Design of Concession and Annual Payments for Availability Payment Public Private Partnership (PPP) Projects

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ABSTRACT

Public Private Partnerships (PPPs) have emerged as an important project delivery method in the United States, where funding agencies are finding it difficult to support the increasing demand of highway projects. The United States has witnessed several types of PPPs during the past two decades, and a recent trend shows that newer designs of PPPs are being adopted for upcoming projects. Availability Payment, an extensively used PPP in the United Kingdom and Canada, is the newest performance-based PPP implemented in California and Florida. Extensive use of these PPPs in other countries strongly supports the belief of their widespread acceptance in the United States. The literature review indicates that concession term and availability payments are the most important parameters of this PPP. However, the public agencies do not have any solid tool that can design these parameters and have to largely depend on traditional methods. This research work introduces a hybrid model that will allow the public sector to determine the upper limit of availability payments and concession duration. The hybrid model has been developed by combining the stochastic dynamic programming model with multi-objective optimization principles. The model allows using private sector's financial condition, uncertainty of private sector's performance and the remaining life cycle costs of the asset. The use of this model ensures cost savings for the public sector and financial stability for the private sector simultaneously. This research includes an analysis of the CALTRANS' Presidio Parkway Project as a case study to demonstrate the use of the model.

INTRODUCTION

A PPP is a long-term contract between public and private sectors for mutual benefits. In the United States, PPPs are generally used for projects that have insufficient bonding capacity and cannot be funded merely by bonds and public equity. For such projects, private investment is inevitable and PPPs, in general, enable the public sector to pursue such projects by transferring funding responsibilities to the private sector. Apart from incurring funds, the private sector also shares several responsibilities with the public sector. Depending on the investment, share of responsibilities and reimbursement method adopted, a PPP in the United States can take forms such as Design–Build (DB), Design–Build–Operate–Maintain (DBOM), Design–Build–Finance–Operate–Maintain (DBFOM), Long-Term Leases and Availability Payment PPPs (FHWA 2007).

Availability Payment PPPs can be considered as an extended version of a DBFOM PPP. In these PPPs, the private sector takes responsibilities of designing, building, financing, operating and maintaining a highway and receives performance-based reimbursement during the operations and maintenance phase. The reimbursement (directly reimbursed by the public sector without tolling the road users) begins only after the project is available for use, motivating the private sector to construct highways faster and have them available for use at all times. This aligns public and private sector objectives leading to better outcomes. However, the literature review indicates that the current approach used for awarding Availability Payment PPP concessions follows a simplistic approach and does not guarantee that public interests will be protected. This research presents a hybrid model that would enable designing Availability Payment PPPs by integrating several aspects of Availability Payment PPPs. The hybrid model is developed by combining multi-objective linear programming (MOLP) principles with stochastic dynamic programming (SDP) to design Maximum Availability Payment (MAPs) and the concession term for Availability Payment PPPs.

LITERATURE REVIEW

Federal and State level highway agencies in the United States are finding it difficult to meet funding obligations for maintaining aging infrastructure and developing new highways (Mallett 2008). In these harsh economic times, PPPs of various types have helped the public sector to deliver highway projects. It is believed that use of PPPs, in particular Availability Payment PPPs, will increase in the coming times (Parker 2011). Recent findings show that agencies are striving to align their high-level goals with performance-based PPPs (FHWA 2011). Thus, long-term performance base PPPs will play an important role in delivering public projects.

In view of their extreme importance, it is a must for agencies to pursue PPPs that can achieve the desired objectives. This becomes difficult since the performance measures of PPPs change with time and thus make it difficult to achieve the desired results (FHWA 2011). Review shows that PPP designs in the United States are generally influenced by the public sector’s funding requirements rather than by the goals to be achieved (Bel and Foote 2009). The Government Accountability Office recommends that transportation agencies develop and conduct rigorous upfront financial analyses to avoid such occurrences again (GAO 2008).

Brandao and Saraiva (2008) have focused on designing revenue guarantees for PPPs. Gross and Garvin (2009) have put forward an approach to structure concession lengths and toll rates by considering them together. Ng et al (2007) used Monte Carlo Simulation model and fuzzy logic to design PPP concessions respectively.

HOW AVAILABILITY PAYMENT PPPS WORK

When Availability Payment PPPs are considered, a competitive bidding approach is used to identify the private party offering best value or lowest cost (Kessler 2011). Generally in practice, the best value approach is observed more often. For example, in the case of the Florida Department of Transportation’s (FDOT) Port of Miami Tunnel and Access Improvement Project, the selection of the private sector was done using the best value approach. During the procurement, FDOT disclosed its established limit of MAPs (which was actually the upper limit of MAPs) and also fixed the concession tenor (FDOT 2006). The bids received during bidding were evaluated and the bidder Miami Access Tunnel (MAT) was declared as the private party on the project. MAT was allocated the responsibilities of designing, building, financing, operating and maintaining the project for 35 years. Such a contract where the majority of the responsibilities are allocated to a private party is known as a concession and the private party that wins such a contract is known as a concessionaire. According to the contract, MAT would be reimbursed directly through FDOT funds but for that, MAT will have to build the highway and keep it available for public use, thus motiving the concessionaire to open the highway early. The reimbursements are predetermined and are called Maximum Availability Payments (MAPs). MAT would be eligible to get 100% of MAPs if it succeeds in operating and maintaining the tunnel without any kind of physical or qualitative interruption with respect to the conditions set in the contract. If MAT keeps the highway available for less than 100% of time, the MAPs would be reduced as per the penalties defined in the contract.

PROBLEMS IN CURRENT APPROACH

When the public sector discloses its capacity to pay MAPs along with the concession term, they are not in a position to ascertain which private party will win the concession, what will be its construction efficiency, how the actual financial structure of the PPP will look like and how efficient the private party will be during operation and maintenance phase of the highway. Hence, the public sector is forced to ignore these aspects and with the motive to get the project delivered, proceeds for bidding. This enables the public sector to move ahead with the project procurement but also leaves it vulnerable to several risks.

The limits on MAPs and concession are determined considering funds available for the project and public sector's long-term societal objectives. In addition the MAP limits and concession duration are fixed at a time when the public sector has no information about the private sector. Under these conditions, the public sector can face following risks: a) the MAP limit offered by the public sector might be too high, enabling private sector to earn super profits, b) some private parties may submit very aggressive bids to win the competitive bidding exposing all the stakeholders towards the risks of major renegotiation during the concession, c) if concession term is longer than necessary, every extra year of concession would allow the private sector to retain control over the asset and enjoy privileges that can go against the public interests, d) if concession term is shorter, then the risk of the private sector's failure due to not being able to get reasonable returns increases, and e) if the concession duration is short, then the post concession highway maintenance responsibilities would transfer back to the public sector, which might increase the overall lifecycle costs of the project.

In each case, it is a loss to the public. This could mean that the public sector might end up paying much more than required. This, in turn, could leave the taxpayers with bad experiences for PPPs and thus increase the opposition towards them. Hence, there is a need to develop a model that will enable public sector to: a) design MAPs allowing reduction in the public sector expenses stressing the fact that these are long-term expenses, b) design MAPs that can hedge the risk of private sector (still unidentified) quitting the project due to uncertainties, c) design a concession term that enables the public sector to meet its long-term objectives (i.e. including post-concession objectives) and d) design a concession term that would enable the private sector to earn reasonable returns from the project and thus simultaneously protect public interests. This research work presents a hybrid model that would enable design of MAPs and concession term.

MODEL FOR DESIGNING AVAILABILITY PAYMENT

Availability Payment PPPs are long-term contracts generally varying from 20 to 30 years. Being long term, these projects are vulnerable to several risks that may significantly impact a PPP project. This necessitates integration of a project's dynamic aspects into the designs. Hence, in this research, the Availability Payment PPP was modeled as a Dynamic Programming model. In addition, casting PPPs in a Dynamic Programming framework would satisfy the condition of optimality, which states that: "An optimal policy has the property that whatever the initial state and the initial decisions are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision" (Benli 1999). However, since the project risks are random events, the PPPs are modeled here as a Stochastic Dynamic Programming model.

Apart from these issues, the current approach used by the public sector does not consider the timing of periodic maintenance as well as their high costs while deciding the duration of concession period. In some cases it might be good for the public sector to extend the concession period to include the major periodic maintenance activity. The extended concession would help the public sector get the private sector's expertise for operating and managing the project, but would increase all the risks being long-term projects. Hence, the PPPs were modeled as a Stochastic Dynamic Programming model having an infinite horizon allowing inclusion of post-concession costs in the design.

The model was further enhanced by considering both public and private sector's interests simultaneously. On a PPP project public sector interests are to save money and the private sector interests are to earn money. This condition brings in competing objectives on the same project and hence the Stochastic Dynamic Programming model was modified to address the public and the private sector's interests making it a Multi-objective Stochastic Dynamic Programming model (MOSDP).

Model Details

The MOSDP model was developed to make PPPs safer and allow parties to identify win-win terms leading to the following model:

$$MAP^P = \underset{MAP^P}{\arg min} \sum_{t=1}^{T} \left\{ w_1 \cdot \left[\left(MAP_t^P - \sum_{i=1}^{m} D_t^i \right) + RSL_t \right] \right\} + w_2 \cdot |CFS_t - FSA_t|$$

$$\text{where } RSL_t = \begin{cases} 0 & t < T \\ f_{RSL\ Costs} & t = T \end{cases} \quad (1)$$

$$f_{\text{Financial State}} \leq \text{ULP} \quad (2)$$

$$f_{\text{Financial State}} \geq \text{LLP} \quad (3)$$

$$f_{\text{RSL cost}} \leq \text{MaxEMC}_T \tag{4}$$

$$f_{\text{RSL cost}} \geq \text{MinEMC}_T \tag{5}$$

$$f_t(FSR) = \underset{MAP_P}{min.} \Bigg[FSR_t + \sum_{FSA \in \Omega} p_{FSA@\,t+1} \left\{ \sum_{t'=t+1}^{T} w_1 \cdot \left(MAP_{t'}^{P} - \sum_{i=1}^{m} D_{t'}^{i} + RSL_{t'} \right) \right\} + w_2 \cdot |CFS_{t'} - FSA_{t'}| \Bigg] \tag{6}$$

Where,
MAP^P_t = Maximum Availability Payment at stage t
D^i_t = Deduction during stage t corresponding to event i ~ probabilistic distribution
CFS_t = Control Financial State at stage t
FSA_t= Financial State Achievable at stage t
FSR_t = Financial State Realized at stage t
$w_1$and w_2 are weights for the objectives
p = number of decision variables considered
m = number of events contributing to deductions
T = number of years of concession
$f_{\text{Financial State}}$ = Financial condition of a private party and is derived by accruing annual equity cash flow developed by including the actual money reimbursed (i.e. MAPs – Random Deductions) to the private sector
$f_{\text{RSL cost}}$ represents highway's estimated remaining service life costs (RLS Cost) implemented via a lookup table developed by using procedures established by guidelines/reports/manuals such as Determining Highway Maintenance Costs (NCHRP 688) or the procedures adopted by various State DOTs for maintenance and rehabilitation of highway networks.
ULP = Upper Limit of Payment and can be obtained by accruing annual equity cash flow developed by including MAPs only (i.e. no deductions applied)
LLP = Lower Limit of Payment and can be obtained by accruing annual equity cash flow developed by including the reimbursements to the private sector with maximum allowable deductions that would satisfy their minimum acceptable rate of return (MARR).
MinEMC_T = Minimum Expected Post-Concession Maintenance Cost corresponding to T concession years
MaxEMC_T = Maximum Expected Post-Concession Maintenance Cost corresponding to T concession years
$f_t(FSR)$ = minimum value of expected public and private sector objectives that can be calculated for stage t by considering stages *t, t + 1, …* end of the problem given that the state at the beginning of stage *t* is *FSR*.
$p_{FSA@\,t+1}$ = probability that the next period's state will be FSA, given that the current (stage t) state is *FSR* and action MAP^P is chosen

In this model, the private sector's financial state is considered as the "state" of the model and years of operation are considered as "stages" of the model. The objective function (equation (1)) is developed to simultaneously protect public and private sector interests, leading to multiple competing objectives. The public sector cost (multiplied by w1 and represented by $MAP_t^P - \sum_t^m D_t^i + RSL_t$) is the amount paid by the public sector, after having deductions from MAPs for unavailability of highway. The second part of the objective function (multiplied by w_2) represents variation in private sector's financial status during stage t and can be elaborated as $|CFS_t - (FSR_{t-1} + MAP^P_t - \sum_{i=1}^{m} D_t^i)|$. The CFS_t is a financial state that is used as a control point in this model. These points are set between the upper and lower financial boundaries described by constraints (2) and (3). The CFS_t basically corresponds to the future's private partner's efficiencies. If the future's private partner is expected to be highly efficient, then the CFS_t can be set towards more towards the lower boundary (given by constraint 3), which would mean that since the private sector is highly efficient, it would be highly efficient and thus it would be safe if the CFS_t is located near the lower financial boundary. On the other hand, if the future's private party's efficiency is expected to be low, then the CFS_t can be located more towards the boundary representing the financial upper limit represented by constraint 2. Thus, the CFS_t represents an ideal state for the private sector from the public sector's perspective. So, private sector's financial state, either greater or lower than CFS_t would be measured and reduced by the second part of the objective function. Since the location of CFS_t can directly affect the private sector's project cash flows, the second part represents private sector interests. Taking the absolute values would always keep the second term positive, which would thus enable the optimization operator (i.e., minimization) to minimize the variation. Thus, the objective function would enable reducing costs and financial variations simultaneously.

In the above formulations, the first set of constraints enables protecting public and private interests. The first constraint in the set of constraints (2) and (3) protects public interests by defining the upper limit of payments. The upper limit can be obtained by considering the private sector to be 100% efficient and allowing them to receive full 100% MAPs. This constraint (2) would terminate the possibility of the private sector's financial condition (FSA_t) going beyond the upper limit. On the other hand, the constraint (3) restricts the private sector's financial condition (FSA_t) from dropping below its minimum acceptable rate of return (MARR). Constraints (4) and (5) enable inclusion of post-concession maintenance costs in the design. The post-concession maintenance costs can vary depending on the concession term, since a small concession period will have high RSL costs and vice versa. The RSL costs depend on factors such as concession duration, type of pavement, design life and the maintenance schedule adopted by a DOT. The last equation (6) is the recursion formula that enables linking two project stages.

Note that as the deductions are directly associated with the private sector's performance, and since the performance depends on random factors like weather, accidents, breakdowns, maintenance activities as well as the ability of private sector to keep the highway available, the deductions are modeled as random variables. Since the distribution of deductions depends on several random factors, some of which are beyond the scope of this research, the deductions were assumed to follow discrete uniform random distribution. The Monte Carlo simulation was used to generate deductions for analysis.

Considering the pros and cons of several mathematical tools, MS Excel was chosen for developing the MOSDP Model. Macros were developed in VBA Excel to enable running backward passes (starting from last stage to first stage) and then analyzing the effect of randomly generated deductions on the MAPs and concession terms by moving from the first stage to last stage. Moving backward from the last stage to the first stage followed by moving forward from the first stage to last stage would complete one MOSDP cycle. The macro was also capable of simulating deductions allowing the model to determine the optimal strategy under uncertain deductions. The model was used in a real-life case study to design its Availability Payment parameters. The value of w1 and w2 used in this research were 0.9 and 0.1, respectively however other values can also be selected depending on the utility of the public sector.

CASE STUDY DEMONSTRATING THE USE OF MODEL

Presidio Parkway, also known as the Doyle Drive Replacement Project, is a $1,969 M PPP project currently in the construction phase in the State of California. This project will replace an existing 73-year-old south access to the Golden Gate Bridge. The project is procured as a DBFOM PPP with availability payment mechanism. The Operations and Maintenance phase of the project would begin from 2013 and would continue up to 2043, enabling the private sector to reimburse availability payments for 30 years. Upon completion of concession, the public sector would be responsible for highway maintenance responsibility and would cost $591M for the remaining service life of the project. As per the contractual data the government would not be able to pay more than $35.53M annually.

The case study was picked up with the intention of designing MAPs and concession term, which required solving the MOSDP. This required that the concession term be divided into several stages. The 30-year period that was expected to serve as Operations and Maintenance phase of the project was divided into six stages. During each stage the financial condition of the private sector represents a state that must always lie between constraints (2) and (3). For each stage, the model was expected to return values of the private sector's financial state between the constraints (2) and (3). Constraints (2) and (3) would collectively define the private sector's financial state, which would satisfy both public and private sector objectives simultaneously. Constraints (2) and (3) were calculated by developing equity cash flow statements for the Presidio Parkway Project. Although all the information was not available, assumptions were made within reasonable limits that enabled development of equity cash flows (ECF). The ECFs were developed considering that private sector earns 100% of MAP, which represented constraint (2). On the other hand, ECFs were developed considering that the private sector earns just enough to satisfy its MARR, which is 11.5% for this case study. If the values returned by the MOSDP model were greater than constraint (2), it meant that the private sector is earning above the upper limit, and if the values were less than constraint (3), the private sector was facing losses.

Furthermore, solving the model required some reasonable values of MAPs as inputs. It was necessary that the MAP values used in the model were reasonable, since smaller values of MAPs could inflict too much stress on the private sector's finances. Hence, deduction of $1.66M was calculated using project documents that would be acceptable to the private sector to earn at its MARR. Thus, we could find out that the minimum MAP acceptable to the private sector would be \$33.93M (obtained by subtracting the maximum acceptable deduction of \$1.66M from the limiting MAP of \$35.53M). Since model required several more values of MAPs for analysis, the MAPs of \$34.33M, \$34.73M and \$35.13M were used during analysis.

The presence of constraint equations (4) and (5) in the MOSDP transforms the model into an infinite horizon model. These equations add post-concession maintenance costs to the model. Ideally, all the post concession maintenance costs must be included when covering the design life of the highway. During the case study, maintenance cost data for about 70 years was available. These 70 years included all the details about the regular and periodic maintenance costs and hence, these were included in the analysis allowing inclusion of several cost intensive rehabilitation and regular maintenance costs.

RESULTS

The MOSDP model developed in MS Excel was run 10,000 times giving us 10,000 optimal solutions. Each run consisted of a backward pass (from last stage to first stage) and then a forward pass (from first stage to last stage). For each solution, information about a) the MAPs appearing in the optimal solution, b) the deductions realized through the concession period and c) variation in private sector's financial condition at the end of concession period was gathered. The difference between optimal MAPs and the deductions realized during a stage equaled the payment made by the public sector during that stage. Adding all such MAPs and corresponding deductions, we obtained the amount paid by the public sector. Plotting the amount paid by public sector and variation in the private sector's finances on X and Y axes, respectively, we obtain a scatter plot representing the feasible region (Figure 1).

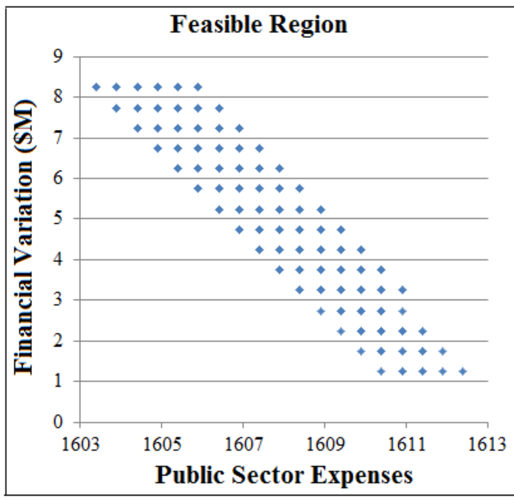

Figure 1 Feasible Area

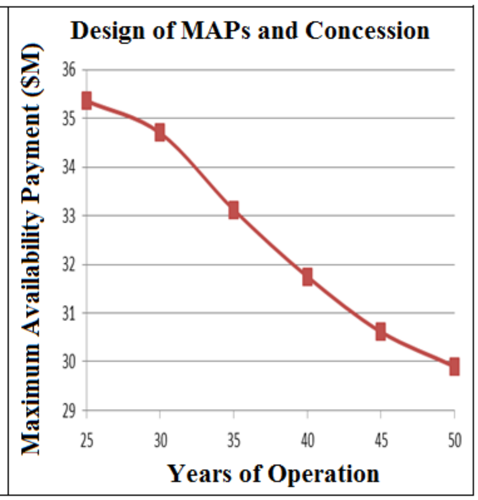

Figure 2 MAP and Concession Design for Presidio Parkway Project

The feasible region shows that the financial variation decreases as the public sector pays higher amounts. Furthermore, the result indicates that the public sector can consider paying just \$1603.4M after deductions. Under any condition, the public sector must not pay beyond \$1610.4M. This would be about \$47M to \$55M less than paying \$35.53M for 30 years, apart from \$591M for maintenance after concession. Note that, as per the scatter plot, the public sector must also remain prepared to pay up to \$1612.4M. In addition to this, the objective of this research was to determine the optimal MAP. The frequency distribution of MAPs occurring in the optimal solution was observed and it was realized that: a) MAP of \$35.13M was selected the maximum number of times during Stage 1, b) MAP of \$34.73M occurred the maximum number of times through all the stages and c) some of the MAPs that were selected throughout the concession term accounted to less than 1% of iterations. Since these observations did not give a conclusive MAP, the concept of weighted average was used to design MAPs. The values were then averaged across the concession term giving us a Design MAP of \$34.676M, as shown in Table 1.

Table 1 Design MAPs Obtained By Using Weighted Average Across Stages

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	All Stages
Average for Optimal Cases	34.722	34.897	34.988	34.829	34.465	34.159	34.676

In the above analysis, the model used expected deductions during backward pass calculations and random values during the forward pass. This closely resembles industry practice where expected values are used. However, providing random values during the backward pass would enable the model to go through higher levels of randomness leading to more conservative results. Upon running the model with random deductions during backward and forward passes, a Design MAP of \$34.689M was obtained. The value obtained by using random deductions during both passes was greater than the value obtained by using expected values, indicating that the model might be selecting conservative values to hedge the risks from uncertainty.

The model was used again, with some modifications, to design the concession duration for the project. Since the model did not allow varying two variables at the same time, several models were set up that had different concession periods. The concession periods of 25, 30, 35, 40, 45 and 50 years were considered during this analysis. For each concession period, corresponding post-concession costs were calculated. These costs were \$644M, \$591M, \$572M, \$513M, \$486M and \$424M for 25, 30, 35, 40, 45 and 50 years, respectively. Furthermore, the upper and lower financial bounds were modified appropriately making some reasonable assumptions. When the model was run iteratively 1,000 times, Design MAPs were obtained for each concession term. These results were plotted, as shown in the figure2, to observe the relationship between the concession term and MAPs.

It is evident from the plot that the years of operation and MAPs are negatively correlated. In addition, we can also use these results to design concession terms considering the public sector's budgetary constraints in the first place. If the public sector can afford \$29.9M as MAPs, then they must consider a concession term of 50 years. On the other hand, if the Public Sector can afford MAPs up to \$35.356M, then they can consider awarding a concession period of just 25 years.

CONCLUSIONS AND FURTHER RESEARCH

This research work introduces a hybrid model, formed by combining multi-objective programming principles with a stochastic dynamic programming model to design MAPs and concession term for Availability Payment PPPs. Since the model utilizes data from the project's equity cash flows and post-concession maintenance costs, it can be used to identify the factors that affect MAPs and concession term by varying the factors one at a time. In addition, since the model is multi-objective, it can also be used to incorporate additional objectives such as performance and safety.

REFERENCES

Brandao, L. E. T. and Saraiva, E. (2008). "The Option Value of Government Guarantees in Infrastructure Projects". Journal of Construction Management and Economics. (November 2008), 26, 1171-1180

Benli O. S. (1999) "Dynamic Programming," Industrial Engineering Applications and Practice: Users Encyclopedia, Copyright 1999 International Journal of Industrial Engineering, retrieved from http://www.csulb.edu/~obenli/Research/IE-encyc/dynprog.html on 7th May, 2011.

Bel G. and Foote J. (2009) "Tolls, terms and public interest in road concessions privatization: a comparative analysis of recent transactions in the USA and France." Transport Reviews, Vol. 29, No. 3, 397–413.

Buxbaum J. N. and Ortiz I. N. (2007) "Protecting the Public Interest: The Role of Long-Term Concession Agreements for Providing Transportation Infrastructure". Research Paper 07-02, The Keston Institute for Public Finance and Infrastructure Policy Research Paper Series Index.

FHWA(2011) "Key Performance Indicators in Public-Private Partnerships – A State-of-the-Practice Report". International Technology Scanning Program, FHWA Report number FHWA-PL-10-029.

FHWA (2007) "Case Studies of Public-Private Partnerships for Transportation Projects In The United States" Task Order 05-002. Report prepared by AECOM Consult Team.

FDOT (2006) "Port of Miami Tunnel and Access Improvement Project – Supplement to Project Information Memorandum", Florida DOT.

GAO (2008) "Highway Public-Private Partnerships: Securing Potential Benefits and Protecting the Public Interest Could Result from More Rigorous Up-Front Analysis". GAO-08-1052T, US Government Accountability Office.

Gross, M. E. and Garvin M. J. (2009). "Approaches For Structuring Concession Lengths and Toll Rates For Transportation Infrastructure PPPs". Construction Research Congress, ASCE, 191-200

Kessler F. W. (2011) "Public-Private Partnerships for California Transportation" Nossaman LLC, Presentation at NCPPP Conference: Implementing Partnerships in California, Sacramento 01/20/2011.

Mallett W. J. (2008) "Public-Private Partnerships in Highway and Transit Infrastructure Provision", Congressional Research Service Report to Congress, Order Code RL34567, July 9, 2008, Washington D.C.

Ng S. T., Xie J., Skitmore M., and Cheung Y. K. (2007) "A fuzzy simulation model for evaluating the concession items of public–private partnership schemes" Automation in Construction 17 (2007) 22–29

Parker M (2011) "Availability Payments and Other Forms of P3s For Surface Transportation". Funding and Financing Solutions for Surface Transportation in the Coming Decade – Conference Report, AASHTO.