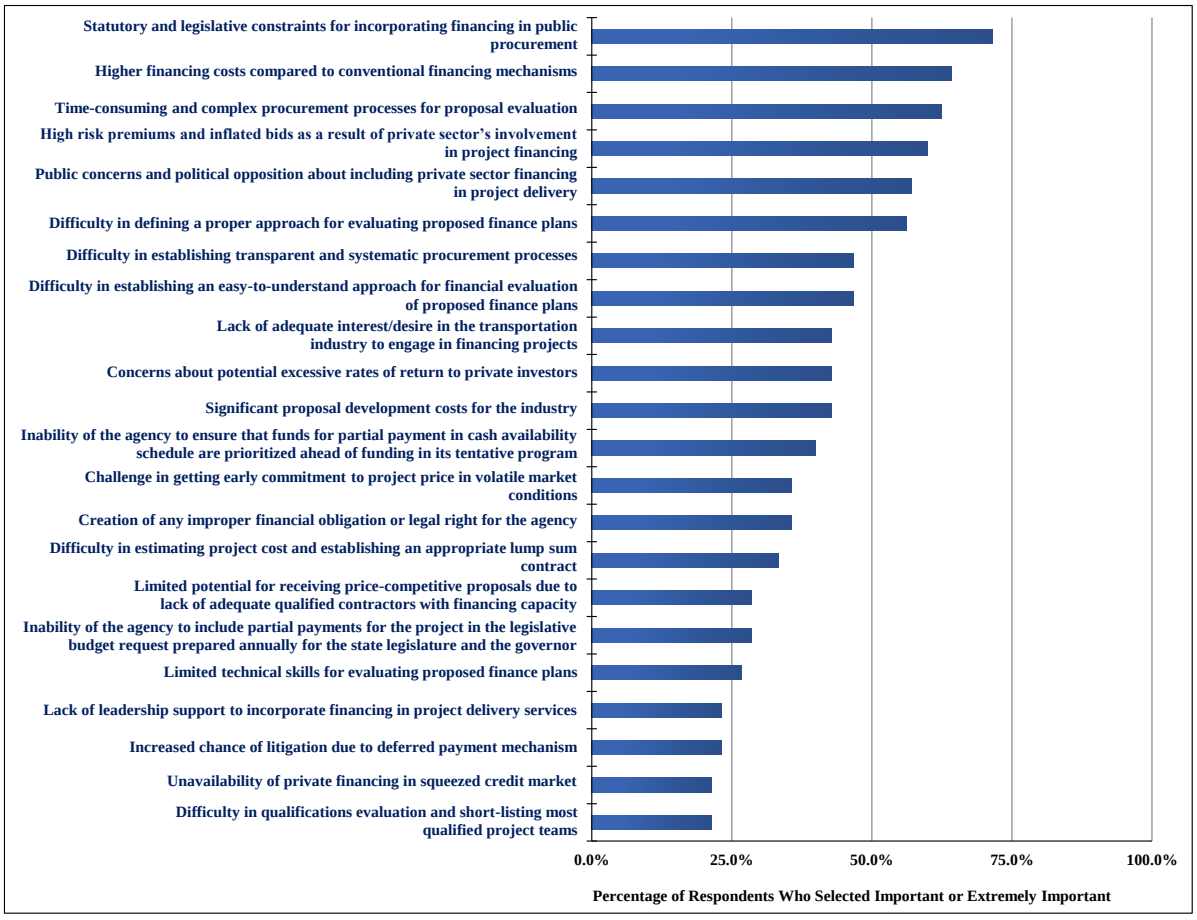

Figure 4.4. Major Concerns of State DOTs for Utilizing Private Financing in Development of Highway Projects

4.2.3. Critical Factors in Evaluation of Financial Qualifications and Financial Proposals during Project Procurement

During the project procurement, state DOTs need to extensively evaluate financial qualifications and financial proposals of project teams. When asked about the importance of essential criteria for financial qualifications, financial relationships, responsibilities of ownership, and organizational structure of all of the entities involved in the project team are recognized as key factors. As shown in Figure 4.5, the financial health of the entities involved, qualifications and experience of key personnel in the project team, the credit capacity of the project financiers, and past experience of the project team with respect to private financing are also acknowledged as important factors for the evaluation of private sector's financial qualifications.

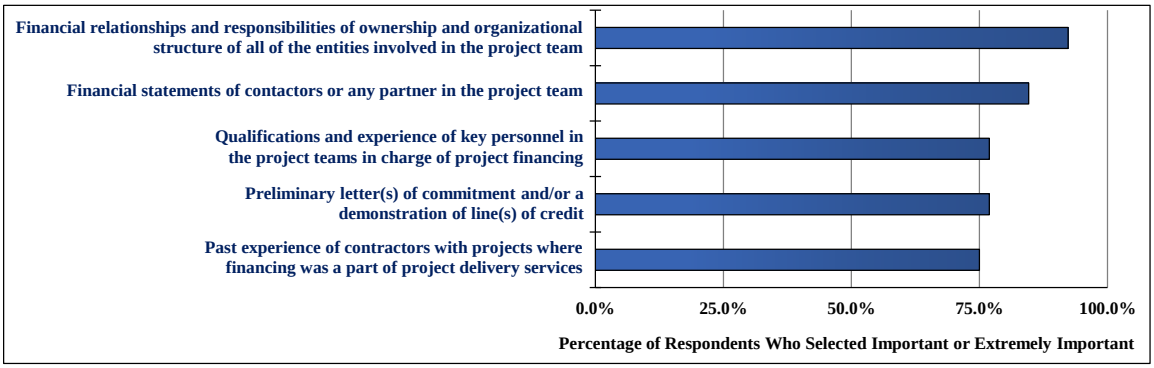

Figure 4.5 Critical Factors in Evaluation of Private Sector's Financial Qualifications

Figure 4.6 summarizes the relative importance of main criteria used by responding state DOTs for financial proposals evaluation. Certification by financial institutions for avoiding collusion, the ability of the project team to meet project's cash flow requirements, financial warranties provided by project teams, provisions for projected total costs, and proposed funding sources and their use, are all important financial evaluation criteria. State DOTs consider these factors for evaluation of financial plan soundness and the ability of the project team in meeting project's cash flow requirements. In addition, other factors, such as proposed project funding sources and uses of funds,

description of the financial elements used to finance the project, financing costs for the project, proposed schedule of payments by the project teams, and estimate of the time required for financial close of third party financing are considered important in evaluation of private sector's financial proposals.

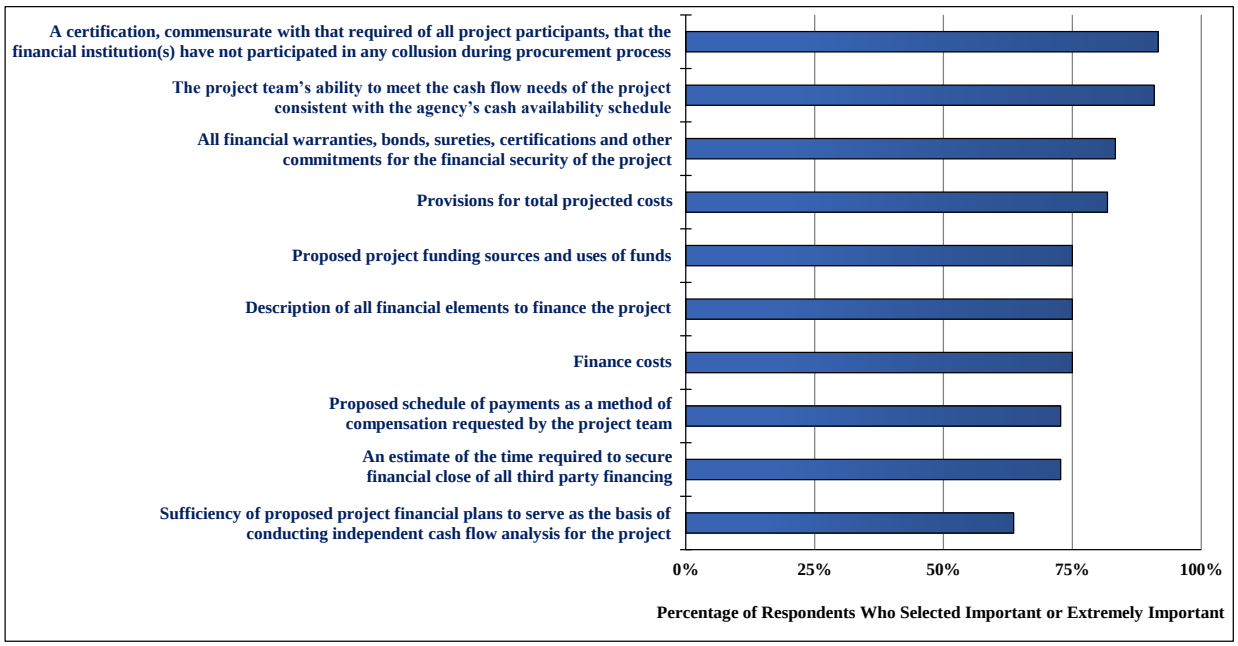

Figure 4.6. Critical Factors in Evaluation of Private Sector's Financial Proposals

4.2.4. Barriers to Adoption of Private Financing for Highway Projects

Involvement of private financing in highway projects is subject to several barriers that are summarized in Figure 4.7 based on their relative importance specified by the survey respondents. Legislative and statutory limitations, inadequate support and commitment from the leadership, and fiscal restraints of governments are recognized as deal-breaker issues that limit the ability of state DOTs to successfully deliver projects using private financing. Constraints related to procurement methods and contract management, complexities in project financing, and lack of coordination and communication between public agencies are identified as major institutional and organizational barriers to private financing.

Uncertain market conditions, such as turbulent financial market and bankruptcy of project financiers, are important issues that are beyond the control of state DOTs but greatly affect the ability of state DOTs to utilize private financing for highway projects. Negative public perception and interagency coordination and communication are also ranked relatively high in the list of major barriers. Barriers, such as labor relation issues, poor prospects for economic growth, and desire not to try new procurement methods, are important issues but are not conceived as critical as the other barriers discussed above.

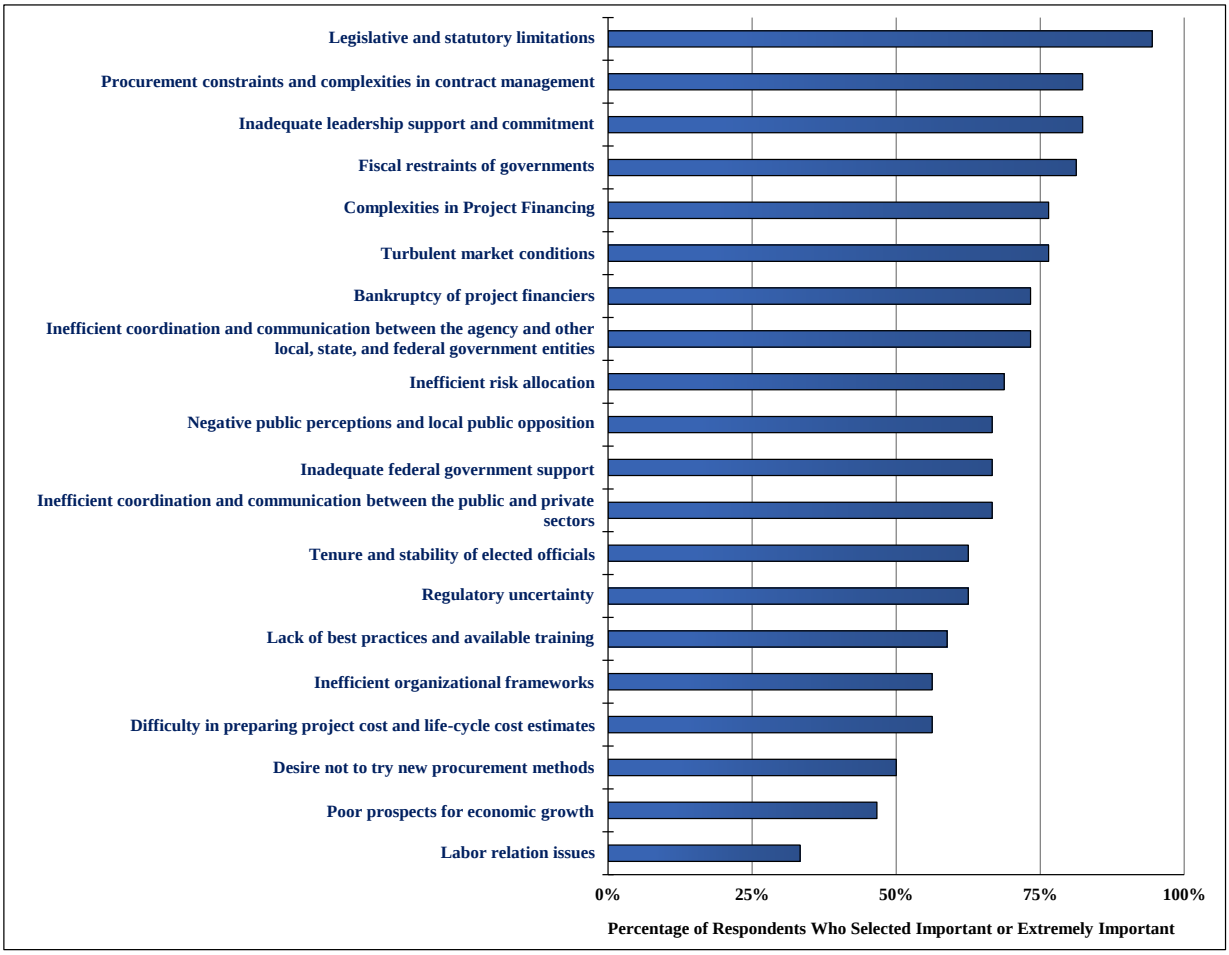

Figure 4.7. Barriers to Adoption of Private Financing for Highway Projects

4.2.5. Improvement Areas, and Required Organizational and Institutional Skills that Enhance the Adoption of Private Financing for Highway Projects

State DOTs as owners of transportation infrastructure projects along with local, state, and federal governments, are the key players that can facilitate adoption of private financing initiatives. When survey respondents were asked about necessary improvement areas, they ranked legislative flexibility, commitment from the leadership, utilizing flexible procurement methods, enhanced public awareness, and proper allocation of financing risks among the best practices that can facilitate involvement of private sector in highway project financing (Figure 4.8). Commitment of the leadership to provide necessary support from political authorities and the legislative flexibly to allow innovative project financing contribute to the elevation of the current state of private financing in highway projects. Enhanced public awareness regarding the transportation investment needs can mitigate public opposition that is a deal-breaker issue for most state DOTs to utilize private financing (Layton and Hsu 2008). State DOTs rely on organizational and institutional skills of their project management teams to address complexity of highway project financing.

According to the survey respondents, projects that include private financing require specific expertise, such as knowledge of financial management and analysis, quantitative risk analysis, familiarity with alternative procurement methods, and leadership and management skills. Figure 4.9 presents the relative ranking of organizational and institutional skills required for effective incorporation of private financing in development of highway projects. Although these organizational and institutional skills have the potential to enhance project financing and delivery practices within agencies, their implementation requires significant shift in mindset, in order to overcome the resistance for change within the agency (Garvin 2010). Currently, most state DOTs rely on outside legal, financial, and technical advisors for providing these services. However, most respondents believe that there is a perceived need to develop certain skills internally to enhance the in-house capabilities of state DOTs in order to expand their private financing programs.

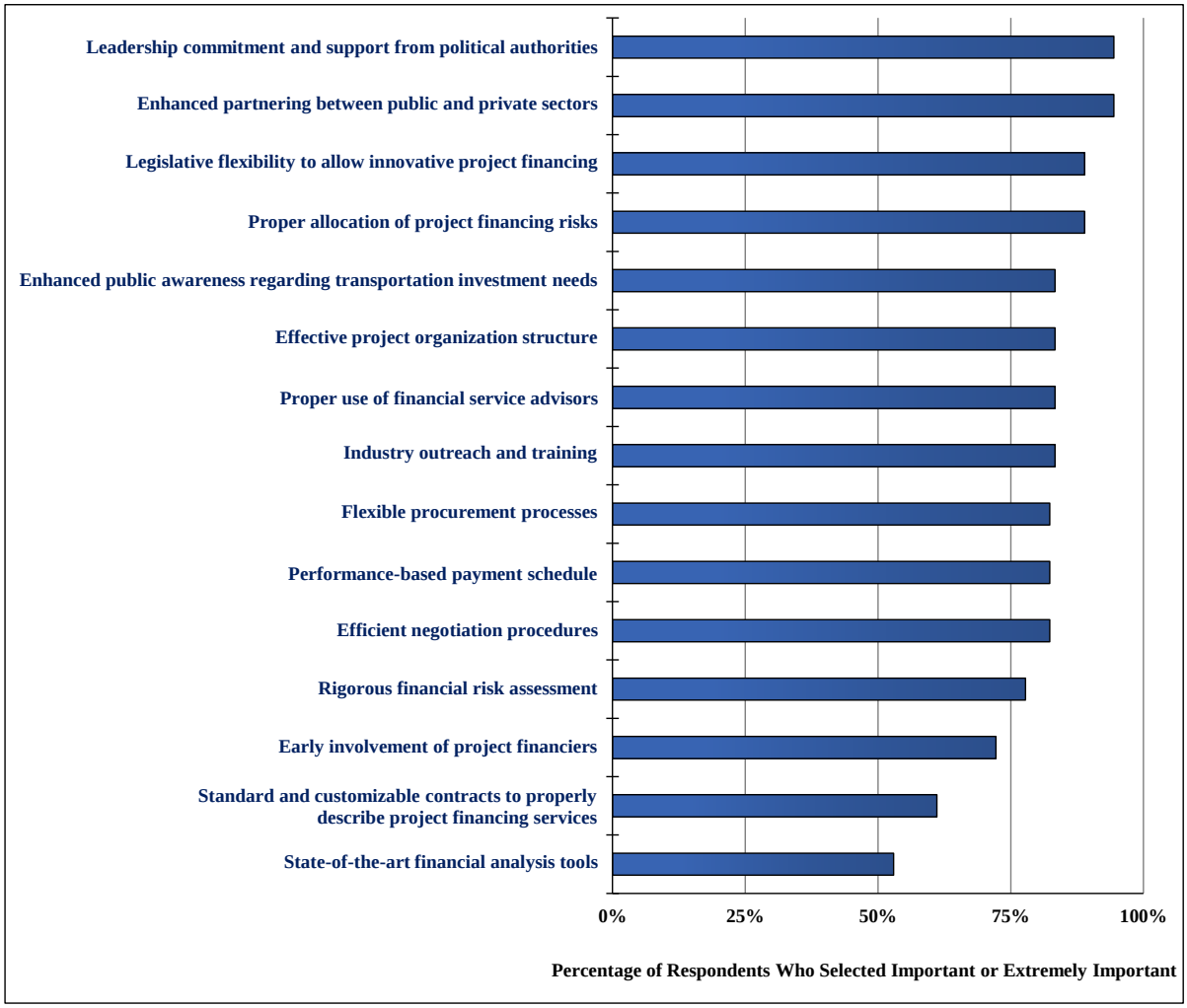

Figure 4.8. Improvement Areas that Can Enhance the Adoption of Private Financing for Highway Projects

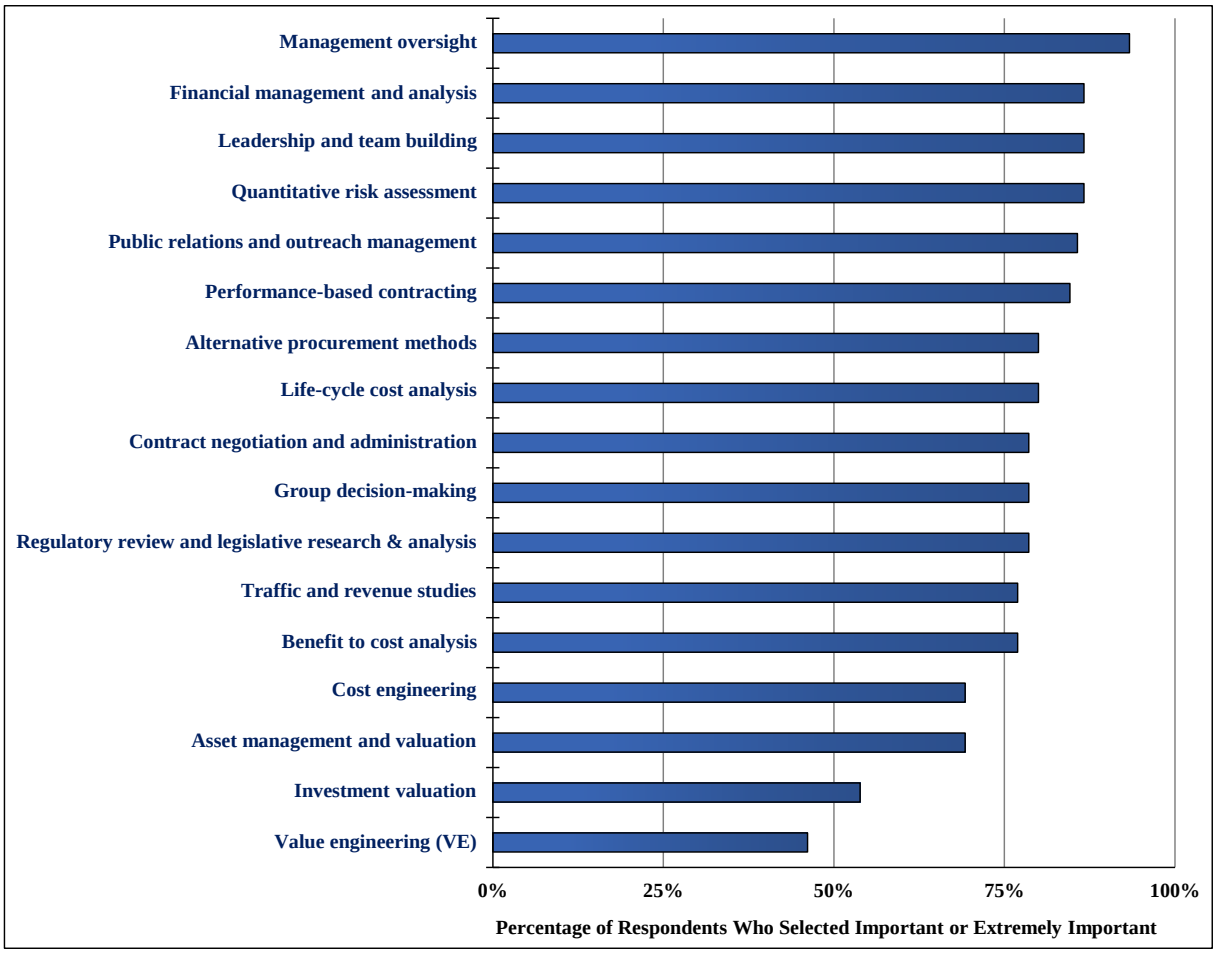

Figure 4.9. Required Organizational and Institutional Skills for Incorporating Private Financing in Development of Highway Projects

4.3. Discussion

The incorporation of project finance mechanisms in infrastructure project delivery has resulted in different forms of public private partnerships (P3s), such as design-build-finance and design-build-finance-operate-maintain-transfer, and long-term lease concessions for a variety of project types (FHWA 2014b; Siemiatycki 2009). Survey results show that although state DOTs are adopting P3s for various project types, only a handful of states, namely California, Florida, Texas, and Virginia have established mature private financing programs for delivery of P3 projects. The survey findings show lack of uniformity in the project development stage for private financing consideration among state DOTs. Since the transportation planning and project development process in most state DOTs is aligned with the conventional design-bid-build project delivery system (PB et al. 2012), it is challenging to involve the private sector during early project feasibility analysis or the National Environmental Policy Act (NEPA) studies (Hannon et al. 2014). However, deviations from this traditional approach under the Special Experimental Project No. 15 (SEP-15) waivers from FHWA are experimented by TxDOT, FDOT, Pennsylvania DOT, and Oregon DOT. These waivers often involve early development agreements with the private sector prior to the completion of NEPA studies (FHWA 2014c). Therefore, it is possible to consider private financing as a viable option during early stages of project development.

4.3.1. Main Objectives and Major Concerns

The survey results show that state DOTs utilize private financing to deliver the backlog of delayed projects and accelerate project completion. These objectives are mainly oriented toward reducing the financial burden on public agencies. Accelerated project completion helps the state DOT with earlier project opening to the public which often results in significant benefit to the public that can offset the project finance costs (Engel et al. 2010). Furthermore, state DOTs also highlighted that expedited contract award helps them deal with future cost escalation that can pose major risks to the project. The survey findings are consistent with studies of the U.S. experience that indicate

objectives, such as better value for money, control of the public budget deficits, and reduction in capital investments by the public sector as major drivers for using private financing (Papajohn et al. 2011; Abdel Aziz 2007). The various concerns of state DOTs with respect to private financing are not surprising, given the broad range of risks and uncertainties associated with long-term P3 contracts. These concerns include a variety of procurement related issues and critical project risks that affect the private financing decisions by state DOTs, and are consistent with the literature.

4.3.2. Critical Project Procurement Factors

Successful private sector participation in financing highway projects relies upon selection of responsive financial proposals submitted by qualified bidders. The project procurement factors investigated in the survey are mostly categorized under private sector's financing capabilities and their ability to meet the specific financing needs of state DOTs. The survey results are consistent with findings of Zhang (2005a), which identifies and ranks 35 financial criteria that are deemed critical in evaluation of private sector financing capabilities. Zhang (2005a) categorizes the surveyed financing criteria under the following four dimensions: strong financial engineering techniques; advantageous finance sources and low service costs; sound capital structure and requirement of low-level return to investments; and strong risk management capability. A review of the private sector role in P3 project failures by Soomro and Zhang (2014) shows that problems, such as insolvency of the project company, cancelation of the concession, and not achieving value for money can be traced back to the project procurement phase. In fact, selection of unqualified bidders, lack of effective financing plans and financing capacity, and improper due diligence by the private sector are identified as major project failure mechanisms.

4.3.3. Private Financing Barriers and Improvement Areas

Legal limitations, political uncertainties, and inefficient public sector processes are among the major barrier categories that disrupt private sector involvement in financing public projects both in

the U.S. and globally (Zhang 2005b; Garvin 2010). The practice of private financing for highway projects in the U.S. suffers from the lack of proper statutory and regulatory frameworks that has resulted in autonomous project planning, financing, and procurement practices across the states. Another issue that can become a serious obstacle to implementation of P3 projects in the U.S. is negative public perceptions and local opposition. Combined with inadequate leadership support and lack of champions in the public sector, public opposition can disrupt project delivery and result in lengthy delays, high transaction costs, or even project cancelation (Rwelamila et al. 2014; Li et al. 2005). These barriers adversely affect state DOTs' project planning and development practice and limit the expansion of the U.S. project finance market.

Review of improvement areas and required organizational skills for adoption of private financing in highway projects shows consistency between the survey findings and the existing literature. Improvements, such as higher legislative flexibility can facilitate utilizing innovative financing mechanisms for various P3 project types (Garvin 2010). Leadership commitment can ensure the private stakeholders and project financiers that projects are real and are being developed in a transparent manner for the public benefit (Rwelamila et al. 2014; Zhang 2005c). Conducting industry outreach and involving private sector during early phases of project planning coupled with regulatory changes can extend the current scheme of private financing into different markets and various project types.

Chapter 5

INCORPORATING PRIVATE FINANCING IN PROJECT DELIVERY: CHALLENGES AND RECOMMENDED BEST PRACTICES

The design-build-finance (DBF) project delivery system involves a complex multi-party agreement between the design-build team and the state DOT. Design-build-finance contracts include several other influential agreements between the design-build team and lenders, equity investors, sureties, subcontractors, and technical, financial, and legal consultants. Figure 5.1 presents the structure of a DBF agreement. As it can be seen from the figure, DBF contracts can include several parties (e.g. 16 parties) with various degrees of involvement. Because of the complex structure of DBF agreements, a variety of issues can disrupt the project development and procurement processes. In this chapter, we delve into the deal-breaker issues and major challenges that can hinder incorporation of private financing in project delivery. We then present and discuss opportunities as potential recommended best practices that can help state DOTs with effective and efficient incorporating of financing in DBF agreements.

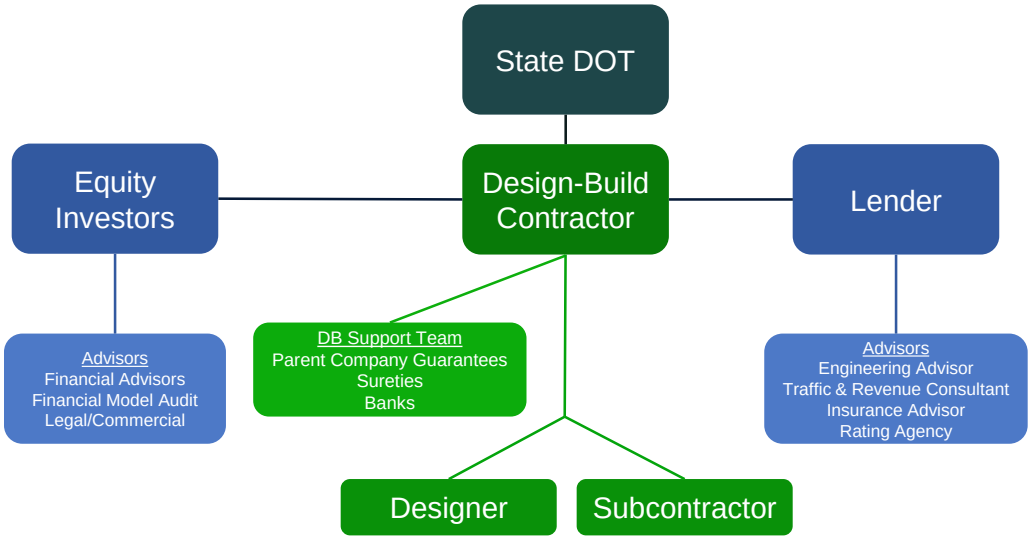

Figure 5.1. Structure of a DBF agreement (Adopted from Girard 2012)

In order to achieve the aforementioned objectives, we employed the interview research method to gain insight from the private sector participants on the state-of-practice with respect to private financing involvement in delivery of highway projects. The interviews enabled us to engage the interviewees in active conversation and document intriguing arguments on various aspects of project finance in the U.S., specifically, major challenges and enabling mechanisms for DBF projects. The interview questionnaire was designed considering critical issues, such as the decision-making process for incorporating financing in project delivery, the major challenges for DBF project development, the opportunities to improve the current state-of-practice, and next generation of private financing for highway projects in the U.S. Examples of questions that were asked include the following:

- Briefly describe the decision-making process for projects that involve private financing in your organization.
    - Describe strategic decision-making
    - Describe the proposal development process
- What are the major issues and challenges of incorporating private financing in highway project?
    - Describe major challenges pertinent to DBF projects
- What opportunities are available that can help both the public and private sector improve the current state-of-practice with respect to private financing?

A total of 20 structured interviews (19 phone and 1 in person) were conducted that involved private sector experts from the following organizations: State DOTs, development companies, investment banks, financial consultants, legal consultants, and think tanks. During the one-hour interviews,

every attempt was made to avoid deviations from the research objectives. In the remainder of this chapter, we present and discuss the interview results under the following two topics:

1. Deal-Breaker Issues and Major Challenges for Incorporating Financing into Project Delivery
2. Recommended Best Practices for the Development of Design-Build-Finance Projects

5.1. Deal-Breaker Issues and Major Challenges

The DBF project planning and development process is subject to various limitations and challenges. State DOTs face a myriad of issues, such as project financing challenges, transportation project planning challenges at the MPO and statewide levels, negative public perceptions and local opposition, and political instability (Kwak et al. 2009; Mallet 2008; Zhang 2005b). These challenges adversely affect state DOTs' project planning and development practice for DBF projects and limit the expansion of the U.S. private financing market. Based on interviews with highway private financing industry experts, the barriers and challenges to incorporating financing in project delivery are identified and categorized under the following two areas:

Deal-Breaker Issues:

Deal breaker issues are the issues that prohibit the private sector from participating in DBF projects:

- Legislative Issues
- Agency-Related Issues
- Issues related to Project Readiness
- Project Cancelation
- Creditworthy counterparty and payment security

Major Challenges:

Major challenges are the challenges that act as barriers for the private sector in effectively and efficiently incorporating private financing in DBF contracts:

- Legislative Challenges
- Agency-Related Challenges
- Differences between Transaction Costs of DBF and DBFOM Projects
- Balance Sheet and Surety-Contractor Relationship
- Timing and Conditionality of Payment
- Risk of Significant Change in the Interest Rate

- Differences between DBF and DBFOM project delivery systems in treating Operations & Maintenance and Life Cycle Cost issues
- Differences in Return on Investment of DBF and DBFOM projects
- Limitation in Offering Innovative Solutions in DBF projects compared to DBFOM projects

5.1.1. Deal-Breaker Issues:

5.1.1.1. Legislative Issues

The implementation of DBF projects that involve private sector financing is dependent upon statutory and regulatory requirements established by the federal and state governments. In states that authorize private financing in highway projects, state laws establish the primary legal framework for DBF agreements. The state laws describe the various types of agreements that the state DOT can pursue as well as the types of projects allowed under the private financing scheme. In addition, state laws also designate the funding sources and financing mechanisms allowed and other relevant issues, such as authority to use private advisors (FHWA 2014d).

- ***Lack of alternative payment authorization under the state legislative framework***

According to PB et al. (2012), these regulatory requirements involve several key legal concepts as the following:

- Authority to use the deferred payment mechanism or an alternative payment mechanism
- Authority to transfer design, construction, operation, maintenance, and financing responsibilities under one contract to the private sector (in some states, design-build-finance projects typically include separate operations and maintenance agreements)
- Authority to involve the private sector in early project development so that they can assist on defining a feasible project
- Authority to obligate funding for future years for projects that involve deferred/availability payments

- Authority to use alternative funding sources and innovative financing mechanisms for DBF and design-build-finance-operate-maintain (DBFOM) projects

From the private sector's perspective, lack of authority to use any of these features can affect the smooth implementation of projects that include private financing. In addition to the enabling legislation (the authority to use private financing), smooth delivery of DBF projects depends upon authority to use alternative payment mechanism. State DOTs need the authority to enter into DBF agreements with flexible payment methods that involve multi-year reimbursement of differed payments to the private sector. In the private sector's eyes, lack of such flexibility to use alternative payment methods under the private financing legislative framework can affect the smooth development of DBF projects. The Association for Improvement of American Infrastructure (AIAI) highlights the significance of a flexible legislative framework for private financing in the following statement (AIAI 2014):

> *"P3 enabling legislation should be broad-based, providing flexibility in the procurement processes that will facilitate submission of innovative and comprehensive proposals in support of public infrastructure needs…Proposed P3 legislation should include details related to the development and restrictions or obligations that should be addressed within the P3 Agreement to plan, design, build, finance, operate or maintain the public infrastructure."*

5.1.1.2. Agency-Related Issues

The transportation planning process requires that state DOTs develop and maintain a long-range statewide transportation plan and a short-range statewide transportation improvement program (STIP). Additionally, metropolitan planning organizations (MPOs) are required to develop transportation improvement plans (TIP) that are incorporated into STIP. The long-range planning typically involves a 20-year period, whereas TIP and STIP involve a 4 year period. The FHWA guidelines require a reasonable vs. unreasonable judgment decision with respect to project revenue

assumptions prior to inclusion of projects in TIP and STIP. The major challenge is consideration of alternative funding sources and innovative financing mechanisms in both long-term and short-term planning horizons for P3 projects. For instance, incorporating a 5 to 7 year short-term financing under the deferred payment mechanism into STIP and long-range planning is a significant challenge for the state DOT. Similarly, tolling and availability payment considerations for DBF projects at early stage of concept development is a major challenge since the project cost estimates and risk profiles are simply at preliminary levels. The interviewees mentioned that state DOTs face significant challenges with respect to inter-agency coordinating between environmental agencies and the FHWA division in their respective states at the project planning phase.

From the industry's perspective, lack of certain characteristics in the state DOTs' project development and procurement practice can act as deal-breaker issues for effective implementation of DBF project delivery. The agency-related deal breaker issues can be explained in the following areas:

- ***Lack of political stability***

The interviewees emphasized that lack of political support for the project can result in project cancelation and even project failure. Delivery of projects that include a private financing component is dependent upon satisfactory political stability in the state since the commitment and political will of the state officials and the legislature are crucial for project success (FHWA 2007b). This issue is highlighted in the AIAI Best Practices Guidebook for P3s (2014) as the following:

> *"A proposed P3 statute should allow for the continuation of P3 projects that were procured independent of changes in administration or leadership."*

- ***Lack of consistency in decision-making***

The private sector considers lack of consistency in decision-making as a major deal-breaker issue. The private sector's main concern is related to lack of commitment to a systematic and well-

established framework for project selection and approval. It is critical to maintain the state DOT's position once a project is approved for private financing.

- ***Lack of a programmatic approach in the state DOTs to incorporate private financing as a strategic means to develop projects (i.e., treating private financing as a one-time deal)***

Private financing is a means to facilitate a new capital structure model for certain types of projects and provide a buffer for delays in anticipated funding (Eno 2014). However, it is critical that state DOTs do not consider private financing as a one-time deal for fixing short-term funding shortfalls. The issue of conducting a one-time deal is closely tied with project cancelation since the perceived success (or failure) of one project can contribute to the ability to move other projects forward. The interviewees mentioned the lack of commitment to sufficient flow of funds as a major challenge to development of all types of projects using private financing capabilities that can significantly increase the project's financial risk. The sufficient flow of funds is crucial for DBF and availability-payment based DBFOM projects, since the submitted proposals by the private sector participants are dependent upon the sufficient flow of funds to these projects.

5.1.1.3. Issues related to Project Readiness

Project readiness and realistic schedules for project milestones are critical for project success. During the interviews with private sector experts, two issues were pointed out with respect to project readiness that can be considered as deal-breaker issues in participating in private financing:

- State DOT's determination to build the project in a specific timetable
- Major NEPA, ROW, and other critical permitting risks that must be resolved prior to soliciting bids

- ***Lack of determination in the state DOTs to build the project in a specific timetable***

The interviewees noted that the failure to have clear objectives and failure to start on-time procurement can result in sending false signals to the market. The private sector participants in

DBF contracts often engage in agreements with lenders and financiers (whether them be the parent company or a financial institution), in order to secure short-term financing for the project. Therefore, it is critical for the private sector that the state DOT has a clear vision, determination, and commitment to develop projects according to a realistic timetable. As noted by one of the interviewees: "*Owners should have a well-defined project procurement process with a realistic schedule since alternations in the process are time-consuming and costly for both the public and private sector participants*." Lack of a clear vision and commitment from the state DOT's side is a major deal-breaker issue as noted in the following statement made by the FMI Corp. "P3 Guide: What You Need to Know" (FMI 2011):

> *"It is important for the public agency to define a clear vision that indicates tangible objectives and outputs and shows clear benefit for the community. It is also critical for the owner to be committed to the process and to understand what the delivery model can bring to the table. Visible leadership by one or two high-profile champions in the public and private sectors can help kick-start the initiative and attract partners from a broad spectrum. A well-defined public relations program and open communication are critical elements of this effort."* (FMI 2011)

- ***Major NEPA, ROW, and other critical permitting risks that must be resolved prior to soliciting bids***

State DOTs need to ensure that major project risks, such as NEPA, ROW, and other permitting issues are resolved prior to the request for qualifications (RFQ) and request for proposals (RFP) phases. The amount of time it takes to reevaluate NEPA documents as a result of major changes to the project scope or ROW is significant. Most of the interviewees mentioned that the private sector participants generally prefer projects that are at the post-NEPA stages, where the environmental risks and their effect on project schedule are minimized. In order to attract a pool of qualified developers and contractors to P3 projects, state DOTs need to show that they are committed to a

realistic project schedule and are willing to resolve major challenges with respect to project readiness. With respect to project readiness and delays associated with NEPA studies, PB et al. (2012) notes the following statement:

> "*While delay is not generally monetized by public-sector project sponsors, time is money to private project developers who have fixed timeframes for implementing projects and deriving a return on their investment. This is the primary reason that all private sector P3 practitioners interviewed stated that they prefer to participate in P3 procurements initiated after the conclusion of NEPA.*"

5.1.1.4. Project Cancelation

- ***Devastating consequences of project cancelation on the continuity of private sector involvement in private financing business with the state DOT***

Project cancelation is among the major deal-breaker issues for the industry as noted by the survey respondents. The major issue is that the authority to enter into various forms of private financing agreements, such as DBF and DBFOM, does not necessarily provide assurance for the private sector that projects will not be canceled or significantly delayed due to legal and political issues. An example is the I-75/575 North West Corridor (NWC) P3 project in Georgia, where the project was canceled during the RFP process. The negative impact of the project cancelation is highlighted as the following statement (PB et al. 2012):

> *"Such an action can have a profound effect on the future financing choices a region has with regard to the development of the infrastructure…While there are many lessons to take away from the Georgia experience, foremost among them is that the public acceptance of one toll project may impact the reputation and desirability or even the consideration of another and with it, the ability to include private partners."*

The interviewees mentioned the negative effects of terminating contracts during the procurement period, since project cancelation not only has devastating impacts on the main players (e.g., design-build teams and developers) but also has cascading negative effects on all secondary parties involved in private financing market (e.g., lenders and various advisors to developers and lenders, such as technical, financial, and legal advisors). The major issue is the opportunity cost of the lost time spent for bid preparation and the significant expenses for the project teams bidding on the canceled project.

The private sector is extremely concerned about recovering their financing charges in case the project is delayed or terminated due to reasons beyond their control. This financing risk represents a great challenge for the private sector in situations that the project gets canceled or deferred resulting from the state DOT's actions or customary supervening events. The private sector is typically challenged when the state DOT does not offer any protection to the industry to cope with the financing risk (e.g., significant increase in interest rate) in the event of project cancellation or delay in signing the contract and making critical decisions.

5.1.1.5. Creditworthy Counterparty and Payment Security

The private sector is concerned with payment security in DBF and DBFOM agreements. The DBF contract structure typically involves a short-term financing component with deferred payments in the future. Similarly, the DBFOM with availability payments contract includes future payments for design, construction, operations, and maintenance services based on pre-specified level of service and performance. When bidding on these projects, the private sector needs full commitment from the public sector with respect to payment security. Without adequate payment security, the private sector typically hesitates to bid for DBF and DBFOP (availability payment) projects since the payment risk may not be acceptable for a lot of firms.

- ***Inadequacy in public sector creditworthiness that can risk payment security for the private sector***

The private sector may be concerned with creditworthiness of certain public agencies that are responsible for project's payments. For instance, if the DBF agreement is structured without recourse against the public sector entities, particularly when the entity is not a state DOT, the repayment risk becomes substantially high for the private sector. Thus, without satisfactory contractual obligation from a creditworthy counterparty, such as the state DOT, the private sector has to bear the risk of reimbursement for the deferred payment component. It is essential for the public stakeholders on DBF projects and DBFOM with availability payment projects to establish proper agreements that provide explicit support of payment obligations. Without satisfactory intergovernmental agreements, lenders are unable to establish payment security on a contractual basis. Lack of payment security may prohibit several participants from the private sector to provide financing for the project.

5.1.1.6. Opportunities to Introduce Innovation

The private financing market is a competitive environment. Contractors and infrastructure developers strive to differentiate themselves in the market through offering unique innovative solutions to their clients. Design-build teams and developers carefully choose to compete on projects that have higher potential for innovation. The ability to provide innovation is essential for developers/contractors as tens of millions of dollars may be spent to prepare a competitive proposal for the project.

- ***Limited opportunities in offering innovative design and construction solutions***

The ability to incorporate innovative design and construction solutions in the project is a critical factor to decide whether to pursue the project. All interviewees from the private sector have emphasized on the importance of the ability to provide innovative solutions as the key issue to pursue a project. All interviewees agreed that procurement based on design performance criteria

provides more opportunities for innovation compared to procurement based on prescriptive design specifications. Also, accepting alternative technical concepts (ATCs) is required for most firms, in order to consider putting bid for the project.

- ***Limited opportunities to differentiate the firm's proposal in DBF projects compared to DBFOM projects (i.e., relatively wider competition field in DBF projects compared to DBFOM projects)***

Several interviewees believed that it is challenging to differentiate their proposals from the other competing proposals, simply because innovation cannot be introduced in the proposal as far as the asset's life cycle cost, operational performance, and O&M cost savings are concerned. In this sense, DBF contracts may be inherently limited. The playing field might be level among proposers for DBF projects since they are not competing on the O&M phase of the project. To some extent, some industry members believe that the playing field is level among all proposers in DBF projects or at least, the competition in DBF projects is more open than that in DBFOM projects. Some industry members consider this issue as opportunity costs when they evaluate bidding on DBF projects (i.e., Go/No Go decision) as the DFM model may limit the private participant's ability for innovations in life cycle cost and O&M performance. In this regard, some contractors may prefer to bid on DBFOM projects, instead. One of the interviewees (who is from a major development company) explicitly specifies that her company prefers bidding on complex DBFOM jobs as the odds of winning are higher than the odds of winning a less-complex DBF project. This represents a disadvantage of the DBF market compared to the DBFOM market.

All interviewees mentioned that the ability to further incorporate innovation in O&M services is a plus since the real value of innovation shows itself in the operations phase of the project. Hence, limited opportunity for innovation can be a major deal-breaker issue for the private sector to pursue a DBF job.

5.1.1.7. Shortlisting Process and Odds of Winning

Proposal development for DBF and DBFOM projects is intensive and takes significant amount of time and resources from the firms involved in the process. The purpose of the RFQ phase is to select a small number of qualified teams to compete for the proposal development in the RFP phase. The industry is concerned if the State DOT shortlists a large number of teams to compete for proposal development as the odd of winning will be substantially low for the firms involved in the proposal development phase.

- ***Low odds of winning***

The industry is concerned when the number of shortlisted firms in the RFQ phase exceeds 3 as the odds of winning will be significantly low on those circumstances. All industry members interviewed in this research emphasized that high proposal development cost prohibits them from chasing projects with too many shortlisted firms. In fact, most firms prefer not making the shortlisting cut once in a while than failing too often in the RFP phase. Most companies can tolerate not getting shortlisted in the project but they will suffer much greatly if their proposals are not selected in the RFP phase as tens of millions of dollars are often spent in the proposal development. The shortlisting issue is equally challenging for state DOTs as proposal evaluation is a time-consuming task for them. Hence, state DOTs will benefit from implementing a right shortlisting process.

5.1.2. Major Challenges:

5.1.2.1. Legislative Challenges

- ***A wide range of variations in the state enabling legislations for private financing***

Since private financing programs for highway projects are primarily driven by states, state DOTs practice private financing under diverse enabling legislation frameworks. Variation among state legislative frameworks for private financing is one of the fundamental challenges that hinders

uniform private financing practice for highway projects across the U.S. Several interviewees mentioned that due to diverse enabling legislation frameworks across the states, both the public and private sector face significant difficulty in reaching standard forms of agreement on all types of P3 projects (includes DBF, DBFOM, lease, etc.). As a result, delay in contract negotiations and significant legal transaction costs have become a major hurdle to private financing of highway projects. In addition, statutes in most states impose restrictions on project size and project types and most importantly, mandate project-based rules rather than programmatic guidelines (Eno 2014). This issue is considered a deal breaker issue for several private sector firms for pursuing private finance deals in some state DOTs.

- ***Inability of private sector to be involved in the predevelopment phases of transportation projects***

It should be noted that engaging in predevelopment agreement with the private sector and involving them in environmental or project feasibility studies are not generally consistent with the requirements of Title 23 CFR that limit the private sector involvement in NEPA studies and project feasibly analysis (FHWA 2014e). Therefore, early contractor involvement in the NEPA studies and engagement in predevelopment agreements are subject to waivers from the FHWA that can be issued on a project by project basis. As mentioned by the interviewees, lack of this feature in DBF projects is a major challenge for developers and contractors. Several interviewees noted that because developers and contractors are often not permitted to provide inputs at early stages of project development (e.g., planning and programming), their ability in developing innovative design and construction solutions becomes limited. They also mentioned that early contractor involvement can help state DOTs incorporate life cycle cost efficiencies early in the programming phase so that the best alternatives are considered for the project while project's environmental impacts are minimized. In fact, early private sector involvement may provide opportunities to reduce the physical footprints of the project and hence, may reduce project's environmental issues.

5.1.2.2. Agency-Related Challenges

In addition to the agency-related deal-breaker issues, there are various agency-related challenges that may exist within the agency or may appear due to lack of coordination and communication between the state DOT and other state and federal agencies involved in the private financing decision-making.

- ***Long lead times in decision-making***

Delay in state DOT decision-making process represents a significant challenge to the private sector throughout the project delivery process. The delay may be due to long lead times within the state DOT for making the decision or may be a result of lead times for coordination between the state DOT and permitting state or federal agencies. These long lead times can disrupt smooth project development and procurement process and negatively affect financial structure of the project.

The private sector is extremely concerned about significant changes in the financing structure in case the state DOT cannot make prompt decisions about critical project problems. This financing risk represents a great challenge for the private sector in situations that the project gets delayed resulting from the state DOT's inactions. The private sector is typically challenged when the state DOT does not offer any protection to the industry to cope with the financing risk (e.g., significant increase in interest rate) in the event of long lead times in decision making.

- ***Failure of delegating decision-making authority to the responsible parties***

It is critical to delegate required level of decision-making authority to the parties responsible within the state DOT. Failure of delegating authority may result in projects cancelation, long lead times for decision-making, and lack of decision-making consistency. The private sector needs to know who actually makes the decision about the project and who has the final word about resolving problems related to project development.

- ***Lack of clarity and transparency in procurement processes***

Several interviewees noted that they have experienced difficulty during the procurement process of some projects in the past. These difficulties are mainly related to clarity and transparency of the procurement process. Hence, the industry will question working with state DOTs that fail to clearly lay out a transparent and fair procurement process for the project. Particularly with respect to projects that involve private financing, procurement can be a time consuming and challenging process that involves several other parties besides the entities in charge of design and construction services.

5.1.2.3. Differences between Transaction Costs of DBF and DBFOM Projects

Procurement of highway projects using private financing, especially mega projects, requires significant legal and contractual services that represent substantial transaction costs. These transaction costs include a variety of expenditures in the following items (Li et al. 2013): preparing a bidding document, estimating, drawing up a contract, administering the contract, and dealing with any deviations from contract conditions. The interviewees mentioned traffic and revenue analysis, legal consultation, technical consultation, financial advisory, and bid preparation as major expenditures of DBF and DBFOM transactions. As described by Li et al. (2013): "*Transaction costs are different than production costs; whereas production costs are the costs of transforming inputs into outputs, transaction costs arise from economic exchange*." Salino and de Santos (2009) conducted a study on transportation projects that include private financing and found that the project procurement procedure imposes significant transaction costs to both the public and private sectors. An early study by Dudkin and Välilä (2005) concluded that average transaction costs for P3 highway projects during the procurement are approximately 3% of the project value.

- ***High transaction costs for DBF and DBFOM projects***

The major challenge is the issue of project size and recoverable transaction costs for bidders. Considering hurdles associated with legal and financial structuring of projects that include private

financing and their transaction costs, investors and developers attempt to recover those costs during the project's life cycle. When one of the interviewees was asked about the typical range of transaction costs for various types of P3 projects, the interviewee responded with the following statement:

> "*There is not much difference between transaction costs of a $500 million DBF/DBFOM project and those of a $1 billion DBF/DBFOM project.*"

Therefore, developers and design-build teams are interested in chasing large projects, if possible. Due to significant transaction costs, private financing is not attractive for small to medium size projects. Some of the interviewees specified $200M as a minimum threshold for project size that their firms would seriously consider bidding on.

- ***Issues related to the recoverability of transaction costs for relatively small DBF projects comparted to that for large DBFOM projects***

Because of higher transaction costs for DBF and DBFOM agreements, contractors cannot afford going after relatively small projects due to lower expectation in recoverability of transaction costs. In fact, several of the interviewees specified that the minimum threshold of project size for DBF and DBFOM projects is approximately $200 million. Seven interviewees (agreed with the following statement regarding transaction costs:

> "*Procurement of smaller P3 projects (typically less than $200 million), where several contract parties are involved and transaction costs are high, neither improves the competition nor is economically feasible*."

5.1.2.4. Balance-Sheet and Surety-Contractor Relationship

The role of sureties and their guarantee of contractors' performance through issuing performance bonds have become a prominent issue in private financing deals. Sureties provide performance bonds for contractors that in their opinion have the capacity to perform the work. Several factors are considered in the contractor assessment by sureties: experience and expertise, ability to work

in the region that the project is located, current work in progress, overall management, balance sheet, and payment record of obligations (Nelson and Marema 2014). Since DBF and DBFOM projects involve some form of private financing, challenges and possible disputes can arise over the role of equity holders in case of contractor's default. In other words, the risk of contractor bankruptcy represents additional risks for the sureties simply because the sureties are not in a position to finance a failed DBF or DBFOM project.

- ***Adverse effect of private financing (using either the firm's own equity or the lender's financial resources) on the firm's balance sheet and its ability to secure performance bonds***

Most contractors cannot afford putting a large portion of their equities in the DBF or DBFOM project without hurting their ability to receive bonding capacity on other projects. Most contractors are especially concerned when significant amount of debt is shown on their balance sheets. This issue is even more critical for publicly-traded firms as it adversely impacts their share values. Further, small or medium size contractors may not have adequate bonding capacity to satisfy the surety's requirement in terms of solid balance sheets. The major challenge reveals itself when for whatever reason, the contractor fails to deliver the project and the owner withholds its payments. Under this circumstance, lenders and sureties can exercise their recourse rights against the contractor's asset.

5.1.2.5. Timing and Conditionality of Payment

Timing and conditionality of payments for the work performed on the project have substantial effects on the private sector's financial risk. Particularly, lenders and project financiers are not at the right position to accept the construction risk and its subsequent impacts on project completion. Issues associated with conditional payments or payments that are tied to project completion are considered as disincentives for contractors to bid on DBF and DBFOM projects that utilize the deferred payment mechanism.

- ***Lack of fixed and unconditional payment schedules for the deferred payment component***

If the state DOT decides not to fix the payment schedule or basically decides to tie invoice payments to the final project completion, the private sector has to bear the invoice repayment risk for the completed portions of the work. Lack of fixed and unconditional payments exposes contractors to project completion risk that may be caused by factors outside their control. Contractors have limited debt capacity on their balance sheets. Consolidating significant debt on their balance sheets due to delays in payment by the state DOT may not be acceptable for several firms. Furthermore, financial risks caused by conditional and not-fixed payments can result in inflated bids due to added risk premiums, higher interest rates, and increased surety bond requirements. Lack of fixed and unconditional payments can be a major challenge, especially for publicly traded firms whose shareholders and investors would not allow them to bear such financial risk on their balance sheets.

5.1.2.6. Risk of Significant Change in the Interest Rate

Interest rate fluctuations in the market are among critical financing risks that can negatively affect the private sector's financing capabilities and may limit their involvement in DBF or DBFOM projects. The private sector is extremely concerned about delays resulting from long lead times in decision-making. Thus, the private sector may require adequate protection in the contract to deal with interest rate fluctuations.

- ***Lack of government support with respect to significant change in the interest rate (market rate) that has negative impacts on the private sector's financing capabilities***

Without adequate support or guarantee from the public sector, interest rate fluctuations can significantly limit the choice of financing for the private-sector developer. The changes in the interest rate can have negative impacts on the contractor's financing package and may result in major losses to the contractor. The private sector is concerned with the interest rate risk that is caused by unplanned project delays due to the public sector's indecision or risks caused by project cancelation. Lack of adequate support from the public sector during the bidding phase and during

periods of delay due to public sector's long lead times in decision-making increases the private sector's financing risk.

5.1.2.7. Differences between DBF and DBFOM project delivery systems in treating Operations & Maintenance and Life Cycle Cost issues

Among the major benefits of P3s are life cycle cost efficiencies that are achieved through transferring design, construction, financing, operations, and maintenance responsibilities services to the private sector (da Cruz and Marques 2014; Davies and Eustice 2005). Since the private party is responsible for the performance of the asset and its operations and maintenance (O&M) services, there is a built-in incentive for contractors to implement high-quality design and construction, in order to reduce the life cycle cost of the project while meeting operational performance requirements of the contract (Garvin 2008).

- ***Lack of incentive clauses in DBF contracts that encourage contractors for considering life cycle cost efficiency in the project***

There is a concern that contractors in DBF projects are not incentivized to incorporate innovation in project's O&M simply because O&M is not included as part of services requested in DBF projects. Lack of incentives for introducing life cycle cost efficiencies is one of the major challenges that distinguish DBF contracts from DBFOM contracts. One of the interviewees noted the following statement with respect to life cycle cost efficiencies:

> *"Contractors are not often interested in optimizing the life cycle cost of the project, especially since they do not hold equity positions in the project. In DBF agreements, this issue is prominent since the contractor is responsible for substantial completion and meeting minimum performance requirements."*

The DBF agreement involves short-term (usually not longer than 7 years) financing by the developer who is responsible for completing just design and construction services. History of DBF projects shows that contractor reimbursement often occurs in the short-term following project

completion. Therefore, most contractors do not hold equity positions in the DBF project much longer than the project completion. Since the O&M component is not included in DBF contracts, they are not interested in optimizing project's life cycle costs. One of the interviewees mentioned that lack of life cycle cost considerations by the contractor can be a major issue in both DBF and DBFOM agreements:

> *"Since contractors are not responsible for O&M component of DBF agreements, they are not interested in optimizing life cycle costs…even in DBFOM agreements, issues can arise between the developer's construction company and the parent company or O&M operator as a result of poor construction performance or failure of incorporating life cycle cost considerations in design and construction processes. In addition, most contractors often fail to consider profit-making opportunity throughout the whole life cycle of an asset. As a result, they may propose inflated bids for the construction component of the work, which is not at the best interest of the parent development company."*

Thus, some developers lean towards DBFOM contracts since DBF agreements typically do not include the O&M component. DBF agreements typically bind the contractor to substantial completion of the project and minimum performance requirements. Since the O&M component is not included in DBF agreements and contractors are not interested in life cycle cost efficiencies, developers lean toward DBFOM agreements. According to the interviews, the major issues with respect to the lack of O&M component for DBF agreements are as follows:

- Including O&M in the contract results in life cycle cost efficiencies and increases the project's profitability and return on investment
- It enables developers to have ownership and control rights over the asset after the construction is complete

- Bidding for projects that include O&M requires higher degree of innovation by the project team
- Including O&M usually results in a more complex project and improves the odds of winning because of some developers' competitive advantages

Davies and Eustice (2005) summarized the differences between DBF and DBFOM models as the following:

> *"…with public private partnerships, the private sector returns are linked to service outcomes and performance of the asset over the contract life. The private sector service provider is responsible not just for asset delivery, but for overall project management and implementation, and successful operation for several years thereafter."*

5.1.2.8. Differences in Return on Investment of DBF and DBFOM projects

The return on investment expectations can significantly affect the contractor's decision on bidding for the project. One of the interviewees (who is from a major development company) mentioned that the company's return on investment for DBF projects ranges from 4-6%/year whereas 10-15%/year for DBFOM projects. This is mainly due to the shot-term nature of financing for DBF projects. Since proposal preparation for both DBF and DBFOM projects is almost equally time-consuming, several developers and design-build firms would like to pursue DBFOM jobs in comparable situations.

- ***Relatively higher targets for return on investment (ROI) in DBFOM projects compared to ROI targets in DBF projects***

Several of the interviewees mentioned that major development companies typically prefer the DBFOM concession model since it provides developers with additional benefits, such as control

over asset during O&M period, innovations on life cycle cost savings through utilizing more-efficient O&M practices, and better risk-return tradeoff.

There is a perception from some industry members that the DBF model does not truly reflect the whole gain realized from the entire cost-saving opportunities available in the O&M phase of the asset's life cycle. Hence, state DOTs may lose some of these cost-saving opportunities if they choose DBF over DBFOM model. The FHWA Transportation PPP User Guidebook (2007) has the following statement in this regard:

> *"It is unrealistic to expect the potential advantages resulting from a PPP to automatically turn an infeasible project into a feasible project. It is also unrealistic to expect the private sector to be attracted by projects that do not have the potential to provide a reasonable rate of return on their investment in the project."*

5.2. Recommended Best Practices for Development of Design-Build-Finance Projects

Throughout our interviews, we have asked industry experts to provide their opinions in terms of appropriate solutions that can be considered by state DOTs to elevate the state of private financing in the U.S. innovative project delivery market. In this section, we describe our findings as a set of possible opportunities identified from the interviews for improving the current practice of private financing in the U.S. These opportunities are summarized as recommended best practices for incorporating private financing services in innovative project delivery systems, especially in design-build-finance projects. The identified recommended best practices are presented in the following areas:

- Program Organization
- Transportation Project Planning and Programming
- Development and Procurement of Project Portfolios
- Accounts Receivable Purchase Agreements or Factoring Design and Construction Invoices

- Asset-Based Financing and Securitization through Conduit Bond Issuers
- Escrow Accounts
- Customary Interest Rate Protection
- Surety and Performance Bonds
- O&M Services
- Flexibility for Buy-Back and Revenue Sharing Provisions in the Contract
- Commitment to a Quality Management Plan

5.2.1. Program Organization

Among the 35 state DOTs that are authorized to deliver projects using private financing, several state DOTs have experimented with only one or two projects and some have established mature private financing programs. The earlier projects were delivered by forming a special short-term team in state DOTs consisting of a group of state DOT experts and private consultants whereas newer projects were developed by well-established programs and offices in state DOTs. Several state DOTs, such as Caltrans, FDOT, TxDOT, and VDOT, have dedicated innovative program delivery/public-private partnership units for development and procurement of projects that involve private financing. The interviews with industry experts identified 2 best practices related to program organization as described below.

- ***Establishing a dedicated group or program for projects that involve private financing with adequate organizational resources***

Several interviewees noted that establishing a dedicated group or program with adequate organizational resources can significantly contribute to reduction of lead times during project development and procurement. A dedicated financing program ensures that the state DOT's project teams have the required project finance and procurement expertise and access to necessary organizational resources to successfully accomplish project objectives. Several state DOTs with mature private financing programs have dedicated programs with adequate organizational

resources. For instance, Virginia DOT (VDOT) has established the office of public private transportation act (PPTA), dedicated to P3 projects primarily concerned with prioritization, selection, development, and procurement of all P3 projects including DBF projects. Similarly, TxDOT has established the Strategic Projects Division dedicated to procurement of various types of P3 projects including DBF and DBFOM under the Comprehensive Development Agreements (CDAs). A list of projects that are appropriate for CDA must be presented to the Texas legislatures along with the summary of technical and budgetary reviews prior to project selection. While VDOT has a centralized approach to innovative project delivery, TxDOT has a project-centered CDA process, partially due to the massive size of its projects. Both state DOTs have enjoyed specialized resources needed to effectively conduct innovative project delivery using private financing.

- ***Delegating authority to the dedicated private financing program***

During the interviews, several industry professionals noted that the industry really likes to deal with a single point of contact in the state DOT about all matters related to the project, i.e., there is a need for one project champion in the state DOT that provides a single voice for the project. In other words, the industry is interested in engaging with a single, specific unit in the state DOT responsible for projects that involve private financing. It is expected that this specific unit has the sole decision-making authority about the project. Negative public perception and other political risks surrounding the project can undermine project planning efforts within the state DOT and send negative signal to investors (Zhang 2005c). Delegation of authority to the private financing unit in the state DOT can be helpful to mitigate most of the political risks about the project and ensure investors that the project is not arbitrarily canceled or delayed. As one of the interviewees stressed on the importance of this subject in the following statement:

> *"...it is desirable to have this specific unit authorized under the state law for private financing or public-private partnerships."*

With respect to the delegation of authority, one of the interviewees mentioned the following statement:

> *"It is extremely important that state DOTs send positive signals to the market by establishing innovative project delivery and private financing units comprised of experts on innovative project delivery and project finance and delegating the required level of authority to these units. Political authorities at local and state governments tend to change their opinions in the long-run, and therefore, it is important for the state DOT to maintain consistency in its private financing program and have the required decision-making authority."*

5.2.2. Transportation Project Planning and Programming

Long range transportation planning (LTRP) is the foundation for development of regional transportation plans. Long range planning involves establishing the transportation vision and goals for the region and its outcome is a broad-based consensus and support for the transportation strategies and project concepts that are recommended. The long range transportation planning process results in adopting a LTRP for the region. According to the "Transportation for Communities Guide" (ICF International 2012), long range planning is described as follows:

> *"Long range planning provides the foundation for all other aspects of transportation decision making by establishing the vision and goals for transportation within a region and identifying strategies and project concepts for implementation."*

The programming phase as defined by ICF International (2012) is *"…the process through which the Transportation Improvement Program (TIP) is developed and adopted. The TIP is a list of prioritized projects drawn from the long range transportation plan that are approved for funding over a period of at least four years."* The programming process involves detailed analysis of project funding sources, project cost analysis, and project prioritization. The major output of the

programming phase is the state transportation improvement program (STIP) that combines all the regional TIPS together and must be financially constrained (FHWA 2007). Because of the nature of the transportation planning and programming process, incorporating private financing considerations is a major challenge for state DOTs. Projects that include private financing require specific planning and programming considerations for alternative revenue sources, unconventional multi-year funding structure, innovative financing mechanisms, and early private sector involvement in project development. Thus, the interviewees recommended two strategies to facilitate the consideration of private financing in highway projects.

- ***Incorporating alternative funding sources and innovative financing mechanisms consideration in the development of the TIP and the STIP***

Funding availability and fiscal constraint requirements described in TIP and STIP require that revenue sources for projects should be reasonably available (FHWA 2009). The FHWA guidance on reasonable funding sources requires the following two considerations:

- Evidence of review and support of the new revenue assumption by State and local officials
- Documentation of the rationale and procedural steps to be taken with milestone dates for securing the funds

However, the Title 23 CFR requires project funding to be available or committed in nonattainment and maintenance areas. In other words, for projects that fall within the nonattainment and maintenance area requirement, their funding sources for the first two years of the STIP should be available. Therefore, DBF projects that involve private sector financing under the deferred payment method or DBFOM agreements with availability payments may not comply with such requirements. Further, financial structuring of projects that involve private financing is dependent on conclusion of NEPA studies. Similarly, credit assistance under the transportation infrastructure finance and innovation act (TIFIA) program requires a NEPA decision. Therefore, incorporating alternative funding sources and innovative financing mechanisms in TIP and STIP becomes critical

for the private sector participants. It may be necessary for the state DOT to revise the TIP or the STIP to capture changes in project revenue sources, such as ability to charge tolls, ability to issue project specific bonds, or other unplanned funding sources. State DOTs may also decide to coordinate with regional FHWA offices and utilize state funds for projects that fall under the aforementioned criteria. Nine of the interviewees (60%) stated that the conventional long-range statewide transportation planning process lacks proper alignment with alternative funding and innovative financing project development needs. The interviewees noted that consistency at the planning and budgeting phase and consideration of alternative funding sources and innovative financing mechanisms can contribute greatly to market predictability for the private sector.

- ***Utilizing private sector expertise in project planning and NEPA studies***

Although there are concerns with respect to early private sector involvement especially during the predevelopment stages, this strategy has been tried before on a number of major DBFOM projects. Early private sector involvement often includes one or a combination of the following approaches (PB et al. 2012):

- Predevelopment agreement between the state DOT and a developer: The state DOT solicits proposals for predevelopment agreements with the private sector participants. The private developer becomes responsible for preliminary studies and scope development services in return for a fee. The project will be subject to NEPA analysis based on both the state DOT's studies and private entity's planning services. The developer holds the right for negotiation as the first choice for project development by conclusion of NEPA studies and project approval. This approach was used on the I-35 West North Tarrant Express Phase 2 by TxDOT. It should be noted that the NEPA documents preparation is the responsibility of the state DOT and the "No Build" option or other alternatives should be weighed against the development alternative.

- Unsolicited proposal from a developer: Private entity submits an unsolicited proposal to the state DOT to potentially finance and develop a project. The developer's concepts should then be evaluated in terms of NEPA conformity by the state DOT and the FHWA regional division. If project is approved, the state DOT may or may not issue an official request for competing proposals. This approach was used in development of "I-495 Capital Beltway HOT Lanes" by VDOT.
- Industry outreach and informal involvement: Conducting industry outreach and informal involvement of the private sector participants is probably one of the least problematic approaches towards involvement of private entities in the transportation planning phase. This strategy allows developers to provide inputs on environmental risks, project finance challenges, and other critical factors that need to be considered in predevelopment stages of projects that are considered as possible candidates for private financing.

Several interviewees noted that state DOTs should proactively utilize private sector expertise in project development in order to allow for more flexibility and innovation in development of projects that involve private financing. Although the recommended best practices indicate early contractor involvement in project planning, the public perceptions and existing regulations can hinder this early involvement. To overcome these challenges, state DOTs have the option to apply for waivers under the FHWA special experimental project No. 15 (SEP-15) program, which allows for deviations in the following components of the transportation planning process (FHWA 2014):

- Contracting;
- Compliance with environmental requirements;
- Right-of-way acquisition;
- Project finance; and
- Other transportation project planning requirements

Several state DOTs, such as TxDOT, Pennsylvania DOT (PennDOT), and Oregon DOT, have applied for waivers to allow for predevelopment agreements (prior to NEPA studies) with the private sector or waivers for TIFIA application requirements that mandate a proposed funding plan and use of funds, a proposed finance plan, and other necessary information that should be provided by the state DOT (FHWA 2014).

- ***Educating policy decision-makers, legislatures, and other stakeholders about private financing***

Another major benefit of a dedicated private financing unit in the state DOT is the capacity to report and educate decision-makers at the legislature and executive levels regarding private financing. Informing the policy decision-makers regarding the potential benefits and possible issues related to private sector involvement in private financing can result in political stability and consistency in decision-making. Rall et al. (2010) summarized this opportunity as the following:

> "*Given the relative lack of understanding in the United States about PPPs and the controversy that sometimes arises when they are proposed, it is important to provide opportunities for debate, explanation and education when decisions are being made about PPP policy and projects. Both legislators and executive agencies can better protect the public interest, gain support and address political risk by effectively educating and involving stakeholders throughout the PPP process*."

- ***Using appropriate consultants (legal, financial, and technical) with specific expertise in private financing***

State DOTs often utilize resource and expertise of private consultants to perform transportation planning, programming, and procurement responsibilities. Sometimes, state DOTs may solicit private sector expertise from firms that have not been actively involved in most recent DBF or DBFOM projects. As a result, the consultant may not be able to provide up-to-date legal, financial, or procurement services to the state DOT. Several interviewees noted that when private financing

is involved in project development, state DOTs need to ensure that they hire knowledgeable consultants that actually have the required (technical, financial, procurement, and legal) expertise for planning, development, and procurement of such projects. Gaining insight from the right people with the right set of expertise is critical for decision-making and project success.

5.2.3. Development of Project Portfolios

Transaction cost is a major issue for highway projects that include private financing since these projects often involve structured financial plans, project-specific legal and procurement documents, and traffic and revenue studies. Therefore, it is critical for both the public and private sector to minimize these costs and still achieve a satisfactory level of rigor on project design, financing, and construction plans. Transaction costs issues can hinder involvement of private sector in financing highway projects and have the potential to increase project planning and programming costs for the state DOT.

- ***Bundling smaller projects to reduce the transaction costs and make private financing a more attractive alternative for the portfolio of the projects***

The interviewees recommended bundling of small projects into a project portfolio to keep the transaction costs down. Bundling projects into a program may result in significant savings for the bidder's transaction costs and lower overall procurement costs for the state DOT. The Missouri DOT's "Safe and Sound Program" to replace 800 bridges is an excellent example for this application (FHWA 2014). Finally, a project portfolio that includes financing and O&M components encourages competition and generates interest in the private financing market that can result in significant cost savings for the state DOT over the asset's life cycle. The Pennsylvania DOT (PennDOT) decided to utilize private financing resources and accelerated bridge construction for replacement of 614 structurally deficient bridges through a DBFOM project portfolio as part of the "Rapid Bridge Replacement Project" designed to address over 4000 bridges in the state (Barnes and Cho 2014). The contract involves an availability payment agreement to design, construct,

finance and maintain the bridges at a prescribed level of performance and condition for 25-35 years (PennDOT 2014).

In addition, private financing can provide financial resources to enhance the scope of a project or combine different phases of a project. This opportunity is valuable as it reduces both owners' and contractors' transaction costs related to preparing and managing several contracts (i.e., economies of scale). It is also desirable for the public as multiple sections of the project will be delivered together. This additional benefit will be realized through design-build-finance model that provides means for financing the gap.

5.2.4. Procurement Process

Procurement of DBF and DBFOM projects involves an intensive process of qualifications assessment and proposal evaluation. From the industry's perspective, SOQ and proposal development is time-consuming and incurs significant transaction costs for the project team. State DOTs also spend substantial amount of time and money to develop RFQ and RFP and review qualifications and proposals. It is critical to establish a systematic and transparent procurement process that protects the public sector's integrity and creates a healthy competition environment for the industry. State DOTs should be equipped with several tools in their procurement toolbox and select the most useful set of tools that has the highest potential for generating a fair competitive environment for the DBF or DBFOM project. Several strategies were recommended by the interviewees as summarized below.

- ***Shortlisting a maximum of 3 teams to incentivize qualified developers to bid for the project and minimize transition costs***

From the industry's perspective, shortlisting 3 teams provides an ideal mix of competition for the project. Expanding the net to more participants decreases odds of winning for the project and may discourage the private sector from active participation in the project. Developing high-quality proposals is expensive and requires substantial resources from several entities involved in the

project team. Selecting 3 best teams for the proposal development phase is also ideal for state DOTs. First of all, it ensures that the field is competitive for the project as three strong teams are competing for the project. Shortlisting 3 teams is a smart move from state DOTs as it saves significant amount of time and resources for the state DOT that is needed for detailed proposal evaluation. It reduces the chance of any possible error or mistake in proposal development process. The state DOT will have enough time to spend with each team to hear their innovative ideas for the project and assess their submitted ATCs. In summary, shortlisting 3 teams is considered a win-win practice for all parties involved in the process. Finally, short-listing 3 to 4 teams, can reduce the proposal evaluation and review costs for the state DOT as well, especially since most agencies have limited resources to disperse.

- ***Providing comprehensive debriefing for unsuccessful teams in both shortlisting and final proposal phases***

At the end of RFQ process, several teams will not advance to the proposal development phase. Similarly, only one team will be selected as a winner for the project. State DOTs should handle dealing with unsuccessful bidders with outmost delicacy. It is important to schedule comprehensive debriefings with unsuccessful teams to explain the state DOT's rationale for not selecting them for the project. An objective assessment of submitted SOQs and proposals should be provided to not shortlisted teams and unsuccessful teams, respectively. Official letters summarizing the outcome of the process cannot replace the great value of face-to-face meetings with project participants. It shows that the state DOT acknowledges the time spent by the project team on the project and truly appreciates all efforts that the team has put into the project. The industry will benefit from debriefings as it helps project teams enhance their knowledge about the owner's specific interests and provide a greater chance for the team to win the state DOT's future calls. Comprehensible debriefing is considered a best practice to mitigate the risk of bid protest and possible law suits.

- ***Paying appropriate stipends to unsuccessful shortlisted teams***

The industry understands that stipends are not meant to cover the entire expenses associated with the proposal development. However, paying stipends sends a positive signal to the industry that the state DOT is interested in elevating the competition in the industry through providing incentives for development of high-quality proposals. Stipends are considered money well-spent as the ideas received from the non-winning teams will be acquired by the state DOT and can be incorporated into the final contract for the project or into any other projects that may benefit from the proposed industry solutions.

- ***Utilizing performance criteria for evaluating design solutions and allowing for ATCs***

The industry is interested in projects that allow for incorporating maximum level of innovation. It should be noted that any P3 project should utilize all benefits of integrated design and construction services as offered in design-build project delivery system. At its core, an efficient design-build project should not use prescriptive specifications to allow flexibility and innovation from the developed private-sector's solutions. The industry is extremely interested in procurement based on performance criteria as it allows the project team to create cost-saving innovative solutions for the project. State DOTs can still use prescriptive specifications for certain components of the project as they may feel uncomfortable to receive solutions other than the required solutions in the final design. Excluding these design components can be time-saving for industry participants as they can deploy their resources more effectively on the elements of the projects that design innovation is much appreciated by the state DOT.

The selected performance criteria should be truly aligned with the specific goals of the project. Recycling general contract templates or common language used in previous contracts does not serve the state DOT's intention for the project. The industry would like to better understand what the state DOT really wants from the project, in order to focus all their efforts to propose specific, innovative solutions for the project.

Allowing ATCs is another approach to seek innovative solutions from the shortlisted teams. ATCs require review and approval of the state DOT prior to contract award; and if approved, they may be incorporated as part of the proposing team's technical and price submittal. ATCs have huge potential for accruing sizable benefits in terms of cost savings, increased constructability, and schedule reduction (Ashuri et al. 2013). ATCs provide additional flexibility to the proposers that will enhance innovation on the project and result in efficiencies in time, cost, and quality (Molenaar et al. 2005). Major benefits of using ATCs include the following (EDC 2012b):

- Involves contractors through pre-award meetings
- Allows competitors to submit confidential proposals for consideration
- Encourages innovation in the participating private sector teams
- Advances the use of new technology, materials, and construction methods
- Promotes best-value solutions
- Allows owners to receive full competitive value for proposals

➢ ***Avoiding over usage of technical or qualification pass/fail criteria in proposal evaluation***

Development of DBF and DBFOM projects by the private sector often involves several participants in the project team; but most recently, it appears that forming large consortia composed of many major firms is becoming a regular practice. The main reason for such partnership (that could be inefficient) is simply to get assured that the project team will pass too many shortlisting or proposal evaluation criteria imposed by the state DOT in the contract. Using pass/fail criteria is a recommended practice to facilitate and expedite shortlisting and proposal evaluation process but the state DOT should avoid over usage of such pass/fail criteria and limit its usage for the most critical elements of the project.

- ***Focusing more on evaluation of proposed innovative design solutions and less on past experience of the project team members***

Evaluating the past experience of the companies in the project team should definitely be remained as one of the important factors that state DOT should take into account for proposal evaluation. However, putting heavy emphasis on past experience may not be sufficient to ensure the procurement success for the project. Instead, state DOTs should focus on evaluating specific solutions the different project teams propose for the current project. This emphasis should be reflected in any scoring system (e.g., adjectival, numerical, categorical, subjective, etc.) that the state DOT implements for proposal valuation. Heavy emphasis on past experience and qualification of the team members has some unintended consequences. For instance, the size of the project team has been substantially increased in most recent DBF and DBFOM projects (i.e., several giant engineering and construction firms create temporary teams to propose for the project).

Very large consortia may not be as efficient as smaller teams due to a large number of new interfaces among various parties involved in the project. Roles and responsibilities can be difficult to define in large consortia. Too many internal contracts are not efficient for project execution and the state DOT may find it difficult to establish appropriate lines of communication and collaboration with the project team. In addition, too few large consortia may limit the competition in the market, which is another undesirable consequence of unnecessary emphasis on past experience of the project team.

5.2.5. Accounts Receivable Purchase Agreements or Factoring Design and Construction Invoices

Accounts receivable purchase agreement or factoring is a globally accepted method of raising capital for short-term financing needs of the firms in various industries. Factoring involves selling a firm's accounts receivable along with the collection risks to a financial institution (e.g., a commercial bank), also known as the factor, at a discount or for a prescribed fee plus interest (Chen

and Chen 2012). Accounts receivable financing on the other hand, involves raising debt using the accounts receivable as the collateral. With approximately $10 trillion worth of accounts receivable on financial statements of U.S. companies, factoring is employed by several industries, such as retail, manufacturing, and production (Katz 2011). For instance, Moussawi-Haidar et al. (2014) showed that engaging into supplier-retailer trade credit coordination results in a win-win situation to all parties involved in the retail supply chain. Buzacott and Zhang (2004) studied the effects of factoring on operations decisions. They found that banks experience less risk with factoring while retailers enjoy higher returns compared to when they use their own capital. However, the construction industry has not yet employed factoring for accounts receivable or invoices of major highway construction contracts.

- ***Utilizing factoring design and construction invoices as a solution to enhance the flexibility of the project team's balance sheet***

Factoring of design construction invoices requires flawless coordination between the agency, the factor (e.g., bank or other financial institution), and the project developer for the benefit of the project regardless of the factor's recourse rights against the developer/contractor or the agency. Expedited cash reimbursements permit the contractor to compensate subcontractors and maintain strong balance sheet. The bank in return may provide the developer and in some instances, the involved subcontractors with loan discounts. Factoring of construction invoices are dependent upon approval of the agency for the quantity and quality of the work done by the project team. A solid plan for quality assurance/quality control and independent verification of the quality of the delivered work items are prerequisites of any factoring agreements. Once the quality of the design or construction work items is approved and the contractor's invoice is certified by the state DOT, the contractor may seek immediate cash reimbursements from the bank in exchange of the certified accounts receivable. One of the interviewees noted that the ability to utilize accounts receivable purchase agreements in DBF or DBFOM projects provides the developer (or the contractor) an

opportunity to increase cash availability and strengthen the firm's balance sheet through reduced debt and enhanced credit. Figure 5.2 presents the structure of a factoring agreement (i.e., accounts receivable purchase) in a project with deferred payments conditions.

A financial structure that resembles factoring was used on the "Texas SH 183 Managed Lanes" project. The comprehensive development agreement issued by the Texas DOT includes a deferred design and construction cost component (worth $200 million) that can be sold to credited financial institutions under a factoring agreement, which is described as follows (TxDOT 2014):

> *Subject to the requirements set forth in the 'Financing of Deferred Payments of the Design and Construction (D&C) Price' section, Borrower may sell or assign all or any portion of its rights, title and interests in and to payment of the amounts certified by TxDOT in any Deferred D&C Payment Certificate and to payment of any Breakage Costs owed to Developer hereunder to any Person from which Developer or Borrower obtains financing to complete the D&C Work or that has committed to purchase the Deferred D&C Payment Certificates (together with any agents or trustees for such Person or Persons, a "Lender") or any D&C Surety."*

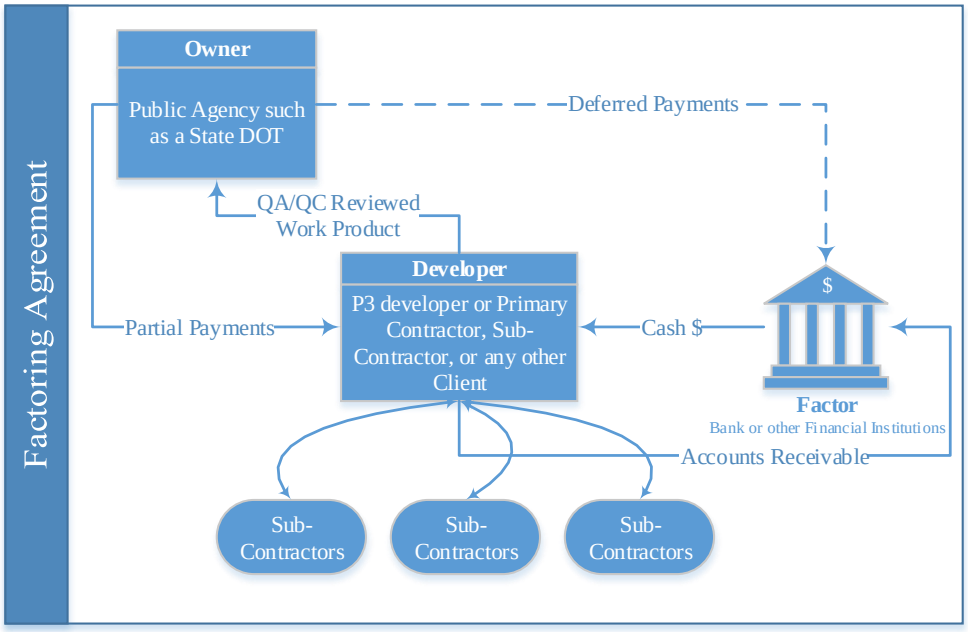

Figure 5.2. Structure of a factoring agreement (i.e. accounts receivable purchase) in a project with deferred payments conditions

- ***Not binding the schedule of payments and the repayment of certified accounts receivables to the final completion of the project (i.e., fixed schedule of repayment)***

The risk of private financing for the project team will be substantially increased if the state DOT does not utilize the fixed schedule of repayment or decides to tie invoice payment to the final project completion. In most cases, variable payment schedule can prohibit the contractor from utilizing appropriate factoring agreements since most financial firms are not interested in accepting project completion risk that is totally outside their control. State DOT's commitment to the fixed schedule of repayment in DBF or DBFOM contracts provides flexibility for private financing that can translate into better financing terms and conditions (e.g., lower interest rate and lower required security package). Providing any opportunity to strengthen the contractor's balance sheet can be eventually helpful for the state DOT through decreased financing cost and the increased competition (i.e., more firms would be attracted to bid on the state DOT's project).

- ***Creating deferred payment certificates that are not subject to set-off or recourse against the contractor***

The industry will benefit from issuing deferred payment certificates by the state DOT for completion of a portion of design and construction work. Creation of these certificates ensures the developer, the lender, and the banker that in case of contractor's default, the state DOT will be still committed to the original repayment schedule for the portion of design and construction work that has received approval from the state DOT. Any deduction or set-off applied against the contractor exposes the lender to the completion risk, which increases cost of private financing or in some cases, may prohibit the availability of a private financier for the project. Without these certified deferred payments, selling accounts receivables (i.e., factoring agreement) may not be feasible for the project team since an additional final completion risk will be introduced to the purchase agreement that undermines the market value of these certified invoices.

The development agreement for the SH-183 project includes provisions with respect to payment certificates and is aimed to mitigate such financing risk from the contractor as described below (TxDOT 2014):

> *"Notwithstanding any other provision herein to the contrary, amounts that have been certified in a Deferred D&C Payment Certificate shall not be subject to set-off, deduction, reduction or withholding for any reason by TxDOT, including defective work, Liquidated Damages, default, termination, latent defects, or warranty claims. Any set-off, deduction, reduction or withholding of payment shall be applied only to amounts owing under subsequent Draw Requests or the Final D&C Payment that have not yet been certified by TxDOT."*

Binding deferred payment certificates to substantial project completion may prohibit the participation of certain contracting firms, especially publicly-traded companies that cannot afford such consolidation of debt on their balance sheets. The state DOT's commitment to payment of invoices that are sold to the lenders for the completed portions of the work results in higher degree of balance sheet flexibility for the project team as described by Tatge and Tatge (2012) in the following statement:

> *"Under prevailing American law, client accounts that are sold to the factor without recourse are treated as having been sold to the factor in a true sale and the accounts sold go off the client's balance sheet. This can be useful, if the client is bound by covenants in other commercial agreements that prohibit the client from taking loans against accounts, but do not prohibit it from selling accounts."*

5.2.6. Asset-Based Financing and Securitization through Conduit Bond Issuers

Asset-based financing and securitization methods involve raising funds either through a financial institution or in the bond market using the future state or project revenues (Fabozzi and Nahlik 2012). These funds (e.g., bond proceeds or loans) are considered debt and limit the issuing entity's

(either the state's or the project company's) debt capacity. In design-build-finance agreements where projects do not have a source of revenue, such as tolls or availability payments, asset-based financing or securitization may seem inappropriate. However, using the deferred payment mechanism and through a conduit bond issuer, state DOTs can pledge bond repayments and deliver projects using proceeds from municipal bonds. The proceeds are used by the developer in a non-debt form that will not appear on the balance sheet of either the project team or the state DOT. Repayment of these bonds is facilitated by the deferred payment mechanism that is backed by future revenue streams of the state. Hence, this method is considered rather low risk as the state backs up the repayment.

- ***Using conduit bond issuing entities, such as counties, cities, or other local entities, to issue Private Activity Bonds (PABs) for project financing***

PABs issued and backed by local and state governments typically still offer the least expensive alternative for project financing. PABs allow for issuance of tax-exempt bonds and are a preferable alternative for lenders. However, according to one of the interviewee's comment, the U.S. bond rating agencies and investment banking need to become more familiarized with asset-based financing mechanisms and understand how this method moves the debt off the balance sheet of the parties involved in the project. For instance, the Florida DOT (FDOT) in collaboration with a local public entity, Florida Municipal Loan Council, utilized a similar financing structure on two design-build-finance contracts, the SR 9B project and I-95 (from SR 406 to SR 44) improvements project (FDOT 2014). The $199 million I-95 project involved $38.6 million in bonds and the $105million SR 9B project involved $59.1 million in bonds issues by local authorities. The financing portion of both design-build-finance agreement involved using the proceeds of bonds issued by a local public entity (i.e., conduit bond issuer) for construction costs without recourse against the joint ventures responsible for project development. The Florida DOT retained the payment responsibility for the bonds while the proceeds were kept off the balance sheet of the joint ventures and the state DOT.

- ***Executing contracts directly with state DOTs with repayment obligations subject to appropriation***

More than often, DBF or DBFOM projects include some toll roads or managed lanes. These toll facilities are typically operated by another entity besides state DOTs, for instance, the State Road and Toll Authority in Georgia. This other entity may operate the facility on behalf of the state and collect tolls, but it is considered independent from the state. Most contractors and developers would like to keep their direct contracts with state DOTs and not with this toll authority since the authority is typically not backed up directly by the state. This concern is also true for conduit bond issuers since they are not directly backed up by the state. To secure repayment obligations to the project team, it is recommended that the state DOT directly executes DBF and DBFOM contracts. An example of direct contract execution is the "SH-130" agreement directly executed by TxDOT with repayments that were subject to appropriations. On the other hand, in the Indiana "East End Crossing" project, the DBFOM agreement was executed between the private sector and both the state DOT and the conduit bond issuing entity.

5.2.7. Escrow Accounts

The authority to use alternative payment mechanisms, such as the deferred payment method, reimbursement of payment certificates, and availability payments, are essential for planning and development of projects that include private financing. However, in some states, the state DOT may not have the ability to directly pay the lenders for payment certificates. For instance, the Florida statutes prohibit FDOT from reimbursement of a party other than the contractor, which has performed the work for payment certificates. This statutory constraint may limit the use of factoring agreements in DBF or DBFOM projects.

- ***Establishing an escrow account, controlled by lenders to indirectly repay the lenders and financiers***

An innovative strategy to overcome the indirect payment barrier is to utilize escrow accounts for making all payments to an escrow account (or a lock-box) controlled by the lender. For example, FDOT has utilized the escrow accounts approach on some of its DBF projects in order to solve the issue of direct contractor reimbursement. The escrow accounts method requires establishment of an escrow account that is directly managed by the lenders and used for making deposits by the state DOT. The agency reimburses the account for the completed portions of the work, and then the lenders can have the flexibility to use the funds in the account based on the agreement with the contractor. An example of using escrow accounts for DBF projects is the Florida DOT's DBF RFP template that provides the following statement in regard to the escrow accounts (FDOT 2014):

> *"Reimbursement shall be made to the Design-Build Firm by warrant mailed to the Project Specific Escrow Account…This Project Specific Escrow Account payment process shall be irrevocable unless mutual written request to the Department is made by the Design-Build Firm, its Surety(ies) and its Lender(s)/Financier(s), and thereafter approved by the Department. The Design-Build Firm may, with the express written consent of the Surety(ies) and the Lender(s)/Financier(s), sell, assign or pledge any monies paid into the Project Specific Escrow Account by the Department in favor of third parties and including but not limited to the Design-Build Firm's Surety(ies) and Lender(s)/Financier(s); however, any such sale, assignment or pledge must only attach to payments made by the Department after such funds have been paid by warrant mailed to the Project Specific Escrow Account, and no sale, assignment or pledge of any receivable from the Department is authorized nor will be permitted by the Department."*

It should be noted that although this approach solves the issue of indirect lender reimbursement, when compared to the factoring method, it may pose additional risks to the contractor. If the state

DOT decides to tie reimbursements to substantial completion, the lenders may exercise set-off rights against the funds in the account. Therefore, it is recommended to utilize escrow accounts combined with the fixed schedule of repayment that is not tied to the final project completion.

5.2.8. Customary Interest Rate Protection

Infrastructure private finance market is affected by volatility in the general market. It is not reasonable to expect that the private financier can guarantee the proposed capital structure for the project over a long period of time. Long delay between the time that the private sector submits its bid and the time that the financial closing of the contract is occurred can affect the capital structure of the project. Changes in the available interest rate in the financial market represent a major risk for the project team. Therefore, the public sector should make any possible attempt to sign the contract as soon as the developer is selected. Any unforeseen delay between the bid date and the financial close date represents an added risk to the project that the State DOT should be ready to bear. Other delays due to long lead times in decision making about major project problems or due to supervening events also represent added risks to the project. Offering customary interest rate protection can be a proper strategy to mitigate this financing risk in DBF and DBFOM projects.

- ***Protecting the project development team from significant changes in customary interest rate as a result of delay in the financial close of the contract or in the event of delay due to the contracting party's inaction or supervening events***

In the event of a delay due to the public sector's indecision or long lead times in decision-making, the best practice for the state DOTs is to provide customary interest rate protection to the project development team. Providing customary interest rate protection in the event of delay or termination due to contracting authority action or supervening events enables the private sector to better deal with financial risks resulting from interest rate fluctuations. An example of this is the SH-183 contract, which provides customary interest rate protection between bid and financial close.

5.2.9. Surety and Performance Bonds

The importance of surety bond requirements for public works projects under the Miller Act of 1935 (40 U.S.C. §§ 3131-3134) has been widely accepted by state DOTs and private developers and contractors. Surety payment and performance bonds protect the public sector, subcontractors, and suppliers in highway project developments. In major DBF and DBFOM projects, where significant private sector financing is involved, the risks are even higher for the state DOT since contractor's default means lack of any funding for project's continuation as the private sector partially finances the project. In case of developer/contractor default, the public sector is left with a project that requires inserting funds from alternative sources for project continuation as wells as supplier and sub-contractor reimbursement. Because of these unique features of DBF and DBFOM projects, the traditional performance and payment bond requirements may be insufficient for DBF and DBFOM contracts.

- ***Utilizing an appropriate performance bond to protect both public and private sector's interests during the construction phase of the project***

During the construction phase, the risk of default is generally the highest among all other phases of a project and hence, it is critical for the state DOT to require special performance bonds on DBF projects. Sureties provide bonds only for those contractors that are capable of performing the work. Surety performance bonds provide the public sector, investors, suppliers, and sub-contractors with the third-party assurance that the contractor is capable of performing the work (Nelson and Marema 2014). Therefore, appropriate performance bonds are a critical requirement that protect the stakeholder's financial interest during the construction phase of DBF and DBFOM projects.

Performance bonds for DBF and DBFOM projects are to some extent different from regular construction projects as an additional liquidity component is often requested by the lenders in P3 projects to secure potential delay damages. In some situations (and especially in the international P3 market), this liquidity component can be replaced by a letter of credit. In case of project delays

that may extend several months, the traditional performance bond does not provide adequate capacity to address potential delay damages. Hence, a liquidity component, which serves as an additional guarantee for lenders and investors, should accompany developers' performance bond for DBF or DBFOM projects (Zurich 2011).

According to Zurich (2011), customized surety products for DBF or DBFOM projects must offer several unique features. There should be an "on-demand" feature in the performance bond that the state DOT can use to receive a payment upon the declaration of contractor default for delay. There should be a unique dispute resolution procedure that provides certain time limits for the resolution of disputes between the surety and the obligee. These features may provide favorable treatments from lenders and investors in the project and hence, may help the state DOT to receive more attractive terms and conditions from the infrastructure finance market.

With respect to the surety requirement for bonding P3 projects, The Surety & Fidelity Association of America (SFAA) and American Insurance Association (AIA) (2014) state the following:

> *"The private partner also can and has failed for reasons unrelated to the construction portion of the P3. If the private partner's financing fails and causes a default when the construction portion of the P3 is not yet complete, the public entity may have to take control of the project. Without a surety bond that includes the public entity as an obligee, the public entity would have to fund, manage, and possibly re-let the construction part of the project. Requiring performance bonds on the construction portion of a P3 will protect the public entity and its taxpayers in the event that the private partner defaults and the public entity takes control of the P3 just as they do in any other public works project."*

The statutes in several states require adequate (some defined as satisfactory for the state DOT) bonding capacity on projects that require private financing. Examples of these requirements include the following:

- Arizona (Ariz. Rev. Stat. Ann. §§ 28/7701-7710):

  "The DOT requires, among other things, a private partner to provide performance and payment bonds, parent company guarantees, letters of credit or other acceptable forms of security or a combination of any of these. The penal sum or amount of the security provided may be less than 100% of the value of the contract based on DOT's determination on a facility-by-facility basis."

- Colorado (Colo. Stat. §43.3.202):

  "A sufficient bond approved by the DOT in an amount that it sets, which shall be not less than 25% of the total amount payable by the terms of said contract."

- *Florida (Fla. Stat. §334.30):*

  "The DOT shall ensure that procurement documents include provisions for performance of the private entity and payment of subcontractors, including, but not limited to, surety bonds, letters of credit, parent company guarantees, and lender and equity partner guarantees. The DOT must balance the structure of the security package for the public private partnership that ensures performance and payment of subcontractors with the cost of the security to ensure the most efficient pricing."

- Texas (Tex. Transp. Code Ann. §223.001-210 and §370.305-317):

  "The private entity entering into a comprehensive development agreement under this subchapter, [is required] *to provide a performance and payment bond or an alternative form of security in an amount sufficient to ensure the proper performance of the agreement and protect the DOT and payment bond*

beneficiaries who have a direct contractual relationship with the private entity or a subcontractor of the private entity to supply labor or material. The performance and payment bond or alternative form of security must be in an amount equal to the cost of constructing or maintaining the project. If the DOT determines that it is impracticable for a private entity to provide security in this amount, it shall set the amount of the bonds or the alternative security. The amount of the payment security must not be less than the amount of the performance security."

It is recommended that the state DOT should better understand various specific bonding requirements that are requested by the lenders and investors from the contractor in DBF or DBFOM project. This understanding can help the state DOT not duplicate the bonding requirements and not demand unnecessary bonds for the project as these additional bonding expenses are directly contributed to the total project cost.

- ***Utilizing an appropriate payment bond to protect the suppliers and sub-contractors in DBF or DBFOM projects***

With respect to payment bond requirements in DBF and DBFOM projects, the suppliers and sub-contractors are concerned with applicability of assurances under existing state laws (Nelson and Marema 2014). In DBF and DBFOM projects, the state DOT is in agreement with the private-sector developer, and therefore, is not directly engaged with the construction contractor. Considering the contract structure of DBF and DBFOM projects, the general contractor's default in the construction phase may pose significant risks to the suppliers and sub-contractors. Furthermore, mechanic's lien cannot be asserted against the public property as a payment for suppliers and sub-contractors. Appropriate payment bonds for DBF and DBFOM projects provide assurance for the suppliers and subcontractors that their interests will be protected in case of contractor's default.

Most recently, several foreign developers, investors, and contractors have become active in the U.S. private financing market. Foreign private partners typically face different bond requirements in DBF and DBFOM projects around the world. State DOTs may become challenged by these big international players when it comes to providing protection for the public, suppliers, subcontractors, and other stakeholders. Changing the fundamental U.S. protections solely to accommodate the financial interests of foreign equity investors or financiers is misplaced. It is noted that bonding 100% of the construction portion of DBF and DBFOM projects still remains the best option in the U.S. for payment and performance security.

5.2.10. O&M Services

There are various O&M issues associated with DBF projects that may result in lack of proper incentives for the contractors to incorporate innovation and life cycle cost efficiencies in the project. Considering the significant highway expenditures on maintenance, including the O&M services in project delivery may result in efficiencies in procurement and life cycle cost savings.

- ***Signing an additional O&M services contract with the DBF project development team to encourage the development of innovative design and construction solutions with potential life cycle cost savings***

Sometimes state DOTs may feel uncomfortable or may be limited by the statute of the state to engage in long-term DBFOM projects, in order to benefit from potential savings due to life cycle cost efficiency and innovative O&M practices. A possible solution in these circumstances might be signing a separate O&M contract with the same development team on the DBF project. The state DOT can still hold the right to collect tolls and manage any long-term financing transactions related to the project. The project development team, however, has an added incentive to build high-quality product knowing the opportunity available to take the charge of operating and maintaining the facility. In fact, some developers specified their interest in this hybrid model since they do not have

to maintain a long-term financing position in the project as their involvement in private financing will be short-term according to the financing requirements of the DBF contract.

5.2.11. Flexibility for Buy-Back and Revenue Sharing Provisions in the Contract

The traditional pay-as-you-go project financing model is typically the most cost-effective option for development of highway projects. Government-backed financing tools, such as TIFIA loans and bond proceeds, often provide the least expensive financing option for highway projects. All interviewees emphasized on the significance of these financing tools as they provide leveraging opportunities to effectively incorporate private financing into the mix of financing methods for the project. State DOTs should use innovative government financing methods as a strategic tool to leverage private funding in the portfolio of their projects.

- ***Incorporating flexible financing terms and conditions to possibly modify the financing structure of the contract throughout various phases of project development***

State DOTs should constantly look for any cost-effective opportunity that can save the interest cost paid for the development of highway projects. Incorporating flexibility in DBF or DBFOM contracts can facilitate lowering the overall financing charges for the state DOT in the project. Several forms of flexibility can be considered in contracts that private financing is utilized:

1. Flexibility to modify the schedule of repayment to pay off the state DOT's debt earlier: This flexibility gives the state DOT a chance to provide additional payment to the project developer in order to save on private financing expenses. This option may be useful when unforeseen sources of revenue become available to the state DOT during the course of project development. It should be noted that exercising this flexible option should be evaluated against possible penalty charged by the private sector for changing the financial course of the project.
2. Flexibility to change the project delivery system prior to contract signing: State DOTs may have originally selected P3 (either DBF or DBFOM) model for project delivery due to the

lack of public funding for the project. As public funding (e.g., TIFIA loan, PABs, etc.) becomes available, it may be more cost-effective to forego private financing and deliver the project with the new government financing resources to save on the interest rate. Flexibility to change the project delivery prior to awarding the contract should not be overlooked. However, the state DOT should communicate its rationale for such change with the industry and the public in a clear fashion. An example of modifying a DBF project to a regular design-build project is the Inner belt Eastbound Bridge in Ohio. The DBF project was initiated in 2012 due to a three year gap in funding, but it was modified to a regular design-build because of some positive changes in the availability of public funds for the project (FHWA 2014f).

3. Flexibly to buy-back the facility in DBFOM agreements, which include toll revenues particularly when the revenues are above the projected assumptions: In case of availability payments, buy-back provisions may result in cost savings in the long-run depending on the financing structure of the project. Sharing unexpected revenues with the private sector can be a better option in these circumstances.

Including flexible provisions in private financing contracts enables state DOTs to utilize the least expensive project financing option, especially when innovative government financing options become available for the project. However, exercising these alternatives often requires payment of fees (i.e., breakage and transaction costs) to the private party (lenders, developers, etc.) that should be considered as an integral part of alternative financing valuation.

The contract provisions in the SH-183 project procured by TxDOT note the following conditions with respect to these breakage fees (TxDOT 2014):

(i) "Upon notice to Developer, TxDOT, in its discretion, may elect to accelerate the amounts available under the Maximum D&C Payment Schedule.

(ii) Upon notice to Developer, TxDOT, in its discretion, may elect to pay, in whole or in part, amounts owed under any Deferred D&C Payment Certificate prior to the payment date set forth in the applicable certificate.

(iii) Upon such election, TxDOT shall pay the sum of (A) the amount under the Deferred D&C Payment Certificates subject to early payment as set forth in the notice delivered to Developer, plus (B) Breakage Costs payable by Developer or Borrower (as applicable) as a result of such election…"

- ***Incorporating sharing clauses for refinancing gains in the contract in case of refinancing***

As the project moves along the development path, its risk profile will become more favorable for the investor. Hence, it is safe to assume that the project development team and the investor may pursue refinancing to reduce the project's financing charges. Refinancing may be planned in the original contract. However, it may be unplanned as a result of favorable project conditions or interests from the infrastructure finance market. In either case, the state DOT should include proper provisions in the contract to share the interest saving with the project development team.

- ***Requesting the right to assess and approve any changes in the project financier***

The state DOT evaluates the entire project team including the entity responsible for providing private financing and selects the most qualified team to perform the project. Therefore, it is not desirable for the state DOT to see instant or frequent changes in the project financier after the contract is awarded. Some financial firms always look for opportunities to sell their positions in the market as they may not be interested in keeping their financial resources tied to the project. The state DOT should have the option to evaluate and approve such changes in the project team. In fact, the state DOT may request no change in the original project team before the substantial project completion as it wants all parties to have "skin in the game" to ensure high-quality project development.

5.2.12. Commitment to a Quality Management Plan

It is critical for state DOTs to achieve quality standards on delivered projects since quality of a project is a reflection of the performance of the state DOT. The quality issues are important for all types of the project but should receive extra attention from state DOTs in projects for which the private sector offers short-term or long-term financing. Poor quality can be especially catastrophic in DBF or DBFOM projects if for whatever reason, the project development team stops working on the project. The state DOT should be ready for the worst-case scenario in case it had to complete and operate the project for several years to come.

Various issues can affect the quality of a project, such as selection of qualified contractor/developer, critical project risks, and contractor's performance. Thus, Managing the ultimate quality of transportation projects is a major concern for state DOTs. Traditionally, design QA/QC has been the responsibility of the state DOT (Gransberg et al. 2008). In projects that require private sector financing, such as DBF and DBFOM, project quality assurance and quality control (QA/QC) responsibilities are ultimately the responsibility of the developer, mainly because the design and construction components of these projects are contracted under design-build requirements. Conversely, the role of the state DOT during the post-award period is more of an oversight and acceptance role. To maintain such oversight and acceptance position over project quality, state DOTs have to utilize certain controlling tools in the post-award period. The major control tools that state DOTs have are design and constructability reviews and design checks, monitoring/verification of quality assurance and quality control (QA/QC) processes, agency acceptance, and independent assurance for compliance with RFP requirements (FHWA 2012a).

- ***Requiring and evaluating a QMP in the RFQ and RFP process to ensure that the project has sufficient quality in case of contractor default***

Although the state DOT can transfer the responsibility of QA/QC to the developer's design-build team, the responsibility for acceptance does not change in design-build contracts (Title 23 CFR

637.207(b)). The state DOT is required to perform all the acceptance activities or hire a consultant to perform the acceptance responsibilities. The state DOT should perform verification sampling and testing on construction and workmanship and validate QC data that is provided by the design-build team (FHWA 2012a). The design-build contract documents should also identify the acceptable quality level of each work item along with requirements for appropriate corrective actions. The challenge is to properly administrate quality acceptance procedures and achieve accepted levels of quality on design-build projects that have the QA/QC responsibilities transferred to the design-build team. One of the interviewees noted that "*state DOTs need to ensure that the contractor complies with the proposed quality management plan so that they [state DOT] are prepared for the worst case scenario. Incentives for project quality are not adequate, particularly in DBF projects that do not have an O&M component. State DOTs have to be prepared for contractor's default so that they [state DOT] can take over the project that has an acceptable performance and level of service*." The state DOT should clearly stipulate the required quality management plan in the project RFQ/RFP and/or solicit proper quality management plan from developers to better deal with the challenges of quality management in design-build projects and allocate QA responsibilities to contract parties. Further, the state DOT can shortlist proposers based on their quality management organization and qualifications of their quality management staff. By requesting proper quality management plans from design-build teams, the state DOT can ensure that shortlisted proposers will be qualified to properly manage QA process and achieve the required level of quality in both design and construction.

5.3. Conclusions

The summary of deal-breaker issues and challenges for incorporating private financing into project delivery is provided in Table 5.1 and Table 5.2 respectively. The recommended best practices for the development of design-build-finance projects are summarized in Table 5.3.

Table 5.1. Deal-Breaker Issues for Incorporating Financing into Project Delivery

Deal-Breaker Issues	
1. Legislative Issues	➢ Lack of alternative payment authorization under the state legislative framework
2. Agency-Related Issues	➢ Lack of political stability ➢ Lack of consistency in decision-making ➢ Lack of a programmatic approach in the state DOTs to incorporate private financing as a strategic means to develop projects (i.e., treating private financing as a one-time deal)
3. Issues Related to Project Readiness	➢ Lack of determination in the state DOTs to build the project in a specific timetable ➢ Major NEPA, ROW, and other critical permitting risks that must be resolved prior to soliciting bids
4. Project Cancelation	➢ Devastating consequences of project cancelation on the continuity of private sector involvement in private financing business with the state DOT
5. Creditworthy Counterparty and Payment Security	➢ Inadequacy in public sector creditworthiness that can risk payment security for the private sector
6. Opportunities to Introduce Innovation	➢ Limited opportunities in offering innovative design and construction solutions ➢ Limited opportunities to differentiate the firm's proposal in DBF projects compared to DBFOM projects (i.e., relatively wider competition field in DBF projects compared to DBFOM projects)
7. Short-Listing Process and Odds of Winning	➢ Low odds of winning

Table 5.2. Major Challenges for Incorporating Financing into Project Delivery

Major Challenges	
1. Legislative Challenges	➢ A wide range of variations in the state enabling legislations for private financing ➢ Inability of private sector to be involved in the predevelopment phases of transportation projects
2. Agency-Related Challenges	➢ Long lead times in decision-making ➢ Failure of delegating decision-making authority to the responsible parties ➢ Lack of clarity and transparency in procurement processes
3. Transaction Costs for DBF and DBFOM Projects	➢ High transaction costs for DBF and DBFOM projects ➢ Issues related to the recoverability of transaction costs for relatively small DBF projects comparted to that for large DBFOM projects
4. Balance Sheet and Surety-Contractor Relationship	➢ Adverse effect of private financing (using either the firm's own equity or the lender's financial resources) on the firm's balance sheet and its ability to secure performance bonds
5. Timing and Conditionality of Payment	➢ Lack of fixed and unconditional payment schedules for the deferred payment component
6. Risk of Significant Change in the Interest Rate	➢ Lack of government support with respect to significant change in the interest rate (market rate) that has negative impacts on the private sector's financing capabilities
7. Differences between DBF and DBFOM project delivery systems in treating Operations & Maintenance and Life Cycle Cost issues	➢ Lack of incentive clauses in DBF contracts that encourage contractors for considering life cycle cost efficiency in the project
8. Differences in Return on Investment of DBF and DBFOM projects	➢ Relatively higher targets for return on investment (ROI) in DBFOM projects compared to ROI targets in DBF projects

Table 5.3. Recommended Best Practices for the Development of Design-Build-Finance Projects

Recommended Best Practices	
1. Program Organization	➢ Establishing a dedicated group or program for projects that involve private financing with adequate organizational resources ➢ Delegating authority to the dedicated private financing program
2. Transportation Project Planning and Programming	➢ Incorporating alternative funding sources and innovative financing mechanisms consideration in the development of the TIP and the STIP ➢ Utilizing private sector expertise in project planning and NEPA studies ➢ Educating policy decision-makers, legislatures, and other stakeholders about private financing ➢ Using appropriate consultants (legal, financial, and technical) with specific expertise in private financing
3. Development of Project Portfolios	➢ Bundling smaller projects to reduce the transaction costs and make private financing a more attractive alternative for the portfolio of the projects
4. Procurement Process	➢ Shortlisting a maximum of 3 teams to incentivize qualified developers to bid for the project and minimize transition costs ➢ Providing comprehensive debriefing for unsuccessful teams in both shortlisting and final proposal phases ➢ Paying appropriate stipends to unsuccessful shortlisted teams ➢ Utilizing performance criteria for evaluating design solutions and allowing for ATCs ➢ Avoiding over usage of technical or qualification pass/fail criteria in proposal evaluation ➢ Focusing more on evaluation of proposed innovative design solutions and less on past experience of the project team members
5. Accounts Receivable Purchase Agreements or Factoring Construction Invoices	➢ Utilizing factoring design and construction invoices as a solution to enhance the flexibility of the project team's balance sheet ➢ Not binding the schedule of payments and the repayment of certified accounts receivables to the final completion of the project (i.e., fixed schedule of repayment) ➢ Creating deferred payment certificates that are not subject to set-off or recourse against the contractor

Table 5.3 (Continued).

6. Asset-Based Financing and Securitization through Conduit Bond Issuers	➢ Using conduit bond issuing entities, such as counties, cities, or other local entities, to issue Private Activity Bonds (PABs) for project financing ➢ Executing contracts directly with state DOTs with repayment obligations subject to appropriation
7. Escrow Accounts	➢ Establishing an escrow account, controlled by lenders to indirectly repay the lenders and financiers
8. Customary Interest Rate Protection	➢ Protecting the project development team from significant changes in customary interest rate as a result of delay in the financial close of the contract or in the event of delay due to the contracting party's inaction or supervening events
9. Surety and Performance Bonds	➢ Utilizing an appropriate performance bond to protect both public and private sector's interests during the construction phase of the project ➢ Utilizing an appropriate payment bond to protect the suppliers and sub-contractors in DBF or DBFOM projects
10. O&M Services	➢ Signing an additional O&M services contract with the DBF project development team to encourage the development of innovative design and construction solutions with potential life cycle cost savings
11. Flexibility for Buy-Back and Revenue Sharing Provisions in the Contract	➢ Incorporating flexible financing terms and conditions to possibly modify the financing structure of the contract throughout various phases of project development ➢ Incorporating sharing clauses in the contract in case of refinancing ➢ Requesting the right to assess and approve any changes in the project financier
12. Commitment to a Quality Management Plan	➢ Requiring and evaluating a QMP in the RFQ and RFP process to ensure that the project has sufficient quality in case of contractor default

CHAPTER 6

CONCLUSIONS

The results of the survey from state DOTs around the U.S. and interviews conducted with private sector participants on the state-of-practice with respect to private financing involvement in delivery of highway projects indicated that most state DOTs are still experimenting with innovative financing mechanisms. Some state DOTs, such as Florida, Texas, and Virginia DOTs, have established mature private financing programs for delivery of highway projects. It is uncovered that most state DOTs pursue private financing, in order to develop the backlog of their delayed projects and use deferred payment mechanisms in anticipation of future funding. Considering the fiscal restraints of governments at federal and state levels, it is anticipated that private financing will remain a viable alternative for highway project development across the U.S. The survey showed that most state DOTs are interested in expanding the utilization of private financing as an alternative for development of highway projects, in order to flexibly respond to investments needs, reduce financial burden on government agencies, accelerate project development and capital programming, and achieve excellence in project finance and delivery. In this chapter, we conclude the results of the survey and interviews and describe interesting areas for future research.

6.1. The Decision-Making Process for Incorporating Private Financing in Project Delivery

Interestingly, it was recognized that state DOTs typically think of private financing more as an instrument to bridge their funding gaps and financing shortfalls and less as an innovative solution to gain life cycle cost efficiencies, encourage competition, and transfer critical project risks to the private sector. Using private financing as a temporary funding replacement for conventional highway funding mechanisms has been a common practice in the U.S. as opposed to the Canadian or European project finance models, which aim at optimizing project life cycle cost and enhancing project efficiency. Survey results showed that state DOTs are concerned with higher risk premiums and inflated bids, excessive returns for the private sector, and creation of improper financial obligation for the agency. Table 6.1 presents the list of main objectives and Table 6.2 presents the list of major concerns with respect to decision-making for private financing based on their order of importance as indicated by the survey respondents.

Table 6.1. Main Objectives of State DOTs for Utilizing Private Financing in Development of Highway Projects (in order of importance)

Main Objectives of State DOTs for Utilizing Private Financing in Development of Highway Projects
Develop projects that otherwise would be delayed
Enable the agency to expedite the award of the contract to avoid future cost escalation
Enable the agency to start project procurement despite funding shortfalls for the project
Incentivize project teams to accelerate the completion of projects
Enhance agency's ability to overcome cash flow constraints
Encourage project teams to develop high-quality projects to ensure timely compensation
Provide opportunity for the agency to defer payment
Decrease project life cycle costs as a result of competitive proposed finance plans
Enhance the agency's image by accelerated opening of the project to the public through efficient use of private financial resources
Maximize the use of available funding through private financing (financing the gap in project costs)
Motivate project teams to propose innovative design & construction solutions to save on financing charges
Leverage available funding (to deliver more projects) with capability of private sector financing
Award the contract early to utilize available federal and state funding
Obtain finance services beyond in-house capabilities/expertise
Incentivize contractor to reduce project cost in spite of financing charges
Transfer interest rate risk (or other financing risks) to the private sector
Encourage price competition through accepting alternative cash flows from project teams
Enhance the capacity of agency financing without hitting the agency's debt ceiling
Reduce financing charges due to availability of deferred payment mechanism
Accelerate start of the project revenue (when road-pricing is used)
Raise financing for construction of emergency projects

Table 6.2. Major Concerns of State DOTs for Utilizing Private Financing in Development of Highway Projects (in order of importance)

Major Concerns of State DOTs for Utilizing Private Financing in Development of Highway Projects
Statutory and legislative constraints for incorporating financing in public procurement
Higher financing costs compared to conventional financing mechanisms
Time-consuming and complex procurement processes for proposal evaluation
High risk premiums and inflated bids as a result of private sector's involvement in project financing
Public concerns and political opposition about including private sector financing in project delivery
Difficulty in defining a proper approach for evaluating proposed finance plans
Difficulty in establishing an easy-to-understand approach for financial evaluation of proposed finance plans
Difficulty in establishing transparent and systematic procurement processes
Significant proposal development costs for the industry
Concerns about potential excessive rates of return to private investors
Lack of adequate interest in the transportation industry to engage in financing projects
Inability of the agency to ensure that funds for partial payment shown in cash availability schedule are prioritized ahead of funding in its tentative program
Challenge in getting early commitment to project price in volatile market conditions
Creation of any improper financial obligation or legal right for the agency
Difficulty in estimating project cost and establishing an appropriate lump sum contract
Inability of the agency to include partial payments for the project in the legislative budget request prepared annually for the state legislature and the governor
Limited potential for receiving price-competitive proposals due to lack of adequate qualified contractors with financing capacity
Limited technical skills for evaluating proposed finance plans
Increased chance of litigation due to deferred payment mechanism
Lack of leadership support to incorporate financing in project delivery services
Difficulty in qualifications evaluation and short-listing most qualified project teams
Unavailability of private financing in squeezed credit market

Stringent organizational policies, inefficient project development processes, and non-flexible procurement methods were found to be among the major concerns of state DOTs for effective utilization of private financing. Statutory limitations and inefficient frameworks for project financing, and procurement method in the public sector were recognized as major barriers for the private sector's involvement in financing highway projects. The resistance to change within the public agencies and the slow shift in their mindsets toward new procurement methods were identified as main issues for enhancing private financing. Negative public perceptions and local oppositions were among major barriers that can disrupt the success of utilizing private financing by state DOTs. It was found that enhanced public awareness regarding the transportation investment needs can mitigate these threats. Table 6.3 summarizes these barriers.

Table 6.3. Barriers to Adoption of Private Financing for Highway Projects (in order of importance)

Barriers to Adoption of Private Financing for Highway Projects
Legislative and statutory limitations
Inadequate leadership support and commitment
Procurement constraints and complexities in contract management
Fiscal restraints of governments
Turbulent market conditions
Complexities in Project Financing
Inefficient coordination and communication between the agency and other local, state, and federal government entities
Bankruptcy of project financiers
Inefficient risk allocation
Inefficient coordination and communication between the public and private sectors
Inadequate federal government support
Negative public perceptions and local public opposition
Regulatory uncertainty
Tenure and stability of elected officials
Lack of best practices and available training
Difficulty in preparing project cost and life-cycle cost estimates
Inefficient organizational frameworks
Desire not to try new procurement methods
Poor prospects for economic growth
Labor relation issues

Legislative flexibility for engaging private financing and commitment of key project stakeholders and top state officials were identified as critical factors that significantly enhance the adoption of private financing in highway project development. Commitment of the agency's leadership to provide necessary support from political authorities and the legislative flexibly to allow innovative project financing contribute to the elevation of the current state of private financing in highway projects. Establishing true partnership culture in the agency, engaging the private sector to develop plans for financing highway projects, and conducting industry outreach sessions were determined as effective means to improve the current state of private financing for highway projects. State DOTs identified several skill sets that they can benefit from with training and organization development, e.g., financial management and analysis, leadership and team building, alternative procurement methods, quantitative risk assessment, and life cycle cost analysis. Table 6.4 summarizes these improvement areas.

Table 6.4. Improvement Areas that Can Enhance the Adoption of Private Financing for Highway Projects (in order of importance)

Improvement Areas that Can Enhance the Adoption of Private Financing for Highway Projects
Enhanced partnering between public and private sectors
Leadership commitment and support from political authorities
Proper allocation of project financing risks
Legislative flexibility to allow innovative project financing
Industry outreach and training
Proper use of financial service advisors
Effective project organization structure
Enhanced public awareness regarding transportation investment needs
Efficient negotiation procedures
Performance-based payment schedule
Flexible procurement processes
Rigorous financial risk assessment
Early involvement of project financiers
Standard and customizable contracts to properly describe project financing services
State-of-the-art financial analysis tools

6.2. Challenges and Recommended Best Practices

In the course of interviews with private sector participants in highway project development, it was recognized that the challenges and limitations of project development are common among the participants of the highway financing market. There are great variations among state DOTs in practicing private financing. These variations result in almost autonomous financing practice across the states. Further, political instability or lack of political commitment has resulted in canceling several highway projects in recent years. Finally, pushing down the funding and financing challenges to developers and contractors is likely to increase financial risks of projects that include private financing. These challenges, as highlighted by the interviewees, are a major source of risk for private sector participants and can discourage investors and competitors from involvement in high-risk and turbulent markets (e.g., states with turbulent market conditions or politically unstable) in favor of more developed markets (e.g., states with mature private financing programs). Table 6.5 presents the deal-breaker issues and Table 6.6 presents major challenges for incorporating private financing into project delivery that can affect private sector involvement in project financing.

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Table 6.5. Deal-Breaker Issues for Incorporating Financing into Project Delivery

Deal-Breaker Issues	
1. Legislative Issues	➢ Lack of alternative payment authorization under the state legislative framework
2. Agency-Related Issues	➢ Lack of political stability ➢ Lack of consistency in decision-making ➢ Lack of a programmatic approach in the state DOTs to incorporate private financing as a strategic means to develop projects (i.e., treating private financing as a one-time deal)
3. Issues Related to Project Readiness	➢ Lack of determination in the state DOTs to build the project in a specific timetable ➢ Major NEPA, ROW, and other critical permitting risks that must be resolved prior to soliciting bids
4. Project Cancelation	➢ Devastating consequences of project cancelation on the continuity of private sector involvement in private financing business with the state DOT
5. Creditworthy Counterparty and Payment Security	➢ Inadequacy in public sector creditworthiness that can risk payment security for the private sector
6. Opportunities to Introduce Innovation	➢ Limited opportunities in offering innovative design and construction solutions ➢ Limited opportunities to differentiate the firm's proposal in DBF projects compared to DBFOM projects (i.e., relatively wider competition field in DBF projects compared to DBFOM projects)
7. Short-Listing Process and Odds of Winning	➢ Low odds of winning

Table 6.6. Major Challenges for Incorporating Financing into Project Delivery

Major Challenges	
1. Legislative Challenges	➢ A wide range of variations in the state enabling legislations for private financing ➢ Inability of private sector to be involved in the predevelopment phases of transportation projects
2. Agency-Related Challenges	➢ Long lead times in decision-making ➢ Failure of delegating decision-making authority to the responsible parties ➢ Lack of clarity and transparency in procurement processes
3. Transaction Costs for DBF and DBFOM Projects	➢ High transaction costs for DBF and DBFOM projects ➢ Issues related to the recoverability of transaction costs for relatively small DBF projects comparted to that for large DBFOM projects
4. Balance Sheet and Surety-Contractor Relationship	➢ Adverse effect of private financing (using either the firm's own equity or the lender's financial resources) on the firm's balance sheet and its ability to secure performance bonds
5. Timing and Conditionality of Payment	➢ Lack of fixed and unconditional payment schedules for the deferred payment component
6. Risk of Significant Change in the Interest Rate	➢ Lack of government support with respect to significant change in the interest rate (market rate) that has negative impacts on the private sector's financing capabilities
7. Differences between DBF and DBFOM project delivery systems in treating Operations & Maintenance and Life Cycle Cost issues	➢ Lack of incentive clauses in DBF contracts that encourage contractors for considering life cycle cost efficiency in the project
8. Differences in Return on Investment of DBF and DBFOM projects	➢ Relatively higher targets for return on investment (ROI) in DBFOM projects compared to ROI targets in DBF projects

It is concluded that establishing a mature and transparent financing program along with project portfolio development can enhance P3 program organization and project development, especially in state DOTs that are inexperienced with P3 and alternative financing methods. Further, additional opportunities in the area of financial structuring are recommended that can be utilized as enabling mechanisms for development of projects that include private financing. Several recommended best practices are identified and analyzed that can increase the financing capabilities of the private sector, relieve liquidity issues, and attract a large pool of secondary market investors. Further, state DOTs can use accounts receivable purchase agreements in order to attract local developers and contractors to smaller design-build-finance projects. State DOTs can also enhance the private financing market in their states and deliver critical projects by involving regional entities in asset-based financing and securitization. The opportunities identified in this study are expected to contribute to the next generation of highway project development using private financing in the U.S. Table 6.7 presents the recommended best practices that can enhance development of design-build-finance projects.

Table 6.7. Recommended Best Practices for the Development of Design-Build-Finance Projects

Recommended Best Practices	
1. Program Organization	➢ Establishing a dedicated group or program for projects that involve private financing with adequate organizational resources ➢ Delegating authority to the dedicated private financing program
2. Transportation Project Planning and Programming	➢ Incorporating alternative funding sources and innovative financing mechanisms consideration in the development of the TIP and the STIP ➢ Utilizing private sector expertise in project planning and NEPA studies ➢ Educating policy decision-makers, legislatures, and other stakeholders about private financing ➢ Using appropriate consultants (legal, financial, and technical) with specific expertise in private financing
3. Development of Project Portfolios	➢ Bundling smaller projects to reduce the transaction costs and make private financing a more attractive alternative for the portfolio of the projects
4. Procurement Process	➢ Shortlisting a maximum of 3 teams to incentivize qualified developers to bid for the project and minimize transition costs ➢ Providing comprehensive debriefing for unsuccessful teams in both shortlisting and final proposal phases ➢ Paying appropriate stipends to unsuccessful shortlisted teams ➢ Utilizing performance criteria for evaluating design solutions and allowing for ATCs ➢ Avoiding over usage of technical or qualification pass/fail criteria in proposal evaluation ➢ Focusing more on evaluation of proposed innovative design solutions and less on past experience of the project team members
5. Accounts Receivable Purchase Agreements or Factoring Construction Invoices	➢ Utilizing factoring design and construction invoices as a solution to enhance the flexibility of the project team's balance sheet ➢ Not binding the schedule of payments and the repayment of certified accounts receivables to the final completion of the project (i.e., fixed schedule of repayment) ➢ Creating deferred payment certificates that are not subject to set-off or recourse against the contractor

Table 6.7. (Continued).

6. Asset-Based Financing and Securitization through Conduit Bond Issuers	➢ Using conduit bond issuing entities, such as counties, cities, or other local entities, to issue Private Activity Bonds (PABs) for project financing ➢ Executing contracts directly with state DOTs with repayment obligations subject to appropriation
7. Escrow Accounts	➢ Establishing an escrow account, controlled by lenders to indirectly repay the lenders and financiers
8. Customary Interest Rate Protection	➢ Protecting the project development team from significant changes in customary interest rate as a result of delay in the financial close of the contract or in the event of delay due to the contracting party's inaction or supervening events
9. Surety and Performance Bonds	➢ Utilizing an appropriate performance bond to protect both public and private sector's interests during the construction phase of the project ➢ Utilizing an appropriate payment bond to protect the suppliers and sub-contractors in DBF or DBFOM projects
10. O&M Services	➢ Signing an additional O&M services contract with the DBF project development team to encourage the development of innovative design and construction solutions with potential life cycle cost savings
11. Flexibility for Buy-Back and Revenue Sharing Provisions in the Contract	➢ Incorporating flexible financing terms and conditions to possibly modify the financing structure of the contract throughout various phases of project development ➢ Incorporating sharing clauses in the contract in case of refinancing ➢ Requesting the right to assess and approve any changes in the project financier
12. Commitment to a Quality Management Plan	➢ Requiring and evaluating a QMP in the RFQ and RFP process to ensure that the project has sufficient quality in case of contractor default

6.3. Limitations and Future Research

The scope of this study was limited to private financing of highway projects within the U.S. Although we focus on private financing in highway projects, other infrastructure sectors may benefit from the findings of this study. It is expected that this work contributes to the professional community of engineering management by describing the current state of private financing used in highway project development in the U.S. The outcomes of this research can help transportation planners, engineers and contractors, and financial institutions make more informed decisions to engage private financing in development of highway projects.

This research project was aimed at the benefits and challenges of incorporating financing into the innovative project delivery process. Public-private partnerships are relatively new in the transportation sector. Future research is recommended at the state and national levels to enhance the transportation planning and programming process for P3 projects.

Recommended Future Research: Incorporating Public-Private Partnerships into the Transportation Planning and Programming Process

Long range transportation planning (LTRP) is the foundation for development of regional transportation plans. Long range planning involves establishing the transportation vision and goals for the region and its outcome is a broad-based consensus and support for the transportation strategies and project concepts that are recommended. The long range transportation planning process results in adopting an LTRP for the region. The programming process involves detailed analysis of project funding sources, project cost analysis, and project prioritization. The result of the planning and programming processes is the state transportation improvement program (STIP) that combines all the regional TIPS together and must be financially constrained. Because of the nature of the transportation planning process, incorporating private financing considerations is a major challenge for state DOTs. Projects that include private financing require specific planning and programming considerations for alternative revenue sources, unconventional multi-year

funding structure, innovative financing mechanisms, and early private sector involvement in project development. With respect to P3 projects, there are two critical issues that should be considered at the transportation planning and programming phase:

1. Incorporating alternative funding sources and innovative financing mechanisms in the TIP and the STIP: P3 projects that involve private sector financing may not comply with requirements set forth in Title 23 CFR that mandates a firm and fiscally responsible and reasonable TIP and STIP. Therefore, state DOTs require assistance with respect to proper consideration of alternative funding sources and innovative financing mechanisms in planning and programming for P3 projects.
2. Utilizing innovative practices for transportation planning and NEPA studies: Currently, involvement of the private sector in predevelopment phases and experimenting with innovative features of P3 contracting is limited to SEP-15 guidelines. Deviations in contracting, project finance, NEPA requirements and other transportation planning components may become required or even necessary for successful P3 project delivery. Research is required to identify and analyze the trends and recommended best practices among state DOTs regarding innovative approaches for transportation planning and programming in P3 projects.

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