

**FEASIBILITY STUDY GUIDELINES FOR PUBLIC PRIVATE PARTNERSHIP  
PROCUREMENT ON HIGHWAY PROJECTS**

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**ABSTRACT**

For many state Departments of Transportation (DOTs), a shortage of transportation funds requires the agencies to combat that shortage by implementing innovative programs. Nationwide, Public Private Partnerships (PPP) in transportation projects are increasingly gaining acceptance as an alternative to the traditional approaches of project delivery and public financing. Due to the complexity of scale of PPP projects, it remains a challenging task for state DOTs to identify PPP opportunity while protecting public interest. This paper presents a framework for PPP feasibility study at the early phase of project development. The financing analysis process model is developed and refined for the guideline. The paper uses the state of Alabama as an example, but the feasibility study guideline and process model is in essence applicable to other states, especially to those states just launching a PPP program. Finally, the US 280 expansion project is discussed to demonstrate the analysis process and outcome. Three types of PPP models are compared and evaluated to achieve a feasible financing structure.

## **1. INTRODUCTION**

Public Private Partnerships (PPP) have been used in the US since the early 1990s for developing infrastructure projects. Over the past two decades, PPP market has grown significantly and an increasing number of states are embracing the PPP approach. According to the Federal Highway Administration (FHWA), twenty-three states had PPP legislation in place by the year 2007. A survey conducted in 2008 at the University Transportation Centre for Alabama (UTCA) shows that about one third of the responding states were already practicing or were experienced in PPPs and about half of the states were planning to implement the PPP projects (Cui and Lindly 2009). One of the primary reasons for increasing adoption of PPP procurement is that state Departments of Transportation (DOTs) are seeking alternative source of funding as the Highway Trust Fund shows a downward trend over the past few years (Brown et al 2009, Mayer 2008).

United Kingdom and Australia are considered world leaders in PPP project delivery. PPIAF and World Bank reports that PPP programs in the UK and Australia have need very successful and few PPP projects performed inefficiently or failed to meet their objectives (Sanghi 2007). However the scenario in the US is complicated and unique. Most state transportation agencies have not yet established best practices and guidelines for PPP projects, causing strong public resistance due to serious concerns regarding the protection of public interests in PPP contracts. The Texas Department of Transportation, as a national leader in PPP pursuits, has had to slow down its efforts (Linderberger 2009). Furthermore the Government Accountability Office conducted a study to evaluate PPP projects and recommended transportation agencies to develop and conduct strong upfront financial analyses which can help in protecting public interests (GAO 2008). Lastly review of Value for Money (VfM) analysis used in Australia, UK and other countries shows that the analysis completely ignores the revenue streams and is based on cost estimates of risk transfer and risk retainage.

This paper used the state of Alabama as an example to present the feasibility study guidelines for PPP projects. The paper first reviews the existing PPP evaluation methodologies including checklists and value for money analysis, then presents the framework of PPP program in Alabama. A generalized evaluation model along with analysis steps will be discussed. Finally the paper presents the PPP feasibility analysis of US280 project as a case study using a MS Excel based toolkit named P3 Feasibility Analysis Toolkit (P3FAST).

## **2. REVIEW ON PPP FEASIBILITY STUDY METHODOLOGIES**

### **2.1 Project Screening**

Recent industry trends have proven the importance of the pre-screening of PPP projects, especially after the increase in the number of PPP candidate projects. The number of candidate projects is usually beyond the limited resources of state DOTs. Pre screening checklist can help to better allocate the available resources to projects which have a better chance of success. More importantly, the prescreening process helps public agencies identify potential risks and barriers during the PPP project development. Due to the mentioned need some state DOTs have started using their own version of project pre-screening checklist; however, there are some differences among those checklists which make them not widely accepted by everyone in the industry. Table 1 shows a comparison between the main elements of some of the available checklists developed or used by the World Bank (2010), Virginia DOT (KMMG 2010), LA Metro (Infraconsult 2009), Norssman (2009), and Florida DOT (2010).

Table 1: A comparison of PPP Pre-screening checklists

Element	World Bank	Virginia DOT	LA Metro	Nossaman LLP	Florida DOT
Does the project align with the institution's strategic objectives?	√				
Does the project meet the minimum cost requirements for PPPs?	€20 M	√			
Does PPP have potential increase in VFM compare to public comparator?	√	√	√	√	√
Is there any need for private equity / debt?				√	
Is there any opportunity for allocation of risk to private party?	√	√		√	√
Is there any time or cost saving opportunity?	√	√		√	√
Is there sufficient time to procure the project through PPP?	√				
Is there a competitive market for PPP? (market interest)	√	√		√	√
Does private company add innovation or particular skills to the project?	√	√	√	√	
Is there public support for the PPP project?	√	√	√		
Does PPP bring new sources of revenue to the project?		√	√		√
Does project meet all Planning and Environmental Requirements Before Moving Forward?				√	√
Does PPP bring life cycle cost efficiencies?		√		√	√
Is there necessary institutional preparedness for PPP?				√	
Is project mature enough for PPP?(environmental clearance/preliminary designs/study reports)		√		√	

## 2.2 Value for Money Analysis

Value for Money (VfM) analysis has been considered as an effective method to determine whether a project be developed using PPP alternative or the traditional procurement method. A review of the analysis method has been provided by Morillos et al (2009). The analysis in essence is to ensure that the government receives value from the invested money using a PPP procurement. In the United Kingdom, the VfM assessment is divided in a 3 stage process (HM Treasury 2004a). Stage one of the assessment is conducted at program level focusing on viability, desirability and achievability of the project; stage 2 assessment focuses on the same factors as in stage 1 but the assessment is carried out with more precise details as it is conducted at the project level and stage 3 assessment is carried out at procurement level focusing on quality of competition, risk sharing, stability of costs, financial flexibility, financial structure and contractor distress. During each stage the authorities have to carry out qualitative assessment and also use a standard spreadsheet toolkit developed by the HM Treasury (2004b). The spreadsheet gives output in terms of net present value (NPV) by comparing the PFI alternative with the conventional option (HM Treasury Guides).

Similarly Australia has also developed and used VfM analysis consisting of quantitative and qualitative assessments. The quantitative assessment requires construction of Public Sector Comparator (PSC) to check if a PPP approach offers value for money in comparison with the most efficient form of available public procurement approach. The PSC is the estimation of the hypothetical risk-adjusted costs for the project considering the public sector finances, owns and implements the project (Kerali). A PSC can be developed by adding together four cost categories - direct and indirect base costs of the project considering

public sector develops the project using traditional procurement (called Raw PSC) with all expenses that private sector pays to the government but public sector is not required to pay (called Competitive Neutrality) and the dollar value of transferred risks and retained risks (Partnerships Victoria 2001 and 2005). The quantitative assessment is followed by a subjective qualitative assessment which ensures that issues which can not be quantified are considered adequately. Canada also uses VfM analysis for the assessment however review of projects in Quebec, Ontario and British Columbia (PriceWaterHouseCoopers 2007). Murray S (2006)) shows that these provinces have developed their own method of conducting value for money analysis. Ireland also uses VfM analysis for identifying candidate PPP projects. In Ireland the State Government seeks answers to three broad questions focused on Sponsoring Agency's power and/or resources to enter PPPs, viability of PPP arrangement as one of the procurement options and the most appropriate form of PPP arrangement for the project in hand (Central PPP Unit 2006). Ireland guidelines divide these broad questions in three sections and seek answers to several questions in each section.

United States adopted the PPP project delivery in the recent years and is on a learning curve. However several states have used PPP alternative effectively to meet the project objectives. These States have also employed VfM analyses but these analyses have used different approach to determine value for money from the PPP alternative. Texas Department of Transportation (TxDOT) has developed MS Excel based toolkit model named TxDOT Public-Private Feasibility Analysis Model (TxDOT 2008). The toolkit can be considered to employ market valuation since it considers different types of ground transportation projects and also accounts for the fact that each transportation project redistributes the traffic in the corridor (Morillos 2009). The toolkit gives results in the form of several graphs and also provides details of benefits from the project like reduction in impedance of traffic due to the new project. In Virginia the PPP projects are carried out by Commonwealth of Virginia and have established a unique feasibility assessment procedure (VDOT 2005). The Commonwealth of Virginia has developed a two-part process in which the first part focuses on qualification and experience, project characteristics, project financing, public support and project benefits and compatibility. The second part of the assessment is a well defined six-phase process which includes quality control, review by an independent panel, recommendation by an oversight board, submission and selection of detailed proposal, negotiations and finally entering interim or comprehensive agreement. Lastly review of VfM analysis reports for Port of Miami Tunnel and Access Improvement Project and I-595 Corridor Roadway Improvements Project and carried out in Florida presents the use of VfM analysis in two different ways. For the first project a public sector was developed and compared with the private sector alternative which is a risk based model similar to the VfM model of Australia (FDOT 2010 and Morillos 2009). However for I-595 improvement project risk based comparison of Design Build Finance (DBF) and Design Build Finance Operate and Maintain (DBFOM) alternatives was adopted (FDOT 2009).

### **3. PUBLIC PRIVATE PARTNERSHIP PROGRAM IN ALABAMA**

The House Bill 217 marks the beginning of PPPs in Alabama. Governor Riley signed the bill in May 2009 making it the Act #2009-769. This bill establishes a PPP program that enables the Alabama Department of Transportation (ALDOT) to partner with private parties to develop toll roads, bridges, tunnels, and other transportation facilities. More importantly, the act established the Alabama PPP framework for transportation investment (Figure 1). The components of the framework include organizational set-up, financing mechanism, PPP format, user fee approach, and procurement process.

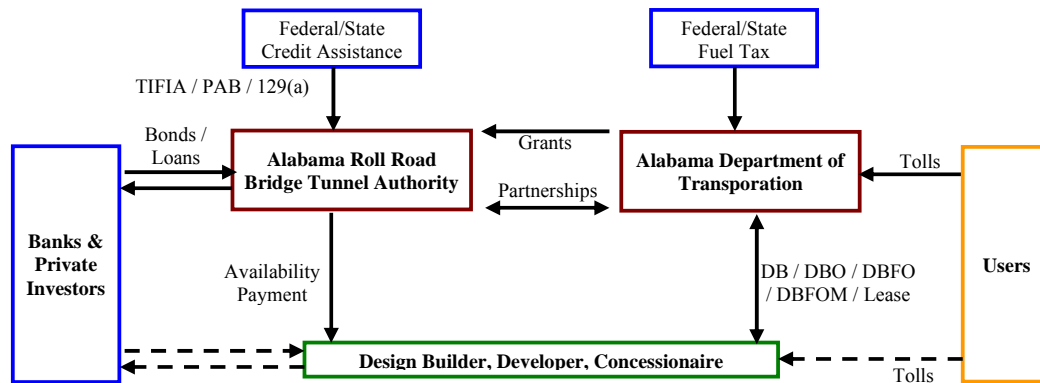


Figure1 PPP Framework in Alabama

### Organizational Set-Up

The Act# 2009-769 establishes an authority named “Alabama Toll Road, Bridge and Tunnel Authority” (ATRBTA) consisting of a well defined organizational structure. Five members of the organization forms a quorum and these members can take decisions if it is acceptable to the majority. ATRBTA is allocated several powers and responsibilities by this law some of which are also allocated to ALDOT. However the primary responsibility of administration and management of planning, construction and operation of the project using partnerships is allocated only to ALDOT. ATRBTA and ALDOT can manage the tolls on highway infrastructure which includes fixing, revising, charging and collecting the tolls from the users. ATRBTA is allowed to accept funds, grants, Federal credit assistance, borrow debt or permit private equity investment in the projects. ATRBTA can use the user revenues or any other forms of revenue or grants to repay the debt.

### Financing Mechanism

The newly established PPP program in Alabama provides relatively more responsibilities and mechanisms to ARTBTA for financing the projects. It authorizes ARTBTA to accept financial aids from Federal, state, local government bodies and ALDOT, take Federal credit assistance (TIFIA funds), issue bonds having maturity up to 75 years or issue notes, interim receipts or temporary bonds, borrow debt from financial institutions and banks, and to allow private equity investment in public projects by signing partnership contracts. ATRBTA is solely responsible for paying to the owners or operators of the project using availability payment, pass-through tolls or other similar payments methods. ATRBTA is authorized to use the financial aids from Federal, state, local government bodies and ALDOT to repay bonds, costs or expenses of the project. Amongst these powers and responsibilities ALDOT has equal powers to enter partnerships for developing projects.

### PPP Formats

Partnerships like Design-Build (DB), Design-Build-Finance (DBF), Design-Build-Finance-Operate (DBFO), long term lease for existing tolled projects and other similar partnerships can now be used in Alabama. ALDOT and ARTBTA shares different sets of powers and authorities under each contract type.

### User Fee Approach

PPP framework in Alabama authorizes ALDOT and ATRBTA to raise revenue in several ways. ALDOT and ATRBTA can fix, revise, charge and collect tolls for the public. These bodies can also lease the facility which enables them to receive upfront fee. However in

several partnerships the private partner is authorized to collect tolls. Similarly, ATRBTA and ALDOT also has the authority to fix, revise, charge and collect tolls from the parties for using the transportation facility for purposes like placing telephone, telegraph, electric lights or power lines or laying pipelines for gas and water. Collection of tolls/revenues from these entities is exempt from any kind of supervision or control by any other commission, board, bureau or agency of the State. ALDOT and ATRBTA can also generate revenue by providing leases, licenses, franchises, or concessions to private parties. The framework allows local and state government bodies to lease lend, grant or convey public property to ATRBTA to help it develop the project smoothly. Lastly, ATRBTA is responsible for payments to the private partners through availability payment, shadow tolls, pass through toll method or other similar payment mechanisms. ATRBTA can utilize revenues from all the sources combined with grants/management reserve funds from ALDOT to pay the private partners.

#### *Procurement Process*

The PPP program also defines the bidding and award process for solicited projects. It requires that ALDOT and ATRBTA to invite bids for a candidate project and publicly open them at a predetermined time and place. The process requires that the lowest responsible bidder must be identified and awarded the contract. However the best value approach can also be adopted if the authorities find that the best value approach will serve the best interests of the State.

#### **4. FEASIBILITY ANALYSIS GUIDELINES**

Based on the framework defined by the PPP legislation, and review of existing feasibility study processes, programs, and projects, a process model was developed and refined for the guidelines presented in this paper. Explanation and descriptions for each step were gathered from PPP analysis reports and were combined with the Alabama PPP framework. Figure 2 presents a generalized flowchart with six analysis modules.

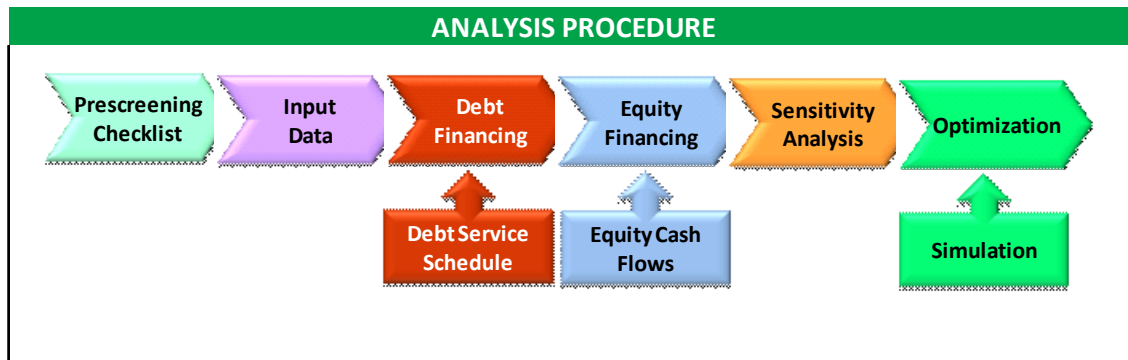


Figure 2 PPP Feasibility Study Procedure

##### **4.1 Project Prescreening**

Because of the needs of the public sector, PPP Pre-screening checklist is developed as a user-friendly and generic tool for measuring the project potentials as a PPP candidate. Meanwhile this checklist would be easy to be understood and answered, yet detailed enough to be effective; and align tool with decision support capabilities to compare projects with the minimum required qualifications for a PPP candidate project. In meeting these objectives, the pre-screening checklist is added to PPP project feasibility toolkit in order to provide a user-friendly pre-project screening tool that can help state DOT decision makers decide whether a project has potentials to be considered as a PPP project, or it should be developed using traditional delivery methods. This screening tool is designed to check three important criteria of a project: Institutional Maturity, Project Maturity and Market Maturity.

Institutional Maturity checks how prepared the state DOT is in terms of legislation, resources such as internal manpower, guidelines and external advisors/consultants, and public and political support. This criterion is very important because it determines whether the state DOT has the necessary resources and authorities to deliver a project under a PPP agreement. The second criterion, Project Maturity, checks the characteristics of the project and aligns them with the minimum required characteristics for a PPP project. This section checks the alignment of the project with the long term transportation plan of the state DOT, clearness of project objectives and scope, completeness of preliminary designs, availability of sufficient studies such as traffic studies, environmental studies, market needs and geotechnical studies, ability of project to obtain necessary permits and approvals, and financial sustainability of the project.

The last criterion is market maturity in which the capacities and conditions of the market to accept compete on and deliver the project will be checked. Before putting a project in the market, the state DOT should check the condition of the financial market, financial and technical capacities of companies in the market, the level of competitiveness and also the level of public commitment to attract private funds and debt. This section is very important because market conditions change very often. And it has a considerable effect on the procurement and negotiation of a PPP contract, and so the success or failure of a PPP project.

#### 4.2 Debt Financing Test

The Debt Financing Test is a systematic analysis which requires the analyst to collect, process, and use the data from various sources and apply them in the financial framework of the project. The process requires inputs of estimates of capital costs, yearly operation and maintenance costs, user toll rates, inflation, user demand, revenue sources, traffic growth rate, pavement maintenance schedule, ramp up period details, truck percentage, truck toll rate and Debt Service Coverage Ratio (DSCR). The processed input data is used in a systematic nine stepped procedure to determine the self financing ability of the project. The debt financing evaluation process is shown in the following Figure 3.

As the process completes the whole process provides answer to the basic question – whether the project can finance through debt and other grants or will it require equity investment? Other valuable information regarding estimates of yearly revenue, project capital expenses, operation and maintenance costs, bonding capacity from different sources, total bonding capacity and in some cases the information about financial gap will be available at the completion of the debt financing evaluation process.

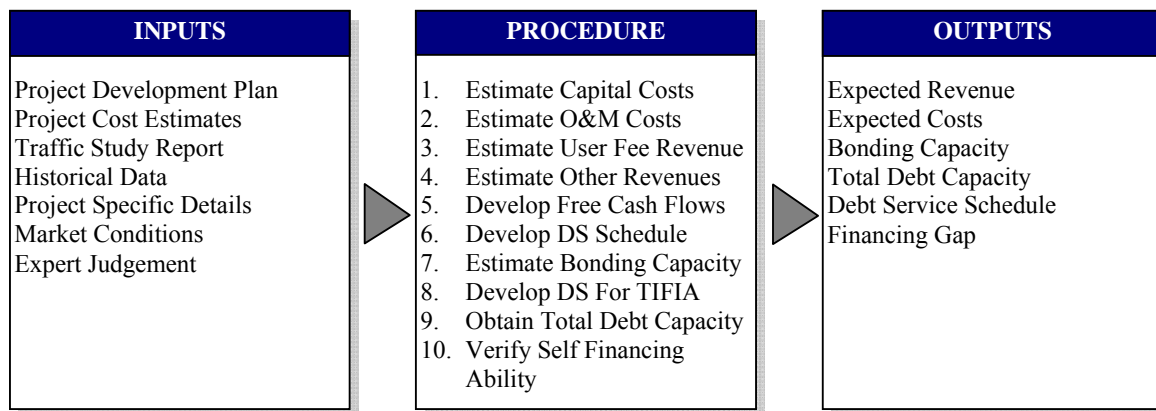


Figure 3 Debt Financing Evaluation Process



### 4.3 Equity Financing Analysis

The Equity Financing Analysis follows debt financing test and conducted only if the project can not be financed through debt. The equity financing analysis provides us information about the likely private equity investment in a project and whether or not public equity will be required for the project. This requires a systematic stepwise approach which is shown in the following Figure 4.

Equity financing test uses the debt capacity, free cash flow statements and debt service schedules obtained as output during the debt financing test. The free cash flow statements and the debt capacity schedules are used to determine the equity cash flows. The equity cash flow represents the yearly cash available to pay the equity investors. Hence discounting these equity cash flows to the year of analysis using the private sector's minimum rate of return we can obtain the possible equity investment. This represents the private sector investment considering base case.

However when the private sector gets involved in the project, it is expected that they may adopt an aggressive approach to generate higher revenues, or may successfully generate higher benefits from their mainstream businesses (like appreciation in real estate values or better customer service by laying electricity cables, telephone lines, internet cables, etc). Considering these conditions the revenues must be increased. Moreover the private sector willingly takes higher risks with the expectation of higher returns. All these points collectively represent an aggressive case in which the private sector expects much stronger revenue streams as compared to the public sector. This requires development of equity cash flows under the aggressive case which are then used to estimate the possible equity investment. Since the revenue streams are stronger in the aggressive case the private sector will be willing to invest much more as compared to what the public sector may evaluate.

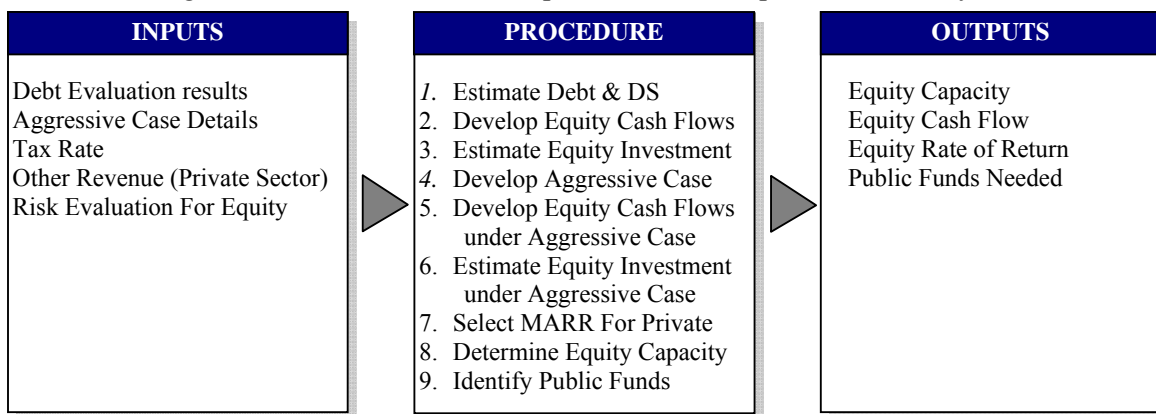


Figure 4 Equity Financing Analysis Process

The private equity investment can be calculated by using an appropriate minimum attractive rate of return for the private sector. This rate of return can be calculated using information from the market or from earlier dealing with similar private sector companies. Using this rate of return the expected private investment capacity can be estimated by calculating the spread of private investment between the aggressive case and base case. If the private equity with the total debt capacity and other funds are able to meet the capital requirement then the public sector does not require any upfront investment in the project. However if the total falls short then the financial gap must be closed through public investment.

### 4.4 Sentivity and Optimization

The PPP feasibility analysis is based on several assumptions. These assumptions are necessary to conduct the feasibility analysis and small changes to some of these variables

strongly affect the final result of the analysis. Hence it is necessary to identify the variables that affect the output and also to quantify the effect on the results. Sensitivity analysis provides this information. This helps the sponsoring department to concentrate and prioritize their efforts on improving the confidence margins on the influential factors. As a result, sponsoring departments get refined results which can help them to take decisions with confidence. The excel toolkit developed for ALDOT enables the users to conduct sensitivity analysis using Tornado Charts feature.

The tornado charts in the toolkit are prepared by varying the values of the critical factors by a certain small amount. Variation in critical factors generates tornado charts for financial capacity of the project and the private investment. These charts provides quantified amounts of increase or decrease in the outputs when the critical factor is increased or decreased. For example if the DSCR is increased then the debt capacity decreases which increases the chances of private investment in the project. On the other hand if the revenues are increased financial capacity for the project increases and at the same time the private investment chances also increases. Similar other valuable information can be obtained in dollar value after conducting sensitivity analysis.

When a project needs equity investment, the public sector is required to divide equity between private and the public sector. The public sector may want private equity since the private sector may want to allocate the available funds to some other project or may want to save some funds to meet unexpected unwanted events or invest in some other more fruitful opportunities. However the public sector does not want to allow too much private investment in public projects since the private sector would want a payback at a higher/highest rate of return which may not protect public interests. Hence the public sector must determine the percentage of private equity investment in a way which would enable the public sector to achieve its objectives. This can be achieved by employing optimization techniques.

A linear programming (LP) model was developed to optimally structure equity in a financial structure of the PPP model. The objective function was set up to maximize public sector benefits and included three major parts which represented debt financing availability, private financing and public sector opportunity costs. Several constraints were set up to define the mutual relationships between these components and achieve other goals. First, a debt capacity constraint defined the maximal amount of debt that a PPP project could secure. Second, the debt holders required that the debt service be secured with higher priority from net revenue. Third, PPP financing must be able to cover project costs. Fourth, the rate of return for private partners must be large enough to attract private investments, yet small enough to protect public interests. The factors  $i_{P(\min)}$  and  $i_{P(\max)}$  in the constraints defined the lower and upper boundaries of the rate of return for private equities. Few more constraints were added to this model to meet the LP modeling requirements. This model used deterministic values of all the variables however revenues are stochastic. Hence the LP model was upgraded to account for the randomness of expected revenue streams. Readers can refer Sharma (2009) for more details on various models and the results.

#### **4.5 Feasibility Analysis Tool - P3FAST**

A spreadsheet based on model, namely Public Private Partnership Feasibility Analysis Tool (P3FAST), was developed to facilitate the feasibility analysis process. The model has seven modules and allow users to conduct PPP analysis timely and with limited data input. The build-in pre-screening checklist helps users identify the PPP maturity interms of institutional maturity, project maturity, and market maturity. With an user input interface, the model is able to calculate debt and equity financing capacity. The sensitivity analysis module helps to identify the risk factors that significantly impact the financing structure and analysis results. The optimization model allows the users to design an optimal borrowing structure considering the benefits and opportunity costs of using private funds.

## 5. US 280 CASE STUDY

### 5.1 Project Background

US Highway 280 travels through rural areas and smaller cities in southeastern Alabama to Birmingham. It has rapidly developed over the past 20 years and become a principal arterial serving commuter traffic and suburban development in southeast Jefferson County and northeast Shelby County. Numerous shopping centers are located on US 280 between the E.B. Stephens Expressway and Eagle Point Parkway, which make it the most congested roadway in the Birmingham metropolitan area. The six-lane facility was designed to accommodate 50,000 daily vehicles. However, recent traffic counts recorded an average daily traffic (ADT) of over 74,000 vehicles on the west side of I-459 interchange and over 82,000 vehicles on the east side in 2008.

The expansion of US280 has been part of the state's long term transportation plan. In 2005, a study supported by ALDOT recommended a combination of improvements including adding interchanges and extra lanes to alleviate the congestion on the corridor (Jones and Sullivan 2005). This kind of improvement is costly and would use up the state's annual capital budget for transportation improvement projects. In 2009, the enacted public private partnership legislation (HB217) provides an alternative funding mechanism for ALDOT to improve transportation infrastructure through private sector involvement and funding. ALDOT then proposed an elevated toll road plan on US 280 expansion. In the design plan, the segment on the west of I-459 interchange will have six local lanes devoted to free travel and four at-grade express lanes converted into toll lanes. Six lanes of free access roadway would remain on the east side of I-459 and an elevated toll road with four express lanes would be built from I-459 interchange to Eagle Point Parkway (Figure 5). The project cost is estimated at \$300 million for the western segment and \$410 million for the elevated road. ALDOT plans to use innovative financing to build the tollway and collect the tolls to pay back. The suggested toll is 20 to 25 cents a mile. The electronic toll collection technique will be used to smooth traffic flow and reduce operation costs.

While tolling major corridors is a new concept for Alabama, there are groups of citizens, business owners, and land holders opposed to the elevated tollway plan. Especially, a group named ReThink280 proposed a toll-free expressway plan in early 2010 as an alternative to ALDOT's plan (MacDonald 2010). *This research will neither evaluate the merits nor endorse any organizations or plans. The analysis in this paper, however, is aimed to demonstrate the process of financial feasibility study under various PPP scenarios.*

### 5.2 PPP Feasibility Study and Financing Plan

Given the limited capital budget available to ALDOT, one major issue associated with the US280 expansion project is to identify alternative funding sources. This paper focuses on the project financial analysis to demonstrate the process and outcome of proposed feasibility study guidelines. The analysis follows conservative assumptions to prevent overestimating project revenues and underestimating costs and uncertainties.

The analysis establishes 2011 as the base year for the purpose of estimating project cash flows. The entire construction will be complete within three years. The traffic will ramp up at an average rate of 3% for the first 4 years during the operation, then grow at a rate of 2% annually for the rest of project life. The initial traffic in the first year of operation is assumed to be 82,690 vehicles per day. 30% of the traffic will be diverted onto the toll lanes. The average toll rate for passenger cars is 20 cents per mile and 55 cents per mile for trucks. Truck traffic is estimated to be 8% of the ADT. Annual inflation rate is 2%. Because the project uses electronic toll collection, the operation cost is insignificant and assumed to be 6% of project revenue annually. Consider a favorable market condition for project financing, the senior secured debt yield 5.5%. TIFIA rate is set at 4%.

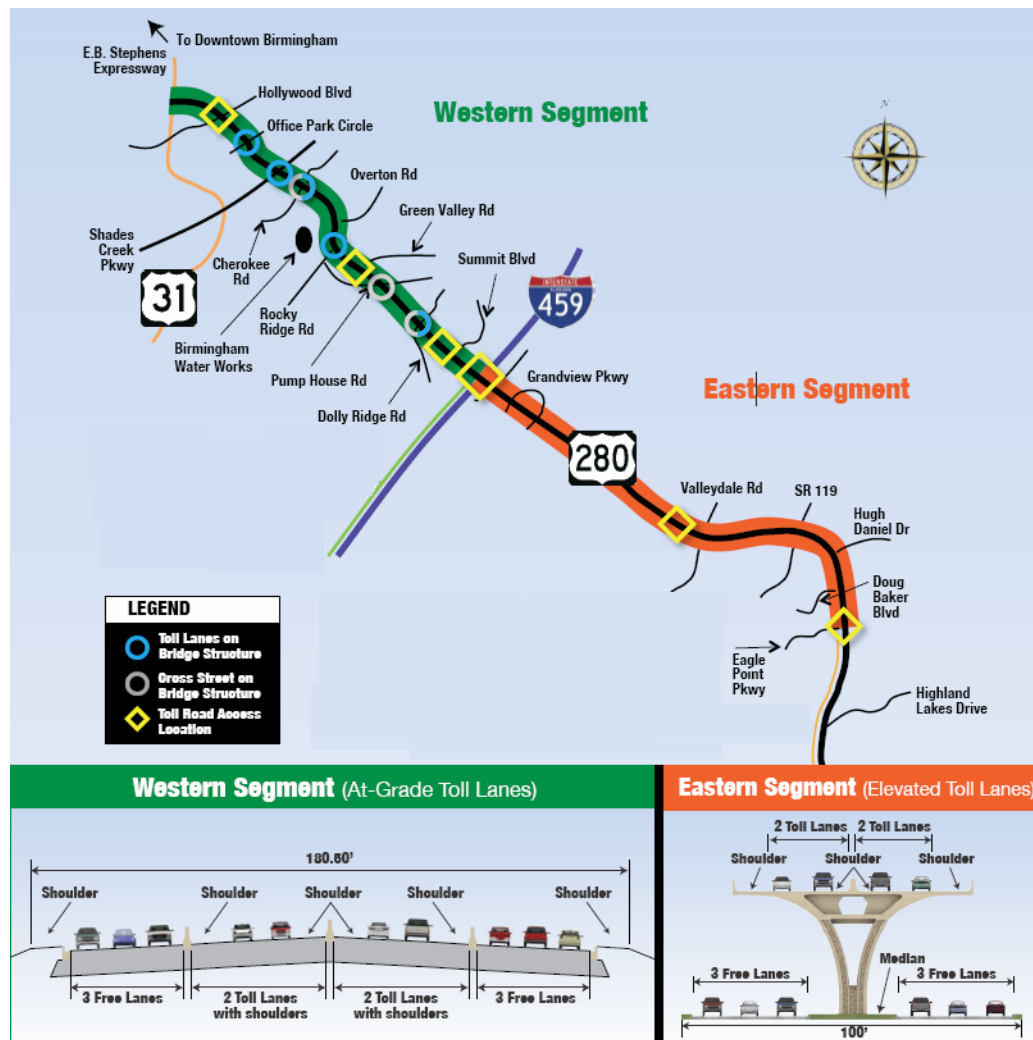


Figure 5 Proposed US 280 Elevated Tollway (source: ALDOT)

Three financing plans are evaluated namely, a) public financing scenario; b) DBFO; c) hybrid financing. Plan A assumes the Alabama toll authority finances the project through a revenue bond secured against future net revenue. TIFIA funding is also available. Under plan B, a private company will finance and build the project, then get the investment back through toll collection within the concession period. A hybrid financing plan is also considered consisting of public financing and availability payment. Under this plan, ALDOT will pledge \$18 million a year to the project for the entire loan term depending upon the performance and service level.

P3FAST model was used to evaluate the financing structure. Table 2 shows the sources and uses of funds under each scenario. In particular, the agency is able to use project toll revenue to secure a debt up to \$310 million, which includes senior debt and TIFIA loan. Additionally, private equity investment will total \$75 million under the base case, and up to \$250 million under the aggressive case scenario. Plan C appears very promising, under which, the project has self-financing-ability. With a small amount of upfront funds from ALDOT, the project revenue will be able to secure debt to cover all project costs and increase the reserve fund for debt service.

Table 2 US 280 Financing Structure

PLAN A: Public Financing		PLAN B : DBFO		PLAN C : Hybrid Financing	
<u>Sources of Funds</u>		<u>Sources of Funds</u>		<u>Sources of Funds</u>	
Revenue Bond	\$ 250	Revenue Bond	\$ 250	Revenue Bond *	\$ 516
TIFIA Loan	146	TIFIA Loan	146	TIFIA Loan	236
Interests Income	26	Interests Income	26	Interests Income	26
ALDOT Funding	349	Private Equity (minimum	60	ALDOT/ATRBTA	86
		ALDOT Funding	289		
Total Sources	\$ 770	Total Sources	\$ 770	Total Sources	\$ 864
<u>Use of Funds</u>		<u>Use of Funds</u>		<u>Use of Funds</u>	
Project Cost	\$ 710	Project Cost	\$ 710	Project Cost	\$ 710
Capitalized interest	60	Capitalized interest	60	Capitalized interests	110
				Reserve fund	44
Total Uses	\$ 770	Total Uses	\$ 770	Total Uses	\$ 864
				* ALDOT pledges \$14 million annually	

## 6. CONCLUSION

PPP as an alternative to the traditional approaches of project delivery and public financing is increasingly gaining acceptance. This paper presents a PPP feasibility study framework that includes six components, namely pre-screening checklist, debt financing test, equity financing evaluation, sensitivity analysis, and capital structure optimization. This integrated analysis framework will be able to help state DOTs: 1) evaluate PPP maturity; 2) identify risk factors and implementation barriers; 3) determine debt capacity; 4) establish minimum requirement private equity investment; 5) evaluate financing plans; 6) optimize capital structure.

The state of Alabama was used as an example to illustrate the analysis framework. However, the process and procedures discussed in this paper are applicable to other states, particular to those states just launching their PPP programs. The Excel based feasibility study toolkit is a generalized software package and could facilitate financial analysis, opportunity evaluation, and financing structure determination for PPP projects.

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