A LITERATURE REVIEW ON ALTERNATIVE HIGHWAY MAINTENANCE PROCUREMENT STRATEGIES

Submission Date: May 15, 2010
Word Count : Text Only = 5829
2 Figures = 500

Total Words = 6329

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ABSTRACT

The research will involve an industry-wide scan of the different procurement contracting strategies related to the ongoing Operation and Maintenance (O&M) of facilities so as to identify those that can be adopted, and subsequently adapted to suit the highway maintenance needs of VDOT. Virginia’s Legislature mandated that by June of 2009 all maintenance activities of the Interstate be executed using Performance-Based procurement strategies. This strategic change can be traced to the apparent success of the first PPTA 10-year highway maintenance project in which a contractor was responsible for the maintenance of all assets located within the fence-to-fence right-of-way. Whereas Performance-Based highway maintenance is characterized by being long-term, comprehensive, and target-driven; Traditional highway maintenance is short-term, piece-meal, and means-based. The research aims to identify alternative highway maintenance procurement strategies from a spectrum bounded on one end by the Traditional process and on the other end by the Performance-Based process. In addition the research will uncover the advantages and disadvantages of varying Performance-Based methods from a wide spectrum of state highway administrations. The research will conclude with a final recommendation report to VDOT’s maintenance division as to how performance contracting can be improved.
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1. INTRODUCTION

The research will involve an industry-wide scan of the different procurement contracting strategies related to the ongoing Operation and Maintenance (O&M) of facilities so as to identify those that can be adopted, and subsequently adapted to suit the highway maintenance needs of VDOT. Virginia’s Legislature mandated that by June of 2009 all maintenance activities of the Interstate be executed using Performance-Based procurement strategies. This strategic change can be traced to the apparent success of the first PPTA 10-year highway maintenance project in which a contractor was responsible for the maintenance of all assets located within the fence-to-fence right-of-way. Whereas Performance-Based highway maintenance is characterized by being long-term, comprehensive, and target-driven; Traditional highway maintenance is short-term, piece-meal, and means-based.

2. OBJECTIVES

The research aims to identify alternative highway maintenance procurement strategies from a spectrum bounded on one end by the Traditional process and on the other end by the Performance-Based process (100% outsourced). This research will be based on NCHRP’s synthesis report 389 entitled “Performance-Based Contracting for Maintenance” where different types of performance based contracting practices were studied and discussed.

Upon completion of the research, a report will be formulated that recommends improvements for VDOT’s current asset maintenance contracts. Improvements will come in the form of increased benefit/cost ratio, more effective risk allocation between contracted parties, higher levels of service and heightened innovation through the private sector. The final report will enable VDOT to incorporate any new contracting strategies they deem adequate for the improvement of their highway asset maintenance program. These new contracting strategies will also enable the maintenance program to more effectively manage their limited in-house resources amidst increasing workloads.

In order to accomplish this goal there must be a systematic approach for uncovering the necessary data on performance contracting. Figure 1, details the steps that will be implemented for compiling the data throughout the literature review as well as for formulating the final report.

The five step methodology process begins with an investigation into current performance-based contracting methods that are being implemented. The literature review will investigate methods of state highway administrations and highway agencies aboard. In addition, other industry sectors will be investigated, like Oil & Gas, Manufacturing, and Education, to identify different O&M contracting strategies, e.g., indefinite delivery, indefinite quantity contracts. However, since these types of contracts are not in practice by highway maintenance agencies, there would not be a direct comprehensive contract comparison. The purpose of the private sector investigation is mainly to adopt contracting strategies that boost project efficiency.

The second step will be to examine current VDOT performance contracts that are in practice. The examination will locate the strategies that are currently being used. If a particular strategy is in use by VDOT and not by another agency, the reasons will be investigated. These comparisons will help with the formulation of the final recomendations.
The third step will be surveying and interviewing VDOT personnel about the needs desired within performance based contracting. Understanding these needs will help steer the research in a more precise direction, thus raising the value of the final output.

The fourth step is aimed at ranking the various performance-based contracting strategies found. In order to rank the strategies, certain parameters will be investigated to determine how successful a performance-based contract is. The major quantitative parameters would be the benefit/cost ratio as well as the amount of cost savings achieved with performance-based contracts compared to the existing traditional methods. The Level of Service data from contracts will be collected too. There will also be numerous qualitative parameters investigated such as VDOT’s preferences towards contracting styles. Preferences over types of risks and allocation of those risks within the contract language will be investigated. Pros and cons for each strategy will be listed and used as a comparison tool to supplement the parameters. The parameters for this research, both quantitative and qualitative, will be collected through the use of interviews and surveys from a combination of VDOT staff and private sector input. This data collection process will help uncover the VDOT maintenance program needs while also getting a well rounded view on the maintenance industry.

The final step will be to compile the recommendations found through the analysis conducted on the industry evidence. The recommendations will be in a final report format that will help VDOT with their performance-based contracting and maintenance program strategies. Currently the project is located within the first two steps of the methodology process. The literature review process is well underway and will continue into the summer months. The VDOT contract review will begin in the coming weeks. The shaded area in figure 1 indicates this transition from step one to two.

3. WORK ACCOMPLISHED

Traditional methods of highway maintenance contracting are focused on the use of in-house resources for asset maintenance work. If work is to be contracted to the private sector under the traditional approach, the use of predominately method-based specifications is used. Method-based specifications allow the road agency to have control over what materials are used and how they are used during maintenance. This type of specification allows the agency more control over the contractor and the quality of the finished product. The down side is that traditional contracting methods place a large burden on the agency to maintain the necessary staff and equipment levels needed for the upkeep of complex road networks. In recent years, tightening budgetary constraints have taken hold on these agencies, forcing them to find more economical ways of doing maintenance work. The hope with implementing new innovative contracting strategies is not only to save money but to bring about better collaboration, heightened innovation, improve levels of service and more effective risk allocation amongst the contracted parties.

Performance-based contracting methods are an innovative way to maintain the complex road networks with limited in-house resources. The innovation within performance-based contracting is that it uses performance-based specifications. These specifications allow contractors to become more self-regulated because they themselves are in charge of the means and methods associated with the work. The highway agency is therefore responsible for mainly contract administration and inspections, which allows them to focus on the quality of the finished product. This division of power helps allocate risk and enables private firms to innovate at a much greater level than with traditional methods.

There are many different agencies that currently employ variations of performance-based contracting. Department of Transportation’s such as VDOT, FDOT and TXDOT have
been applying performance-based contracts to some of their road networks. Other DOT’s are experimenting with this style and are at various transitional phases between the traditional and performance approaches. The U.S.A leaders in the performance contracting field are the three DOT’s mentioned above and will be the primary focus of this paper. Their contracts tend to have varying percentages of both method-based and performance-based specifications.

The idea for the shift in contracting strategy here in the U.S.A comes from the positive experiences realized by highway agencies abroad. The following agencies currently retain no in-house resources and contract out either all or nearly all of the maintenance work. Their commitment to performance-based contracting has seen cost savings and higher levels of efficiency (4). The following countries outsource all or nearly all maintenance activities and are seen as the leaders in the field of performance-based maintenance contracting:

- Western Australia
- Alberta, Canada
- British Columbia, Canada
- Ontario, Canada
- The Netherlands
- England
- Norway
- Finland
- New Zealand

The performance-based contracting variations found in the literature review to be in use by domestic DOT’s and foreign agencies will be discussed in subsequent paragraphs. These variations in use were found in tandem with case studies that will be useful for the final recommendations. This report will share the findings that have been found thus far. The final report will encompass all of the case studies found that were deemed relevant to the final recommendations. (4).

In order to better understand the performance-based contracting realm the basics must first be understood. Choosing the right variation of performance-based contracting depends on the agencies level of experience with this style of contracting. Agencies with little or no experience may want to first outsource a single activity such as a periodic or routine maintenance activity. A routine maintenance activity is one that needs attention on a yearly basis. Activities that classify as routine are pothole repair, vegetation control, trash removal, winter maintenance (snow removal) as well as others. A periodic maintenance activity differs in that it occurs less frequently and often is associated with major improvement activities such as bridge rehabilitation or resurfacing (4). Outsourcing a single activity acts as a “pilot” project for the inexperienced agency. This first step allows the agency to judge whether or not it can handle its new role as client rather than producer within the asset maintenance industry (4). Cost analysis can also be done between in-house and outsourced crews with this “pilot” project to determine its monetary implications. On the other hand, agencies who have had previous experience with performance-based contracting could try outsourcing multiple activities in both routine and periodic maintenance. As experience with performance-based contracting is gained, the agencies will learn what variation work best for their road network and budgetary constraints.

The current status of the project is still within the literature review phase and will be transitioning into the VDOT contract examination phase in the coming weeks. The literature review process will continue well into the project to ensure that sufficient evidence is found from the numerous DOT’s and foreign highway agencies working with performance-based
contracting. The four sections below summarize the key points from the articles found thus far.

3.1 NCHRP’s synthesis report 389 entitled “Performance-Based Contracting for Maintenance” by the Transportation Research Board conducted by William A. Hyman (2)

NCHRP discusses the industry evidence that performance-based maintenance contracting results in better outcomes at lower cost with less risk and more financial predictability for highway agencies (2). The evidence also suggests that when first implementing a (Performance Based Maintenance Contract) PBMC, the service levels tended to decrease; however, over time, service rose above pre-PBMC levels. This can be attributed to contractors and a “learning curve” for developing an effective method for maintaining their assigned road network. This “learning curve” response with service levels is common if the local contracting market is unfamiliar with performance-based contracts. Agencies new to the field of performance-based contracting should pay close attention to the level of contracting experience in their respective area before inacting any new contracting styles and methods. An example of the “learning curve” effect took place within the first two TxDOT performance-based contracts let in 1999. The first contract was for 120 miles of I-35 in the Waco District and the other was for 60 miles of I-20 in the Dallas District. The following assets and operations were addressed in the contracts: pavements, bridges, roadsides, traffic operations, traffic services, incident response, hazardous materials clean-up, and emergency repairs. These projects turned out to be a success despite the initial drop in service levels as mentioned. Upper management noticed the higher levels of service that resulted after the initial decline and requested that many more contracts be let in this fashion. TxDOT’s extensive involvement within the asset management field will help provide a wealth of data throughout the researching process.

It is also noted that some agencies are sceptical of the potential savings from outsourced work. Sceptics claim that there is difficulty when comparing public and private costs associated with maintenance. The cost comparisons are said to be on “unequal” footings and should be examined very carefully. The cost discrepancy stems from the variations in direct and indirect costs incurred by in-house and outsourced crews.

The data collection for this report was done using surveys and an extensive literature review. The surveys were aimed at agencies with varying degrees of involvement with highway asset management. Some agencies had never before used PBMC, while others were quite familiar, such as TxDOT, FDOT and VDOT. The agencies that reported back mentioned their experiences and recommendations with PBMC. Producing, administering and collecting surveys from VDOT and other agencies will be an important step towards achieving the proper recommendations for this research.

Another key element of the NCHRP report is that it incorporates a wealth of references for future research. For example, Appendix B entitled “Sample Procurement and Contract Documents” and Appendix C entitled “Evidence on Changes in Levels of Service and Cost Savings” will be essential for the final report recommendations.

3.2 “International Overview of Innovative Contracting Practices for Roads” – by Pekka A. Pakkala - Finnish Road Administration (4)

The Finnish Road Administration echoes the NCHRP report in detailing how agencies are turning towards performance contracting methods. The distinct difference between the two reports is that the Finnish Road Administration separates its report into two main sections,
capital investment projects and maintenance projects. The capital investment section is unique in that it discusses the increasing use of various procurement models for new road projects. The traditional design-bid-build is being replaced with design-build-finance and operate (DBFO). The following is a list of delivery methods outlined in the report (4).

- Design-Bid-Build (D-B-B)
- Design-Build (DB)
- Construction Management (CM At-Fee) - Rare
- Construction Management (CM At-Risk) - Rare
- Design-Build-Operate (DBO) or Design-Build-Operate-Maintain (DBOM) - Rare
- Design-Build-Finance-Operate (DBFO)
- Build Operate Transfer (BOT) & Build Own Operate Transfer (BOOT)
- Early Contractor Involvement (ECI)
- New – “Alliance model”

In addition to the focus on new capital investments, the report has a larger focus on agencies abroad that are using PBMC as compared to the NCHRP report. For example, highway agencies such as England are currently using the “Alliance model” for performance contracting. This model awards the contract based on technical score only. The price is later worked out as a fixed price with a percentage fee. The hope with this new model is for higher amounts of collaboration between owner and contractor (4).

3.3 Project 0-6388: “Synthesis Study on Innovative Contract Techniques for Routine and Preventive Maintenance Contracts” - conducted by Cindy L. Menches, PE of The Center for Transportation Research, University of Texas at Austin (3)

This article echoed the first two in that highway agencies have a growing need to explore innovative contracting strategies. The harsh economic climate and increasing budgetary constraints makes maintaining existing roadways a daunting task. The new way of contracting is becoming increasingly focused on outsourcing to the private sector. The move to a greater percentage of outsourced work aims to increase cost savings, efficacy levels and promote better solutions to existing problems in relation to traditional methods as mentioned previously. To assist agencies in implementing performance-based contracting, the author has formulated a decision flowchart that helps choose the right contracting strategies. The user has to know a few inputs such as level of experience with PBMC, type of activity that will be contracted and specification type that will be used. Using these inputs, the user follows the chart and is led to the optimal contracting strategy (3).

Along with the decision flowchart, the article also outlines the 13 major performance contracting methods that are currently being used (3). The method best suited for a particular agency or firm depends on their experiences with performance-based contracting. Some methods involve outsourcing only one activity as a “test pilot” while others outsource numerous activities. The flow chart in figure two was located in the Center for Transportation Research report (Project 0-6388). Figure 2 shows the grouping of the 13 contracting methods and how they can be used for either a single activity, bundled activities or practically all activities that require performance-based maintenance contracting. The flowchart duplicates some contracting methods more than once. For example, “Framework Contract Method” is under both “Single Activity” and “Bundled Activities”; this means that the method can be used for either one or many activities (3). Figure 2 is accompanied by a summary for each contracting method that explains characteristics such as contract duration typically used and
type of specification preferred under the respective method. The summaries are listed below and were compiled from chapter 4.

1. **Individual Activity Contract Method**: Only one maintenance activity is outsourced to a contractor, who performs all of the work associated with that activity. The contract duration for this method ranges from one to two years. Implementation is recommended for agencies new to the PBMC system and allows the agency to experiment with a pilot test. If the activity chosen is thought to be risky, a warranty based specification is encouraged; however a method-based specification is better for an activity which lacks clear performance criteria.

2. **Jointly-Performed Maintenance Contract Method**: This method is for activities that are too large for in-house resources to handle. The contract method outsources a portion of the work to the contractor who can pick-up the remainder of the work. This method is ideal for periodic maintenance (e.g., milling and overlays), emergencies, severe weather or time constraints. The usage of a method-based specification helps keep both in-house and contractor crews following the same standards. Performance specifications can also be used as way to promote competition and increase efficiency. Warranty specifications are not recommended, since the contractor will not want to guarantee work performed by the in-house resources.

3. **Long-term Separate Maintenance Contract Method**: This method as the name implies is used for a period of time greater than 5 years. Longer durations allow the contractor to gain a return on investment if the equipment for the job is costly. Under this method, one activity is contracted out due to its wide spread area or remote location. This helps the SHA with activities that are considered risky or outside their core of expertise. For example, outsourcing the maintenance of all rest areas, all bridges and even herbicide treatment in a particular state. Method-based specifications are recommended for tasks such as milling and overlay or other specialized work. Performance-based specifications are recommended for activities that are far apart (rest areas).

4. **Framework Contract Method**: A pool of contractors are pre-approved and given nominal contracts, permitting them to work on future maintenance projects in a rotational style. The contractors are promised a minimum value of work with the nominal contract. This method involves the administering of work orders for each contractor as assignments become available. Awarding contractors via the framework contract method can save time and money for in-house resources by reducing the number of bid packages and RFP’s needed. Potential urgent projects are recommended for this quick selection style of contracting. Performance, method and warranty based specifications can all be used for the framework model.

5. **Moderately Bundled Activities Contract Method**: Only a few maintenance activities with similar nature and sequences of work are outsourced to a contractor. An example would be sweeping, mowing and litter pick-up. Bundling activities helps the agency to decrease the amount of contracts on hand therefore reducing in-house overhead. This method is a good second step for agencies that have outsourcing experience. Experience will help them effectively bundle the proper activities for a contractor that can handle the increased workload. SHA’s should use this method if they have the in-house resources to handle inspections of the different assets included in the bundle. Performance specifications should be used for agencies looking to expand their experiences with PBMC. Riskier activities included in the bundle should have method-based specifications.

6. **Partial Competitive Maintenance Contract Method**: This method involves both in-house resources and outsourcing as a means to activity maintenance. A particular percentage of work is kept in-house while the remaining is outsourced. The outsourced
work is then competitively bid on by both in-house staff and contractor. The competitive bidding makes in-house staff innovate and develop better maintenance practices.

7. **Routine Maintenance Contract Method**: All routine maintenance activities are outsourced. This method is known as a Total Asset Management contract when performance specifications and lump sum contract is used. Elimination of separate contracts for routine maintenance will lower in-house costs when using a Total Asset Management contract. The contractor as with previous methods must be able to handle variety of work associated with the activities.

8. **Integrated Contract Maintenance Method**: This method incorporates both routine maintenance and preventative maintenance activities that will be outsourced as one contract. The term Total Asset Management contract is used for contracts using this method. Implementation of this contract is similar to that of the routine maintenance contract method. This method helps bundle an even larger number of activities thus helping to reduce in-house costs.

9. **Significantly Bundled Activities Contract Method**: This method outsources all maintenance activities except for a few that are unique, risky or priced better individually. This method differs from the moderately bundled method in that it contains more maintenance activities in the contract. Recommended for SHA’s that have a considerable amount of experience with the moderately bundled activities contract method and are comfortable outsourcing even more activities to one service provider. The contracts usually deal with all maintenance activities in a particular area or for a certain stretch of highway. This method is suited for contractors that have the ability to handle a considerable workload. Use of method-based specifications is the only recommend strategy for this contract method. It allows the agency to maintain greater control over “how” and “when” the work is completed.

10. **Total Asset Management Contract Method**: This method involves maintaining an asset throughout its lifecycle. The agency outsources operations, maintenance, upgrades to, and expansion of, an asset to a single service provider. Total Asset Management Contracts are about 5 years or more in length. Performance-based specifications are to be used which shift risk away from the agency. Agency should have a defined set of performance criteria that can be evaluated with in-house resources. Agencies should only engage with performance-based contracting if they have the knowledge on how to administer and maintain this type of contact.

11. **Alliance Contract Method**: This contract model awards the contractor based upon qualifications not price. After award, an “Alliance Team” should be formed consisting of both contractor and agency personal for administering the contract. Under this method the contractor has the ability to gain or loss 15% of the contract value. After the contractor is selected the agency negotiates a fixed price on the work and agrees on a fee as profit. This helps to reduce the potential conflicts that may arise between contracting parties compared to others methods. Only performance specifications should be used for evaluation of the contractors work.

12. **Kilometer (mile) Per Month Contract Method**: The contractor awarded is responsible for the routine maintenance of a sub-network of roads. The contract does not include large rehabilitation work or preventive maintenance for the roads. The sub-network must already be in fair to good condition if this method is to be used. The payment style is based on dollars per kilometer/mile of road maintained within a month. As long as service levels are maintained then daily penalties are avoided. This contract includes a grace period of 3 to 4 months for the contractor to repair existing deficiencies.

13. **CREMA Contract Method**: The “Combined Rehabilitation and Maintenance Method” contracts the service provider to first rehabilitate and then maintain a given sub-network
of roads. This method is thought to be ideal because it encourages the contractor to pay close attention to rehabilitation since they must maintain the road later. This contract type should be used on roads where the cost of maintenance is not economically appropriate. The agency will need to provide two sets of performance-based specifications for rehabilitation and another for maintenance. This is similar to the total asset management contract however rehabilitation comes first.

There have been numerous cases where DOT’s and other highway agencies have implemented one of these 13 contracting methods. TxDOT and FDOT are two agencies that have been very open with this new innovative style of contracting. Below are two case studies that were located during the literature reviewing that detail the successful implementation of a performance-based contracting method. Other case studies were mentioned within the reports, however, these two were found to be the most relevant. Additional case studies located during the literature review will be used within the final report. The use of case studies will help compare current VDOT and other agency performance-based contracts. It will also supply important supporting evidence for or against certain styles of performance-based contracting methods.

Case Study – TxDOT (Lufkin District) (3)

The Lufkin District decided to use a Jointly-Performed Maintenance Contract Method for milling and laydown operations. The decision was made due to a lack of in-house laydown equipment. In-house resources performed the milling work and the laydown operations were outsourced. The laydown operations included, rolling and racking. Even though TxDOT had the rolling equipment capabilities, the decision was made to outsource that portion. This helped to avoid quality issues with the finished surface by assigning all laydown responsibilities to the contractor. In order to have a greater control over the finished product, TxDOT decided to use method-based specifications for the work. This choice makes the contracting method a variation of a true performance-based contracting method which would have used performance specifications. The contract was awarded through a purchase of services agreement that included a price index. The agreement duration was 24 months with the option to renew for two more terms of 24 months. TxDOT also reserved the right to terminate the agreement by issuing a 30 day written notice. The agreement also had a cost index that allowed the unit prices to be updated if the agency wanted a renewal. Incorporating this index into the agreement/contract is a recommended practice among agencies that use performance-based contracting methods. TxDOT’s use of this contracting method enabled them to perform specialized tasks; through augmentation of equipment they did not have. Cost savings were realized and higher service levels were reported by TxDOT.

Case Study – FDOT (3)

The use of the “Total Asset Management” contract method is used by FDOT for all routine maintenance on interstate highways. Interstate highway I-75 is currently under this type of contract and is a 7-year, lump-sum contract mixed with unit prices also known as a hybrid contract. Nearly all routine maintenance operations are covered within the contract except mailboxes, traffic signals, Intelligent Transportation Systems and bridge painting. FDOT’s highway maintenance program is unique in that it has a standardized “Maintenance Scope Customization System”, which gives each district the option to choose from a pool of approved activities that can be outsourced. This system helps to ensure clarity and consistency among contracts statewide (3). The award strategy for this contract is on the basis
of best value. The best value is assessed as follows: technical proposal score accounts for 60-70% and price is 30-40% of the value. The formulas below are from the synthesis report.

(1) Technical Score = (Average Technical Score from Technical Evaluation Committee) × (Technical Proposal %)

(2) Price Score = 100 × (Lowest Price / Proposer’s Price) × (Price Proposal %)

(3) Total Proposal Score = Technical Score + Price Score

FDOT is currently involved with 40% Asset Maintenance contracts, 40% traditional contracts and 20% in-house. The FDOT asset maintenance program also has an MRP program that was developed in order to assess the contractor’s performance (3). Results of this contracting method being implemented have revealed a 12% cost savings as well as an increase in service levels.

3.4 “A Cost Savings Analysis of Performance-Based Contracts for Highway Maintenance Operations” by Panagiotis Ch. Anastasopoulos, et al. (Purdue University)

(1)

In a recent study (1), a team of civil engineers from Purdue University and Iowa State University investigated a system to determine the cost savings or losses from performance-based contracting in relation to traditional contracting approaches. The study entitled, “A cost savings analysis of performance-based contracts for highway maintenance operations” used complex statistical models including linear regression to determine the likelihood and amount of the savings. The study investigated maintenance contracts that were let in the U.S.A and abroad between 1996 and 2007(1). In total 337 contracts (traditional, performance, warranty and incentive/disincentive style contracts) were input into the models, 269 were from the U.S.A and the rest from agencies abroad. Of the domestic contracts, 203 (various types) were from the state of Virginia which is important since their maintenance program has been one of the leaders in performance-based contracting. The results of the study showed that projects with high in-house costs perform better when outsourced to private firms (1). Contracts with longer durations both traditional and performance promote cost savings. The cost savings of long term performance contracts was however higher compared to the long term traditional contracts. The study also suggested that contracts that incorporate more activities for maintenance have heightened cost savings; however, some activities did lessen the savings. Activities such as litter removal, and even periodic bridge and tunnel maintenance were not outsourcing friendly. The periodic maintenance finding is consistent with the Finnish Road Administration report, which stated periodic maintenance should not be coupled with routine maintenance in a contract. In contrast to the other reports, findings indicated that performance contracts increase cost savings by 5.8% which is quite different than the 10-40% claimed by others. This report does shed light on the costs savings when comparing various contracting styles. Future reports by these professionals will have more contract data which will help to validate/discredit the statistical models used. Validating and/or discrediting these models will help industry professionals’ make better decisions on future contracts and comparison methods.

In addition to the reports and studies mentioned above, proponents of these new and innovative contracting strategies claim to have seen better innovation with equipment and project management skills with private firms. The use of incentives and disincentives within
the contracting language is also said to have brought about better productively from the firms. The incentives for exceeding service level goals are realistically attainable and disincentives are reasonable for non-performance. The goal is not only to heighten performance but to promote trust between the contracting parties. The parties have also voiced their desire and need for open communications, workshops, seminars, & cooperative sharing sessions to take place at various stages in the project lifecycle (4). These collaboration efforts have helped promote clear and concise contracting language and helps make each party aware of their duties.

The industry trend in highway asset maintenance is undoubtedly moving towards a contracting style that enables agencies to reduce their costs while increasing services levels. These new and innovative contracting methodologies have the ability to better promote self-regulation on the part of contractors as well as agencies and any third party consultants. The new style of contracting also distributes the power amongst key players more efficiency by allowing contractors to choose their own means and methods. Collaborative efforts have also seen a rise with this new contracting style and will bring about clearer and more concise contracts. In return, all parties will benefit when the risks are effectively allocated and players know their role in all phases of the project. As with all new technologies and ways of doing business, there will be critics that are reluctant to change and discrepancies within data. Yes, there are instances where performance-based contracting for maintenance needs to be examined and changed; however, with the recent push at research and development, the future looks promising for performance-based contracting within the highway asset management industry.

4. WORK TO BE ACCOMPLISHED

The literature review process will be continuing as the transition into step two takes place. Step two, VDOT contract reviewal will begin shortly in the upcoming summer months. The expectations are to continue working closely with my research professor and VDOT staff to ensure clarity as I comb through various industry data. The ultimate goal by the conclusion of the summer will be beginning the third step of the research process; gathering the desired VDOT targets. The interviews and surveys will be carefully compiled and modeled after the various data found within the reports gathered. Careful consideration of these surveys will ensure that all targets VDOT desires are being investigated.
5. ACKNOWLEDGEMENTS

The research reported in this paper was conducted at Center For Highway Asset Management Programs (CHAMPS) and funded by the Virginia Department of Transportation (VDOT). Any opinions, findings or conclusions are those of the authors and do not necessarily reflects the views of VDOT.
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LIST OF FIGURES

FIGURE 1 Alternative Highway Maintenance Procurement Strategy methodology flowchart
FIGURE 2 Spectrum of 13 Performance-Based Contracting Methods
1. Investigate performance-based contracts that are currently in practice.

2. Examine current VDOT performance-based contracts.

3. Determine the main targets that VDOT is aiming for in performance-based contracts.

4. Set the performance parameters to compare different strategies.

5. Recommend the strategy that best fits VDOT's goals.

FIGURE 1 Alternative Highway Maintenance Procurement Strategy methodology flowchart.
FIGURE 2 Spectrum of 13 Performance-Based Contracting Methods. (3)