

**OUTSOURCING VERSUS IN-HOUSE HIGHWAY
MAINTENANCE: COST COMPARISON AND DECISION
FACTORS**

FINAL REPORT

SCDOT Research Project 653:
Maintenance Outsourcing

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ABSTRACT

A research project was conducted by Clemson University for the South Carolina Department of Transportation (SCDOT) to examine the relative merits of outsourcing highway maintenance activities as opposed to performing those activities with in-house forces. The project examined the costs associated with maintenance work performed within the state for 20 maintenance-related activities in FY 03-04. The in-house unit costs for activities including drain pipe installation, mowing, sign installation, and full depth patching were found to be about the same as their out-sourcing unit cost. Some activities including drainage structure replacement, guardrail installation, and raised pavement marker installation, were difficult to compare due to project contract differences. Then too, some activities were performed exclusively either by contract or in-house in FY 03-04. The project also included workshops conducted in all seven SCDOT district offices to examine subjective factors that impact local decisions as to whether or not it is appropriate to outsource various maintenance activities. District personnel cited equipment availability, local contractor expertise, SCDOT inspection and contract administration capabilities, seasonal work fluctuations, and the need for immediate SCDOT response to specified problems among their decision factors. Workshop participants also suggested that improvements be made to standard outsourcing contracts to give them more leverage with respect to specification conformance.

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CHAPTER I

INTRODUCTION

Legislative mandates, lack of equipment, a need for specialized expertise or equipment, downsizing and retirements, and perceived cost savings are among a few of the reasons why many state transportation agencies have increased their level of highway maintenance outsourcing. However, not all agencies have had positive experiences when deciding to outsource maintenance work. Some maintenance outsourcing impediments have been noted to be poor quality of work, lengthy time of delivery, contractor inexperience, high or exculpatory costs, and monitoring issues (NCHRP Synthesis 246, 1997).

The South Carolina Department of Transportation (SCDOT) currently uses a combination of in-house forces and private contractors to maintain its highway system. It is important for SCDOT to understand the factors which affect the decision to let maintenance work to contract. SCDOT is also concerned with how cost effective these contracts have been. To better understand their maintenance outsourcing process, research was conducted to determine the underlying decisions that are employed when deciding the extent of maintenance outsourcing.

Problem Statement

SCDOT county and district maintenance units use a combination of in-house maintenance forces and private contract resources to perform their maintenance activities. The appropriate maintenance outsourcing activities which should be let to contract need to be determined. Some maintenance contractors may possess expertise that is not available within SCDOT. However, it requires additional expense to administer maintenance outsourcing contracts, and this will need to be weighed against potential benefits. A number of other states have experienced political and practical implementation issues that may or may not impact the extent to which maintenance outsourcing will be beneficial in South Carolina.

Objectives and Scope of Research

The primary objective of this research project was to examine the cost of performing maintenance activities with SCDOT forces compared to the cost of outsourcing. One secondary objective of this research was to evaluate the subjective advantages and disadvantages of outsourcing more or less maintenance work than is currently undertaken by in-house forces. The anticipated advantages and disadvantages focused on such issues as personnel availability and expertise, equipment utilization, and the ability of either entity to perform quality work. The scope of the overall research project, which was determined by members of the SCDOT Research Steering Committee, included 20 distinct maintenance activities.

Research Methodology

To examine the relative advantages and disadvantages of maintenance outsourcing, the research consisted of the following tasks:

1. Extensive literature review.
2. Questionnaire survey of other state agencies.
3. Compilation and analysis of SCDOT in-house and outsourced contract cost data.
4. Workshops held in all seven SCDOT district offices to document decision factor issues.
5. Questionnaire survey of selected maintenance contractors.

The literature review indicated that states were addressing maintenance outsourcing in various ways. It was, therefore, decided to obtain specific feedback to better understand how state agencies were executing maintenance outsourcing programs. The Research Steering Committee concluded that the best way to achieve this was through a focused questionnaire survey. The Research Steering Committee developed a survey questionnaire that included 20 maintenance-related activities (Appendix A). The survey questionnaire (Appendix A) was sent to each of the 50 states and the District of Columbia

A complete compilation and analysis of SCDOT in-house and outsourced contract cost data was performed to fully examine the cost benefits that could be obtained from maintenance outsourcing within South Carolina. Maintenance cost data from in-house performed activities were accessed from the SCDOT Highway Maintenance Management System (HMMS). All in-house performed maintenance activities for the period July 2003 to June 2004 were examined and are presented in spreadsheets located in Appendix

B-1. The entries within the spreadsheet include: activities' descriptions, work quantity, unit of measure, labor cost, equipment cost, and material cost. The unit costs were then computed.

Maintenance projects let to contract are administered and tracked by two separate entities within SCDOT. Projects less than \$50,000 are administered by the SCDOT Procurement Office. Projects over \$50,000 are administered by the construction office. A separate spreadsheet was created to analyze procurement office data (Appendix B-2) and the construction office cost data (Appendix B-3).

To more fully document the factors that impact maintenance outsourcing decisions, a series of half-day workshops were conducted in each of the SCDOT district offices. For each workshop a formal agenda was prepared to ensure that input would be obtained with respect to all 20 maintenance activities. The workshops provided informed opinions of over 70 SCDOT maintenance professionals. The workshop input data (Appendix C) was analyzed.

The Research Steering Committee also decided it was important to capture the input from contractors performing maintenance work in South Carolina. To accomplish this task the Research Steering Committee decided to survey the contractors. The Research Steering Committee subsequently developed a list of 60 contractors that perform a significant amount of maintenance work within the state. A questionnaire survey (Appendix D) was then drafted and administered to these contractors.

Research Steering Committee

A Research Steering Committee was established to oversee the research progress and to assure that the research team was meeting the research objectives. Table 1 is a list

of Committee members. The Committee was comprised of various SCDOT employees, including district maintenance engineers, an assistant state maintenance engineer, research staff, and internal audit personnel. The primary function of this committee was to oversee the work produced by the research team, and to provide guidance when necessary. To accomplish this, meetings were held every three months for approximately two hours to discuss work currently being undertaken. During these meetings, reports produced by the research team were critiqued and corrections were made to meet SCDOT's expectations. Committee members were also forwarded progress reports and updates in-between meetings to facilitate communication between SCDOT and the Clemson University Research Team.

Table 1. Members of the Research Steering Committee.

Name	Organization/Title
Lansford Bell	Clemson University/ S.E. Liles Distinguished Professor
Ryan Dlesk	Clemson University/ Graduate Research Assistant
Terry Swygert	SCDOT/Research Coordinator
David Cook	SCDOT/Asst. State Maintenance Engineer, Committee Chairman
Cyril Busbee	SCDOT/District 3 Engineering Administrator
Sherry Barton	SCDOT/Director of Internal Audit
Mike Sanders	SCDOT/Research Engineer
Cal Murray	SCDOT/District 6 Maintenance Engineer
Don Horne	FHWA

CHAPTER II

LITTERATURE REVIEW

A literature review was conducted to gather information in the area of maintenance outsourcing. The literature review was divided into two basic searches. First, information was obtained from the internet addressing approaches to maintenance outsourcing used by other states. Information was reviewed from the Federal Highway Administration website (www.fhwa.dot.gov/webstate.htm) for each State Department of Transportation and the District of Columbia through links on the site. Direct contacts were established for several states, which further provided insight into how these states were managing their maintenance needs. The second part of the literature search consisted of reviewing Ribreau's (2004) research, publications from the National Cooperative Highway Research Program, and related materials.

Maintenance Outsourcing Approaches of States

There appears to be a wide range of maintenance activities that are currently being outsourced by state agencies. Relevant information describing maintenance outsourcing was obtained for 14 states and 1 Canadian province. Information was obtained from documents studied during the literature review, direct contact with various state transportation department personnel, and access of state websites.

Arizona

The Arizona's Department of Transportation outsources maintenance activities on the basis of a number of justifications. Often, specialized equipment is required that the

agency does not own. Hazardous operations require specialized operators or equipment that does not reside within the agency. Work may not be suited to normal maintenance crew assignments. Legislative limitations have been imposed on how much work can be done with in-house crews. An on-site private contractor can be more responsive being closer to the worksite. Arizona does not outsource on a fence-to-fence basis. They select the items most suited to outsourcing and perform the other maintenance tasks in-house. For those areas that in-house forces can directly complete, outsourcing can increase the cost over 20% (Jim Dorre, personal communication, Sept. 13, 2004).

British Columbia

In the late 80s, British Columbia, Canada, transferred all highway maintenance to private contractors and eliminated most of its transportation resources. In the following years it was reported that there had been an overall cost increase, and that the contractors were spending less effort on long-term preservation efforts than may be needed. It was also reported that there was less competition in the process of renewing contracts. The Canadian Ministry of Transportation is now shifting to performance-based contracts that will be randomly audited and rewarded for high performance levels. The Ministry also faces problems with rising insurance and third party litigation costs. Additionally, British Columbia is finding it difficult to retain an experienced management team (Ribreau, 2004).

Colorado

The Colorado DOT claims on their website that it depends heavily on the private sector, and does more work with private businesses-contractors, design-engineering firms and vendors than any other state. CDOT only outsources peripheral maintenance duties

on a regular basis, such as mowing and fence repair. Each year they assess maintenance needs on pavement surfaces and, if they feel in-house personnel cannot meet the demand, they turn to pre-qualified contractors for assistance.

Florida

The Florida Department of Transportation has been mandated to execute an employee reduction plan and to examine privatization as a means of cost reduction. The percentage of FDOT maintenance work performed by private contractors was estimated in 2003 to be 74%. Department managers compared the unit costs for services such as mowing, embankment repairs, and shoulder repairs performed by employees to prices bid by private contractors and determined that in many cases private contractors were providing services at a lower unit cost than in-house employees. This allowed the FDOT to reduce its budget request for highway maintenance by \$5.9 million in Fiscal Year 2002-03 (OPPA, Florida Oppaga Progress Report, 2003).

Georgia

The Georgia Department of Transportation (GDOT) has outsourced the following activities: centerline interstate mowing; custodial and landscaping maintenance of rest areas and welcome centers; landscaping maintenance of some metro Atlanta gateway corridors; sweeping of interstate routes in metro Atlanta, including drain cleanout; and various rehab projects, including bridge joint sealing, deck overlays and pipe re-lining. The activities listed above have proven to be the most successful for outsourcing. Some other activities are in consideration for outsourcing such as guardrail maintenance, and striping. Further activities were considered either by study or by pilot projects and were found not to be feasible at this time. GDOT is continuously searching for better products

and means by which to maintain the roads and bridges in Georgia (Cale Durrence, personal communication, Sept. 13, 2004).

Louisiana

The Louisiana Department of Transportation and Development (DOTD) outsources a number of maintenance activities, including mowing, litter removal, tree and brush trimming/removal, rest area operation, guardrail repair, crash attenuator repair, signal maintenance, striping, surface repair (such as patching or micro-surfacing), equipment repair and culvert replacement. In general, outsourcing has been successful. However, DOTD personnel noted there are usually unanticipated issues the first time an activity is contracted, which sometimes hinders the anticipated success. The contracts usually improved with each cycle as these issues were identified and addressed. DOTD outsources maintenance activities because of statutory and political limits placed on their staff size, operating budget (i.e. money available to spend on staff, equipment, and materials), and project cost. In general the agency found most activities were more expensive to outsource. Usually simple activities, such as operating rest areas, can be contracted for the same cost as performing the activity with staff. Complex activities or those involving equipment always seemed to be more expensive to contract. For example, the cost of striping increased by a factor of three when DOTD attempted to contract this activity. DOTD has noticed there are activities where there are no interested contractors. This would usually occur when an activity is uncommonly difficult to accomplish (John Collins, personal communication, Sept 14, 2004).

Massachusetts

The Massachusetts Highway Department currently contracts portions of its highway maintenance system. Their practice has expanded to approximately 50% performed by in-house staff and 50% outsourced. However, their outsourcing program has not been a complete success. The maintenance-outsourcing pilot in Essex County gave "inadequate attention to asset inventories, contract details, costs, and oversight arrangements" (Ribreau, 2004). The post-audit report found state workers performing as much as 35% of the work covered by outsourcing, and other costs were being hidden by the state to polish the financial appearance of the program. A state report concluded that the program resulted in a loss of over one million dollars. The report also concluded that an inadequate cost analysis had been performed and that the claims of benefits and other savings were not substantiated. State officials involved in the program have offered little or no documentation to support claims of cost and performance achievements (Ribreau, 2004).

Another report on this pilot stated that "the contracting process was driven by a desire for a political 'win' and fell into the trap of proceeding with an inadequate contract concept and poor understandings of the costs and activities necessary to write a suitable contract" (Ribreau, 2004). The pilot was not expanded to other areas of the state (Ribreau, 2004).

Maryland

The Maryland State Highway Administration (SHA) uses outsourcing to accomplish many maintenance activities, either exclusively, or in conjunction with state personnel. Their reason for performing maintenance outsourcing is due to increased lane

miles and a decrease in budgeted field positions. Their contracts are typically based on single maintenance activities such as overhead lighting maintenance, traffic barrier repair, mowing, etc. These activities are usually limited to a single county or SHA Engineering District. Currently the SHA is very pleased with how contractors have performed, and note that it is very rare a contract is terminated because of poor performance (Russel Yurek, personal communication, Sept 29, 2004).

Minnesota

The Minnesota DOT is currently outsourcing a significant amount of its maintenance activities to contractors. In 2003, outsourced contracts consisted of 18.5% of their annual maintenance budget. Maintenance outsourced contracts in 2003 totaled \$37,750,134 and were estimated to be \$25,234,854 in 2004. The totals in 2003 were considerably higher than the 2004 estimates for two reasons. The first reason being, building contracts are usually higher in the second year of a biennium. The other reason was because end of biennium funds were reallocated to building projects in 2003 (Jan Ekern, personal communication, Sept 17, 2004).

Oklahoma

The Oklahoma DOT entered into two five-year contracts for routine maintenance of areas surrounding Oklahoma City and Tulsa. The contracts included pothole and guardrail repair, snow and ice removal, sign repair, and litter pickup. The contracts were cancelled in May of 2002, less than a year after their September 2001 start date. Performance problems were noticed early and by the third month the DOT was withholding payments for performance shortfalls. A March 2002 snowstorm caused problems and led to public and civic criticism of the contractor. After the contracts were

cancelled the Oklahoma DOT went into litigation with the contractor. The director of the Oklahoma DOT stated that in future outsourcing they would hire individual contractors and use experienced DOT managers (Ribreau, 2004).

Pennsylvania

The Pennsylvania DOT has been contracting progressively more of its maintenance needs since the mid-70s. The department recognizes that it can be more cost effective to contract maintenance activities. They suffer from maintenance force reductions, which limit their abilities to perform work in-house.

Rhode Island

Chuck Alves (personal communication, Sept 20, 2004), a Rhode Island Maintenance Engineer, noted that much of the maintenance activities in Rhode Island are performed by existing staff. However, over the years, with reductions in staffing levels, some maintenance activities such as striping, guardrail repair, fence repair and the use of some vendors during winter operations have been outsourced.

Texas

Texas entered into five-year contracts for highway maintenance in the Waco and Dallas areas. Problems were encountered with de-icing efforts in the wake of several storms in the area. Questions were raised about the contractor's resources and ability to cope with the clearance requirements. Pavement repair also seemed to be a problem with the contractor who tended to fix highway problems with cosmetic repairs when more extensive maintenance was required. During the contract period the level of service for portions of the highway being maintained decreased significantly. Texas implements a

“maintenance accountability program,” which monitors level of service with a statewide system. Decisions had not been made about renewing the contracts at the end of 2004. Texas has also awarded four contracts for total rest area maintenance, with close departmental supervision and financial disincentives for under performance. Texas is evaluating the effectiveness of disincentives versus incentives for the rest area maintenance contracts (Ribreau, 2004).

Tennessee

Tennessee's maintenance budget is approximately \$165 million for over 14,000 road miles, which consists of approximately 36,000 lane miles of highways. Approximately 50% of the work program is performed in-house with TDOT employees, approximately 30% of the work program is let to contract through specific contracts such as mowing, litter removal, striping, sign repair, guardrail, attenuator, sweeping, drain cleaning, and fence repair. The remaining 20% is for agreements in which other agencies and consultants perform specified duties. Due to an insufficient workforce to perform all the work in-house, Tennessee will continue their contracting process through activity-based contracts. They do not have a formal review process for cost benefit analysis of the work accomplished, but a Maintenance Management System is under development, which will provide a cost/benefit capability (Gerald Gregory, personal communication, Sept. 14, 2004).

Utah

The Utah DOT has contracted a number of specific maintenance tasks to private contractors and government entities over the years. There are many maintenance activities for which the Utah DOT issues external contracts. Some contracted activities

include pavement preservation, rest area maintenance, litter pickup, sign fabrication, animal carcass removal, weather services, high-scaling, materials, avalanche control, roadside vegetation seed, revegetation, and pavement marking. Approximately 2/3 of the Utah DOT pavement preservation program (\$40 million) is contracted annually. Typical contracts can be for asphalt overlays, chip seals, rejuvenation, and concrete slab repair. Many of the small rural projects are executed in-house because contract cost can be much higher. Lane leveling, patching and crack sealing are still being performed with state forces. In the past, the Utah DOT contracted with the Utah Department of Corrections for inmate labor for crack sealing, but the quality control was poor and the seals did not function properly. After receiving public complaints about this work, the contract was abandoned. However, 90% of DOT litter pickup work is still being contracted to the Utah Department of Corrections. This has proven to be very cost effective, because inmates only receive a small wage (\$0.40 to \$1.00 per hour). Lynn Bernhard (personal communication, September 17, 2004), Utah DOT Methods Engineer, stated she is very pleased with the majority of their maintenance contracts.

Virginia

The Virginia DOT currently contracts maintenance work to one of the largest maintenance firms in America, VMS Inc. In 1997 VMS entered into a five-year contract with the Virginia DOT to maintain 250 linear miles of interstates in a \$131.6 million dollar contract. VMS estimated the Virginia DOT would save \$22 million from this contract. A Virginia Tech University study predicted the savings range to be 16 to 23 million, but a joint legislative audit and review commission concluded "the savings claim was, on inspection, neither accurate nor verifiable" (Ribreau, 2004). The Joint

Legislative Audit and Review Commission of Virginia (JLARC) indicated that the "Virginia Tech study, due to narrow scope, may not provide conclusive findings on the overall cost effectiveness of the approach" (Ribreau, 2004). The JLARC reviewed performance under the contract and made recommendations to improve performance and oversight guidelines. Virginia extended the contract and increased the fixed price for services. The cost increase was double the consumer price index and it is not clear if this increase has impacted any savings for the renewal term. There has been no expansion of maintenance outsourcing scope in Virginia. VMS currently has maintenance contracts in Alaska, Florida, Oklahoma, Texas, Virginia and Washington DC. The five year \$70 million contract with Washington DC., includes, responsibility for 340 lane-miles of roads that comprise the district's portion of the national highway system. VMS responsibility in this contract consists of maintaining eight tunnels, pavements, bridges, pedestrian bridges, weigh-in motion stations, curbs, gutters, sidewalks, retaining walls, guardrails, barriers, attenuators, pavement markings, signs and lighting. However, not all of VMS's work has been considered satisfactory. Dallas has reported litter problems on VMS-maintained highways. After disagreements on the scope and performance of the contract, Oklahoma voided their five-year contract in 2002 (Ribreau, 2004).

Table 2 summarizes selected maintenance outsourcing activities undertaken in other states for which current information was available.

Table 2. Selected maintenance outsourcing activities in other states.

State	Recent Outsourcing Activity
Colorado	Mowing, fence repair and pavement surface improvements if demand necessary
Florida	Planning, administration, management and inspections of routine maintenance corridors.
Georgia	Centerline interstate mowing, rest area and welcome center maintenance, interstate sweeping, bridge joint sealing, deck overlays, and pipe re-lining.
Louisiana	Mowing, litter removal, tree and brush trimming/removal, rest area operation, guardrail repair, crash attenuator repair, signal maintenance, pavement striping, surface repair (such as patching or micro-surfacing), equipment repair, and culver replacement.
Maryland	Single maintenance activities such as: overhead lighting maintenance, traffic barrier repair and mowing.
Oklahoma	Pothole patching, guardrail repair, snow and ice removal, sign repair, and litter pickup.
Rhode Island	Pavement Stripping, guardrail repair, fence repair, and snow and ice removal.
Tennessee	Mowing, litter removal, striping, sign repair, guardrail, repair, sweeping, drain cleaning, and fence repair.
Texas	Pavement repairs, rest area and welcome area maintenance, and snow/ice removal.
Utah	Pavement preservation, rest area maintenance, litter pickup, sign fabrication, animal carcass removal, weather services, high-scaling, materials, avalanche control, roadside vegetation seed, and pavement marking.

Maintenance Outsourcing Constraints and Justifications

Highway maintenance outsourcing, when utilized by state departments of transportation, has been met with mixed success. Table 3 summarizes constraints encountered and justifications that have been employed by select state agencies.

Table 3. Maintenance outsourcing activity constraints and justifications.

State	Constraints	Justifications
Arizona	Legislative limitations on how much work can be done with in-house crews.	Specialized equipment is required, specialized operators, on-site private contractor can be more responsive being closer to work site.
Florida		Lower overall cost, allow for expertise without hiring extra employees.
Louisiana	Statutory and political limits placed on their staff size, operating budget, and project costs.	
Maryland	Increased lane miles, and a decrease in budgeted field positions.	
Pennsylvania	They suffer from maintenance force reductions, which limit their abilities to perform work in-house.	More cost effective to contract maintenance activities.
Rhode Island	Reductions in staffing levels have led to some maintenance activities being let to contract.	
Tennessee	Insufficient workforce to perform all the work in-house.	
Virginia		Notices substantial cost savings when choosing to outsource.

From Table 3, it appears that some states claim benefits when outsourcing maintenance activities while others have had problems. An excellent compendium of the experiences of other states was documented in a paper presented by Nicole Ribreau at the January 2004 Annual Conference of the Transportation Research Board titled “Synopsis of WSDOT’S Review of Highway Maintenance Outsourcing Experience.” In reference to the concept of maintenance outsourcing, Ribreau (2004) states that her research found

cases where costs may have gone up instead of down, services deteriorated rather than improved, administrative and supervisory arrangements proved problematic, and contractor failures left states scrambling to provide services or caught in the distraction of litigation.

Factors that impact Highway Maintenance Outsourcing

The current outsourcing trends among a wide range of transportation agency activities are summarized in NCHRP Synthesis 246 (1997), on outsourcing of highway facilities and services. NCHRP Synthesis 246 (1997) indicates that 21 of 30 states surveyed indicated all or some part of highway maintenance work was outsourced. The factors listed in NCHRP Synthesis 246 (1997) that should be considered before implementing an outsourcing program include:

1. Limited in-house resources.
2. Need for specialized expertise or equipment.
3. Better quality.
4. Statutory requirements or agency policies.
5. Seasonality of work.
6. Contractor availability.

Although not addressed in NCHRP Synthesis 246 (1997), the concept of transportation asset management, of which maintenance management is but one component, is gaining in popularity. The NCHRP Transportation Asset Management Guide (2002, Number 266) briefly discusses outsourcing maintenance activities and stresses factors to consider when analyzing the tradeoffs between in-house and outsourced work. These factors include:

1. Availability of accurate cost data for comparing in-house versus outsourcing.
2. Internal costs and expertise to administer outsourcing contracts.
3. A “safety net” if public employees are displaced by a private-sector work force.

NCHRP Transportation Asset Management Guide (2002, Number 266) also cites as examples the turnpike maintenance experiences of the Florida DOT, the \$131 million fixed price contract experience of the Virginia DOT, the phased implementation experience of the Massachusetts Highway Department, and the managed competition experience of the Iowa DOT.

CHAPTER III

SURVEY OF OTHER STATES

As part of the maintenance outsourcing research project objectives, the Clemson University Research Team created a state DOT survey instrument (Appendix A) utilizing input from an October 2004 meeting with the SCDOT Research Steering Committee. The survey instrument was later approved by the committee in November of 2004 and was forwarded to a research contact representative within each of the 50 state DOT agencies. In an attempt to obtain candid information, a cover letter for the survey included a confidentiality statement (Appendix A).

State DOT Survey Objectives

The primary objective of the state DOT survey was to determine which states were outsourcing maintenance activities and to what extent. A secondary objective was to determine why states were outsourcing some activities versus others, and what types of issues, if any, they may be facing with the outsourced activities. States were also asked to rate their degree of satisfaction with various activities. This would help to determine what activities have the potential to cause problems when outsourced.

State DOT Survey Findings

There were several deductions which could be drawn from the survey results. From the 50 states that were surveyed, only 13 responded. States that responded to

the survey are listed in Table 4. Of those states that responded, only New Hampshire and Oregon reported that they do not currently outsource any maintenance activities.

Table 4. States that responded to outsourcing maintenance survey.

State	Currently Outsourcing Maintenance Activities	
	Yes	No
Arizona	X	
Arkansas	X	
Colorado	X	
Connecticut	X	
Idaho	X	
Iowa	X	
Maryland	X	
Michigan	X	
Minnesota	X	
Mississippi	X	
New Hampshire		X
New Jersey	X	
Oregon		X

Due to the partial number of responses, the survey could only produce a limited amount of information. However, there was some relevant information which could be deduced from the survey. Of the 20 activities listed, the two most frequently outsourced activities were: rest and welcome area operations, and sweeping of streets and bridges.

The relative frequencies of outsourcing the activities are illustrated in Table 5. Not a single state reported outsourcing roadside features inventory for their maintenance management system. There were also some patterns which could be noted from the

survey results. A number of activities were only partly outsourced (less than 60%) for example, vehicle and equipment shop maintenance, grade and shoulder repair, and sign maintenance/management. States seemed to be reluctant to turn the majority of this work over to contractors.

Table 5. List of states outsourcing maintenance activity and level of outsourcing.

Activities	Number of States Outsourcing Activity	States Reporting Percent of Activity Outsourced					
		0 - 19%	20 - 39%	40 - 59%	60 - 79%	80 - 99 %	100%
Guardrail Maintenance	8	2	2	1		2	1
Mowing	6	1	1	2	1	1	
Cable Rail Maintenance	2					1	1
Chip Sealing	7	1			2	2	2
Pavement Striping	8	1	3		2	2	
Catch Basin Repairs	5	3		1		1	
Sidewalk Repair	5	2		2		1	
Sweeping - Streets, Bridges	9	3	1	2		3	
Fence Repair	5		2			3	
Tree Removal	7	2		2	2	1	
Rest & Welcome Area Operations and Maintenance	9		2		3	3	1
Signal Installation	6		1			2	3
Sign Lighting	2					1	1
Wildflower Planting and Maint.	2		2				
Vehicle and Equipment Shop Maint.	5	2	3				
Crack Sealing	4	1		1		2	
Pot Hole Patching	2	1				1	
Grade and Repair Shoulders and Ditches	3	2				1	
Sign Maintenance	3	1		1		1	
Roadside Features Inventory for Maintenance Mgmt or Other System	0						

A few states were significantly outsourcing activities (60% or greater) such as cable rail maintenance, chip sealing, rest and welcome area operations and maintenance, signal installation, and sign lighting. Table 5 indicates that, for the most part, maintenance activities were outsourced in different amounts from state to state.

The survey also asked the states to rate the level of satisfaction for each maintenance activity being outsourced. The activities were rated on a scale of 1-5 for various categories where, 1=numerous problems, 3=acceptable experiences, 5=very favorable experience. Since there were limited data, only maintenance activities that were being outsourced by five or more states were compared. States reported fence repair to have the highest degree of overall satisfaction and reported mowing to be the most unfavorable, as noted in Table 6. There was a wide range of satisfaction ratings for other activities that did not seem to follow any apparent trends.

Table 6. States' DOT satisfaction ratings for outsourced maintenance activities.

Activity	Number Of Responses	Average Rating	Standard Deviation
Rest & Welcome Area Operations and Maintenance	9	3.66	0.32
Sweeping - Streets, Bridges	9	3.71	0.17
Guardrail Maintenance	8	3.89	0.23
Pavement Striping	8	3.88	0.30
Tree Removal	7	3.86	0.22
Chip Sealing	7	3.40	0.21
Mowing	6	3.07	0.26
Signal Installation	6	3.71	0.23
Catch Basin Repairs	5	3.69	0.44
Sidewalk Repair	5	3.90	0.28
Fence Repair	5	4.12	0.28
Vehicle and Equip. Shop Maintenance	5	3.37	0.22

One question that was included in the survey was, “Why are states deciding to outsource maintenance activities?” From the results it was obvious that states were being forced to outsource more because they lacked the necessary in-house equipment. This is illustrated in Table 7. The second leading driving force for maintenance outsourcing was the increase of maintenance workload given DOT resources. Cost appeared to be the least important factor impacting outsourcing decisions.

Table 7. Compilation of reasons for initiating maintenance outsourcing.

Reason	Number of Responses (N=11)
Lack of Equipment within DOT	10
Expansion of Maintenance Workload	9
Lack of Unique Expertise within DOT	7
DOT Downsizing or Retirements	6
Political Mandate Budget/Staff	6
Anticipation of Cost Savings	5

State departments of transportation were also asked if they currently used any contractually stipulated incentives/disincentives with any of their outsourced maintenance activities. No states reported using incentives in their maintenance contracts. However, a few states did apply liquidated damages for projects not completed by the contract completion date. Arizona determined a way of rating the contractor’s performance and, if the contractor failed to perform, a procurement deficiency report was issued. The deficiency report can cause the contract to be terminated and/or re-bid. If the contract were re-bid, the deficiency report would significantly reduce the contractor’s chance at acquiring the work. Idaho also used a rating system that was applied to only rest area

maintenance contracts. If the contractor was rated poorly, there were disincentives in the form of fee reductions written within the contract.

After reviewing the literature and analyzing the survey, it appears that state departments of transportation are outsourcing maintenance activities at various levels. It seems apparent there are activities in-house, such as rest area maintenance, that most agencies currently prefer not to perform. Of the states reporting, not one has decided to outsource all activities and rarely do they even totally outsource a single activity. The reason for this were not determined from this survey. It is assumed that states would like to perform a percentage of work in-house for various reasons that may include emergency repairs and response time. It could also be noted that not all states are operating on the same budget nor do they have the same needs, partly due to geography. It was surprising to find that few, if any, states were outsourcing because it was more cost effective. Even more surprising was the fact that nearly all states had no cost data to compare in-house costs to outsourcing costs. The concept of providing incentives within maintenance contracts has not been explored within any state that responded. The reasons for this are unknown, but it is suggested this could be due to budget limitations. Concurrently, the concept of disincentives was mainly being used in the form of liquidated damages. Maintenance contractors are only being judged based on performance on select activities within a few states.

CHAPTER IV

SCDOT COST DATA ANALYSIS

The Clemson University research team also solicited data from South Carolina Department of Transportation (SCDOT) in order to compare the cost of work performed in-house and outsourced. Cost data for in-house maintenance activities is captured in the SCDOT Highway Maintenance Management System (HMMS). Cost data for outsourced contracts resides within both the SCDOT Procurement Department (contracts less than \$50,000) and the SCDOT Construction Office (contracts more than \$50,000). All of the cost data for the fiscal year 2003-2004 were obtained from the SCDOT HMMS system to compile in-house activity unit costs. A total of 118 contracts were obtained from the SCDOT Construction and Procurement Offices that provided contracted activity costs. The cost data obtained from the three SCDOT sources are reproduced in tabular form in Appendix B. (FY04-05 in-house data also provided for reference only.) The activities for which a unit cost comparison could be made are listed in Table 8. A two tailed statistical T-test was then performed for each of these activities to determine if the in-house unit cost was significantly different from the average outsourcing unit cost.

SCDOT Cost Data Comparison

Drainage Structure Installation

The majority of drainage structure work includes installing, repairing, and upgrading catch basins. The bulk of drainage work is performed with in-house forces, however districts often outsource the installation of major structures, or structure

upgrades. Nine drainage structure contracts were examined from procurement, which showed a significant cost difference when compared to in-house costs. The average unit cost to perform this activity with in-house forces was much less than the average outsourcing unit cost. This significant cost difference is due to the fact that larger drainage structure projects are let to contract, and minor work is performed in-house.

Table 8. Comparison of SCDOT in-house and outsourcing costs for Fiscal Year 2003-2004

Maintenance Activity	Unit Of Measure	In-House Unit Cost (\$)	Average Outsourcing Unit-Cost (\$)	Significantly Different
Drainage Structure	Each	515.67	2,545.84	Yes
Drainage Pipe	LF	39.13	32.62	No
Tree Trimming	SH Mile	201.46	733.69	Yes
Mowing	Acre	23.65	24.29	No
Chip Sealing	SY	0.31	0.77	Yes
Guardrail Installation	LF	34.81	11.88	Yes
Pavement Striping	LF	0.19	0.03	Yes
Raised Pavement Markers	Each	17.28	2.61	Yes
Sign Installation	Each	25.28	35.31	Yes
Full Depth Patching	SY	25.12	33.25	Yes
Bridge Replacement	SQFT	133.49	65.00	Yes

Drainage Pipe Installation

The unit cost of installing drainage pipe with in-house forces was slightly higher than outsource unit cost (Table 8). This may be due to the fact that in-house work constitutes projects of lesser magnitude.

Tree Trimming

The majority tree trimming and tree removal is let to contract. These contracts are usually combined with mowing contracts and are priced per mile. The discrepancy between in-house and contracted unit costs are most likely due to the fact that more labor intensive work, involving hand trimming from a bucket truck, is let to contract. All tree removal contracts provided by procurement were fixed price lump sum contracts. Tree removal involves an extreme amount of variability from job to job, which is reflected through contract prices.

Mowing

Almost all-interstate mowing is outsourced by SCDOT. The agency no longer has the necessary equipment and personnel to adequately perform this activity. Contractors bid for this work by acre and per cycle. A typical contract consists of five cycles per year. As indicated in Table 8, it appears that outsourced and in-house performed unit mowing costs are about the same.

Chip Sealing

One way to preserve many of the secondary roads is through the use of chip sealing. Most contracts have many activities added to them such as pavement striping, raised pavement markers, and full depth patching. Only the cost associated with a single chip sealing treatment has been compiled. After reviewing many chip sealing contracts, it appears to be more expensive to outsource this activity. As noted in Table 8, the in-house unit cost was \$0.31/SY, the outsourced cost was \$0.77/SY. Fiscal Year 04-05 data, not shown in Table 8, indicates the in-house cost had increased to \$0.50/SY.

Guardrail Installation

In general, SCDOT does not have the necessary equipment to perform guardrail installations and it is acknowledged by SCDOT personnel that contractors may perform better quality work. The difference in unit cost shown in Table 8 is most likely due to minor projects being performed in-house, with major projects let to contract.

Pavement Striping

SCDOT performs much of the pavement striping; however, they also use contractors to supplement their efforts. The cost to perform this activity with in-house forces is approximately \$0.19/LF as compared to outsourcing this activity at \$0.03/LF (painting, not thermoplastic marking). The reason for the cost differential is the fact that in-house work is typically small symbol marking projects, whereas major projects of significant distance are almost always let to contract.

Raised Pavement Marker Installation

As noted in Table 8, the cost for SCDOT installation of raised pavement markers is \$17.28 each, whereas contracted costs are \$2.61 each. SCDOT seldom performs initial marker placement, performing instead marker replacement. SCDOT usually performs less than 5000 marker replacements per year and does not have the necessary equipment to meet the production demands of large projects.

Sign Replacement

Limited data were available to compare sign replacement costs. One recently received contractor bid for a project involving approximately 7000 sign replacements stipulated \$35.31 per sign with SCDOT providing the signs. In-house unit costs,

excluding material, averaged \$25.28 in FY 03-04, and (not shown in Table 8) \$26.57 in FY 04-05.

Full Depth Patching

A significant amount of full depth patching is outsourced. Contracts which were used for comparison, were for full depth patching assuming a 6-inch uniform depth. Many contracts included a separate asphalt pay item for leveling of the roadway after the full-depth patch was complete. This was considered to be a separate activity and, therefore, this cost was excluded from the contract analysis. The traffic control cost, and mobilization cost was also divided between the two activities. As noted in Table 8, the cost to perform this activity with in-house forces in FY 03-04 was \$25.12/SY. After reviewing 28 FY 03-04 contracts, it was determined that the average outsourcing unit cost was \$33.25/LF. It appears to be more cost effective to perform this activity with in-house forces, but the cost difference may be due to the fact that contractors were using more expensive fill material.

Bridge Replacement

SCDOT has been mandated to outsource the construction of bridges over 120 feet in length, which has made a cost comparison difficult. The unit cost of longer bridges are most likely less than the unit cost of the shorter bridges that are replaced with SCDOT forces. The significant cost difference may be related to the different scope of work that is undertaken by the in-house forces. It was also noted that generally contractors only bid on the cost to construct the foot print of the bridge, whereas SCDOT personnel will often include other activities into their bridge unit cost, such as work necessary for the approach.

SCDOT Maintenance Activities for Which a Cost

Comparison Could Not be Made

Whereas reasonable cost comparisons could be made for many of the activities listed in Table 8, a meaningful cost comparison for other activities could not be executed. This is primarily due to the fact that many activities are performed exclusively in-house, or exclusively let to contract. In some cases (as also noted with activities listed in Table 8), the magnitude or type of activity that is outsourced is vastly different from what is performed in-house.

Table 9. SCDOT maintenance activities that could not be compared.

Maintenance Activity	Reason
Cable Rail Installation	Completely outsourced
Herbicide Treatment	Insufficient data
Rest Area Maintenance	Completely outsourced
Crack Sealing	Incompatible unit of measure
Install ROW Fence	Insufficient data
Litter Pickup	Not let to private contract
Snow/Ice Removal	Hourly wage rate stand-by contracts only
Vehicle/Equip. Maintenance	Major repairs let to contract
Features Inventory	Insufficient data

The activities for which a cost comparison could not be made are listed in Table 9. Cable rail installation is exclusively let to contract. Herbicide treatment applications are often included in mowing contracts but this activity is not a contract pay item. Rest area maintenance is completely outsourced and there is no desire within SCDOT to perform this activity in-house. Crack sealing is performed both in-house and under

contract, but in-house work is currently recorded in units of lane miles, whereas the contract pay item is pounds of sealant. Right-of-way fencing is performed in-house only for minor repairs, whereas major new fence installations of extensive fence quantity are let to contract. Litter pickup consists of voluntary assistance programs such as Adopt-A-Highway, and in some districts, corrections inmates perform the activity. Snow and ice removal is contracted only on a cost reimbursable hourly basis with no units of measure recorded. Routine vehicle and equipment maintenance is performed in-house with major repairs let to contract. SCDOT personnel anticipate contracting a number of features inventory tasks in the future. At present only one contract for a guard rail inventory has been let to contract.

CHAPTER V

SCDOT DISTRICT WORKSHOPS

As determined from a review of the literature, many states have had difficulty projecting the cost savings benefits associated with outsourcing maintenance activities before initiating such a project. Indeed, even a comprehensive analysis of all cost data for an entire fiscal year may not produce useful comparisons of in-house performed versus outsourced costs for all anticipated outsourcing activities. Political and administrative mandates to outsource maintenance services have not always produced anticipated benefits. Thus, the state agency considering maintenance outsourcing should carefully examine other factors impacting the two alternatives. Those factors, termed “decision factors” in this study, include:

1. Agency and contractor equipment availability and expertise.
2. Workloads.
3. Equipment utilization rates and internal policies.
4. The ability to respond to emergency situations.
5. Contract administration costs and resources.
6. Demands of seasonal work.
7. The ability of local contractors to provide specification conforming work.

SCDOT Workshops Meeting Schedule

To formally explore these decision factors within the SCDOT, a series of seven half-day duration workshops were conducted, one in each SCDOT district office. Table

10 lists all seven districts and their office locations. At least ten or more SCDOT maintenance professionals attended each workshop. The entire effort produced a compilation of input from over 70 highway maintenance professionals. Prior to each workshop date a meeting agenda was distributed listing the 20 maintenance categories for which SCDOT had some experience, or interest in outsourcing. Workshop participants were informed that the reports compiled by the Clemson University Researchers would not identify the district by name.

Table 10. List of SCDOT districts, office locations, and meeting dates.

District	Office Location	Meeting Date
1	Columbia	2/18/2005
2	Greenwood	2/09/2005
3	Greenville	2/07/2005
4	Chester	2/14/2005
5	Florence	2/23/2005
6	Charleston	2/16/2005
7	Orangeburg	2/04/2005

During each workshop, notes were taken and a draft of the notes was forwarded to the participants for their additions and corrections. Workshop findings, organized by the 20 maintenance categories, are summarized in Table 11. To maintain confidentiality of the workshop proceedings, the districts are not identified by their actual numerical designations in the tables. More complete transcripts from the district workshops are located in Appendix C.

Table 11. SCDOT workshop summary information.

DISTRICT	DRAINAGE	TREE TRIMMING	MOWING	CHIP SEALING
A	Outsourcing decision dictated by project magnitude.	Tree trimming and mowing contracts were recently combined with good results.	Larger counties prefer contracting, smaller counties do not. Workload dictates significant outsourcing.	Adequate inspection is the key to quality work. Chip sealing is a good candidate for outsourcing.
B	Most activities performed in-house. It would be best to outsource activities other than those related to drainage maintenance that are less “public sensitive.” Drainage structure repair, curb and gutter repair, and cross line repair are good outsourcing candidates.	Tree trimming is outsourced and should continue to be outsourced.	All mowing work is let to contract. Enforcing contract provisions has been a problem. There are a sufficient number of available contractors to bid the work.	This activity needs to be outsourced if and when it is resumed. However, this activity is more costly to perform by contract.
C	Most drainage related activities are performed in-house. Catch basin repair and conversion has been let to contract. Better and more uniform statewide specifications are needed.	The district would prefer to have all mowing and trimming under one contract. There is a needed to specify expected work performance in contract.	In general all mowing has been satisfactorily performed under contract. An improved “final cleanup” specification is being drafted.	Before discontinued, this activity was performed under contract. Past performance problems with contractor quality could be resolved
D	Catch basin repair is a good candidate for outsourcing. The increased need for environmental compliance is making drainage activities more costly.	Trimming requires specialized equipment and is therefore a good candidate for outsourcing. Competence of local contractors varies widely.	District prefers to continue contracting interstate mowing although some contract problems have been encountered. Other mowing kept in-house because they do a better job. In-house is 50% less costly.	District believes it can perform this activity better and at less cost, thus it is not performed under contract. This is an important activity that should not be discontinued.
E	Catch basin repair and large diameter pipe replacement is outsourced. Shotcrete pipe repairs are outsourced. Capable contractors are available. Bids are reasonable but catch basin repair bids may be somewhat high.	Most work is performed in-house. Each county has a limb-trimming target and equipment availability is not a problem. Some trimming is performed by contract as part of interstate mowing.	Only interstate mowing is contracted as per statewide mandate. Routine mowing was at one time contracted but contractor performance was poor. The district has adequate equipment for routine mowing.	This work was performed the last two years by outsourcing because it is very labor intensive. It is probably about 10% more expensive to contract this work as opposed to perform in-house.
F	A pressing need in this district is to widen roads to a 24 foot pavement width with 2 foot paved shoulders and adequate earth bank shoulders. This work would be a good candidate for outsourcing contracts. Catch basin maintenance could be outsourced also.	Some work is performed in-house, some is outsourced. Outsourcing appears to be preferred to clear vegetation encroaching the ROW. Competitive bids have been obtained for ROW clearing.	Approximately 95% of mowing in the district is contracted. Mowing is labor intensive, and contracts free up personnel to perform other tasks. Contracts need to be written to clearly to specify the pay item.	This is one of the most important activities performed in the district. There is the perception of the public that chip sealed roads devalue their property. Lightweight aggregate with a double or triple seal may produce improved results.
G	Most drainage related work is performed with in-house forces. The district plans to let some basin conversions to contract in the near future. One county has let a ditch cleaning contract. Some cities perform sweeping related activities under contract.	Tree removal has been let as on-call contracts to small local contractors. One county has included tree trimming in the mowing contract.	The district is attempting to contract all mowing activities. Boom mowing (back slopes and ditches – year end cleanup) is performed in-house but the necessary equipment is limited. There are political pressures to mow some areas more often than planned. Contractor compensation on the basis of acres generates disputes.	If this work is continued, it would be preferred to let the work to contract in order to free in-houses to perform other work. However, when this work was performed in-house, higher quality was attained.

Table 11. SCDOT workshop summary information (Continued).

DISTRICT	GUARD/CABLE RAIL	HERBICIDES	REST AREAS	MARKINGS/PAINTING
A	Cable rail contractor performs excellent work. Guard rail work is let to contract. Contract should specify contractor response time to address breaches.	Most all herbicide spraying is performed in-house. Equipment utilization requirements may dictate outsourcing in the future.	This work is contracted by “lots” which permits some flexibility in structuring contracts to meet local needs.	The district is moving toward more outsourcing of thermoplastic work. Raised pavement marking contracts need to be let earlier to maximize use before ice and snow operations may be required.
B	Guard and cable rail work should be outsourced. Contractors are available and they are competent.	All counties have a good in-house program that includes training. This activity needs to be retained by the counties, but each county needs its own truck.	This activity is outsourced and should continue to be outsourced. Consideration should be given to transferring rest area and welcome center responsibility to PRT.	Most work is contracted and should remain so. A district-wide on-call contract would be appropriate. The district no longer has the equipment to perform centerline painting.
C	This work has been satisfactorily performed under contract. Bid costs have been reasonable	This work is performed in-house, but large scale projects could be outsourced. Mowing and herbicides should be addressed in the same contract.	Rest area work has been let to contract and has been generally satisfactory.	All marking activities except symbol markings are let to contract. Centerline painting has been let to contract with good results.
D	Guard and cable rail activities are contracted because specialized equipment and expertise are required. Guard rail contracts are let when many areas need attention to minimize mobilization costs.	All herbicide spraying is conducted in-house. Mowing and herbicide spraying need to be, and are, coordinated.	This activity is outsourced with general satisfaction. Lump sum payments are made to the contractor monthly.	Thermoplastic markings are let to contract. Raised pavement marking has been contracted at a cost of about \$400 per mile.
E	It is believed the same contractor used in this district performs work in about half of the state. The contractor is very timely in responding to cable rail notifications, somewhat less timely in responding to guard rail.	Herbicide spraying for brush control is mostly performed in-house. The district had a disappointing experience with one contractor the last spraying cycle.	All work is contracted with satisfying results. Some vandalism occurs when contractor forces leave the areas after 11:30 PM.	Edge and centerline markings are contracted through the Construction Office. Roadway painting needs to be retained in-house for quick response time. Raised markers are contracted because it is labor intensive.
F	All cable rail and 95% of guard rail maintenance is outsourced. This can be justified by the equipment and expertise of outside contractors. Contractor performance has been adequate, but on occasion issues with response time	Most herbicide work has been performed in-house, but there are good arguments to perform this activity by contract. Material storage, equipment calibrations and other factors could best be handled by a contractor.	This activity has been contracted and should remain so.	All centerline markings are contracted. Some “by hand pre cut” markings are best performed in-house to respond to critical needs. Some centerline painting is contracted but had district has an excellent district-wide paint crew serving some counties. Raised markings are contracted.
G	Guard and cable rail work is let to contract and should remain so. There is more guard rail work that needs to be addressed in the district than can be completed under the current district-wide on-call contract.	In-house performance works well when equipment is available. It is preferred to keep this activity in-house. If it is contracted, herbicide treatment should be combined with mowing. Previous contracts for mowing have given the contractor herbicide spraying options.	All rest area maintenance is contracted with adequate contractor performance. It is suggested that 24 hour security is needed and it would be preferred that rest area and welcome center responsibilities be transferred to PRT.	Thermoplastic marking activities are let to contract. Most symbol markings are placed in-house. It would be preferred to let symbol markings to contract if the current contracts are properly executed.

Table 11. SCDOT workshop summary information (Continued).

DISTRICT	SIGNS	CRACK SEALING	FULL DEPTH PATCHING	WILDFLOWERS
A	Temporary personnel were hired to perform the sign inventory. Routine sign management activities are best performed in-house.	Crack sealing has been successfully performed in-house in the past with good results.	A substantial amount of work is performed by contract. Inspectors need training in order to be able to better evaluate conforming work.	Most work is performed in-house which is the preference.
B	Only a large scale sign replacement program should be considered for outsourcing. The State should retain the operation of the three state sign shops.	The district does not perform this activity and believes it is not cost effective.	Full depth patching should continue to be outsourced. However, better performance specifications are needed in the contracts.	This activity has been performed both in-house and under contract. The preference is that it be contracted.
C	Routine sign maintenance frequently requires an immediate time response and therefore is not a good candidate for outsourcing.	The district has just begun to contract some crack sealing work but has not had sufficient experience to evaluate the caliber of the contractor's work.	Most work is let to contract with good results. More full depth patching is needed throughout the district.	This work is performed in-house but the district would prefer to let it to contract. The contract should give total bed preparation, planting, and maintenance responsibility to the contractor.
D	Routine sign maintenance should be performed in-house, whereas major projects could be outsourced.	This activity is not performed in the district.	Approximately 95% of the work is contracted. There have been no problems with specifications or work quality.	District personnel strongly believe this activity should be outsourced. Soil testing and other related functions can best be performed by the private sector.
E	Sign inventory work was completed using temporary employees. All sign work except large signs or the interstates is appropriately performed in-house.	This activity is not at present performed within the district. The district would like to begin performing this activity on primary routes, under contract, if the budget permits.	Some work has been performed in-house, some by contract. This activity may become more important if chip sealing is not resumed. Contractors capable of performing chip sealing are not capable of performing full depth patching.	This work is currently performed in-house but the district would prefer to perform it by contract and is planning this as outsourced work for the future.
F	It is not clear to what extent the central administration vs. the district should retain responsibility for interstate signs. It may be best to give the district more autonomy to respond to critical needs on the interstates with on-call contracts.	A small amount of work is performed in-house.	Since initiating mowing contracts, crews formerly performing the mowing function can not address patching. Approximately 60% is performed in-house. Outside contractors perform well but occasionally do not extract poor subgrade material.	This work is presently performed in-house but the district would like to see how other districts have successfully outsourced this work. District personnel are now adequately trained to perform this activity.
G	Large overhead sign repair is let to contract. The contracts are structured to address signs in groups to minimize contractor mobilization expenses. An on-call contract is not cost effective. Routine sign maintenance should remain an in-house activity. Outside assistance would have been helpful in performing the sign inventory.	Some crack sealing is performed within the district and more is needed. One county would like to perform this work under contract if clear specifications could be drafted.	This work is performed both in-house and by contract. There are no strong feelings as to which is preferred. Work quality is perhaps better when performed in-house. The cost for in-house work is approximately \$60/SY.	All work is currently performed in-house but it is time consuming. If this activity is let to contract, the contract should be structured such that the contractor is given total responsibility for bed preparation, planting, and maintenance. Contractor performance in the past has been marginal.

Table 11. SCDOT workshop summary information (Continued).

DISTRICT	BRIDGES	ROW FENCING	LITTER PICKUP	SNOW/ICE REMOVAL
A	District crews are effective in performing bridge replacement. District forces can perform this activity more quickly and at less cost.	A major contract was recently executed and contractor performance is being monitored.	Department of Corrections provides good assistance.	Contracts are in place with counties, municipalities and contractors to provide assistance as needed.
B	Maintenance bridges can be replaced with district forces but sufficient equipment is not available. Most bridge maintenance is performed in-house. Wage rates for crane operators need to be increased.	This activity is now being performed in-house but it should be outsourced.	Department of Corrections provides good assistance on the Interstates.	N/A
C	One district-wide replacement crew has functioned very effectively. There is a long time period to get replacement contracts executed.	Only minor work is performed in-house. Bid prices from contractors in the past have been disappointing.	Some counties have had good cooperation from the Department of Corrections, others have not.	On-call contracts provide assistance as needed.
D	District can erect bridges up to 120 feet in length. About 6-8 are erected per year. When contracted, it takes 2-3 years. In-house and contract costs are comparable.	All ROW fence replacement is contracted. There have been no problems with specifications or work performance. Fence repairs performed in-house.	Appropriate corrections facilities are notified prior to interstate mowing. They may or may not respond. Debris pickup on interstates executed daily.	All work performed in-house as it should be.
E	Most bridge work is let to contract which is the preference. There is a district-wide bridge crew that has proven to be very effective, mostly addressing problems related to rotting timber piles.	An outside contract was let a number of years ago, and if funds are available, another contract may be needed.	Inmate crews can be utilized throughout the district. This is a low priority maintenance activity and the district essentially becomes involved only in Adopt-A-Highway and mandated programs.	The district's motor grader fleet has been depleted in recent years, and thus has on-call contracts with local contractors. The district is negotiating a contract with the National Guard to perform these services, if needed, in the future.
F	There are now two district-wide crews performing bridge replacement. Contractor availability may impact the cost of performing additional work in the future. Crane operators must be paid a competitive wage.	Only minor repairs are performed in-house.	Strategies differ within the counties. Some counties utilize Department of Corrections personnel, some utilize personnel sentenced to perform community service work.	In the past contractors have assisted with this activity but have been unreliable. This needs to remain an in-house activity. The ability to effectively perform this activity has been impacted by imposed equipment utilization rates.
G	Two district-wide bridge replacement crews perform effectively. The district would prefer to retain this capability. Bridge maintenance is performed in-house. There may not be a sufficient number of locally qualified contractors to perform bridge maintenance.	Some counties are now drafting contracts for fencing.	The Department of Corrections and County facilities assist in two counties. The traditional twice a year and Adopt-A-highway cleanups are executed.	Contractors would invest in the required equipment to outsource this activity on a large scale. On-call agreements are in place for major events, which stipulate rental rates and operator wages.

Table 11. SCDOT workshop summary information (Continued).

DISTRICT	VEH/EQUIP MAINT	FEATURES INVEN	GENERAL
A	Approximately 15-30% of work is outsourced. Contractor response time would be a critical constraint to totally privatizing this activity.	Features inventories are good candidates for outsourcing because the activities are labor intensive.	Adequate inspection resources are required for outsourced contracts. SCDOT Procurement is not responding to requests in a timely manner. Partnering sessions may have the potential to improve communications between district personnel and the contractor. Personnel turnover impacts contract administration communications. Contracts should give the district more enforcement authority.
B	District personnel strongly believe this activity should, to the extent appropriate, be performed in-house. Equipment repair priorities need to be controlled by SCDOT.	Features inventories should be outsourced. Data acquisition for HMMS should be outsourced. HMMS daily data requirements are placing a burden on foremen.	Contracts for seasonal work need to be put in place well in advance of the seasonal work schedule. The concept of asset management would be very expensive to implement.
C	Some counties contract more work than others. Total outsourcing should be approached with caution. Diagnostic equipment and mechanic training is needed.	If or when HMMS is updated with more accurate information, the inventory work should be outsourced.	Interstate sweeping is appropriate for outsourcing. Driveway paving has been successfully let to contract. It may be appropriate to let contracts for all aspects of driveway installation, not just paving. Specifications for contracted work in some areas need to be improved. Imposing retainage in maintenance contracts may impress on contractors the need to fully comply with the specifications.
D	The district has the expertise to address all but special work.	Outsourcing future features inventory activities would permit central coordination with SCDOT data processing and insure single point data entry.	Activities that require SCDOT installed equipment or materials purchases may not be good candidates for outsourcing in that delay claims may result. Contractor availability should be carefully examined before expanding maintenance outsourcing. Some environmental compliance activities (SWP3 and SPCC for example) should be outsourced or transferred to other SCDOT entities.
E	All work is performed in-house except for major engine work, air conditioning, and tires. In-house work permits a faster response time. Some dealers appear to be more responsive to the private sector.	If additional features inventory information will be required, this activity should be let to outside contract. The SCDOT HMMS system is helpful to district personnel.	Equipment utilization regulations have required this district to turn in about one-half of its equipment fleet in the last 5 years. This has caused some problems, particularly the ability to respond to emergency situations, and the ability to pull less utilized equipment from a yard with a primary unit is down for repair. Bucket trucks, sweepers, and paving machines have been turned in but would have served a useful purpose had they been retained.
F	Some utilities in the state (Bell South) have successfully outsourced this activity and therefore outsourcing should be examined within SCDOT.	Future features inventories should perhaps be outsourced to insure statewide conformity. On the other hand, district personnel may do a better job.	A competitive wage rate must be paid not only to crane operators, but to motor grader and back hoe operators as well. SCDOT invests significant funds to train equipment operators and they will leave for private sector employment if not adequately compensated. This will result in "de-facto" outsourcing. Contractors should be required to perform pre-bid site visits to verify actually work quantities. Maintenance contracts should be let well in advance of the activity start dates to facilitate bids from contractors that do not include unrealistic contingency.
G	All except major work is performed in-house. The district is opposed to a wholesale outsourcing of this activity.	HMMS may require updating to better determine features locations. Some future features inventory activities could be outsourced, but it should be recognized that SCDOT could better perform this activity.	Training in the areas of work zone safety and equipment operation have been successfully outsourced. Pre-bid conferences are effective in improving contractor performance. The concepts of contract retainage and incentives have merit and should be investigated. Some contractors, cities, and utilities have not performed traffic control work to SCDOT expectations. As the district installs more electronic equipment, such as message boards and monitoring cameras, it may be cost effective to contract electronic equipment maintenance on an on-call basis.

Workshop Findings

The workshop findings are summarized in Table 11. There was a general agreement in these workshops that some activities, such as rest area maintenance, guard and cable rail maintenance, large-scale drainage projects, and thermoplastic markings are very appropriate for outsourcing. The desire to outsource some activities was based on limited personnel and equipment resources within the county facilities. For a number of activities the workshop participants believed that in-house forces provided superior work quality and/or a more rapid response to emergency situations and public demands.

As noted in Table 11, the decision to outsource a drainage-related activity depends on project magnitude. There is a need to address the adequacy of contract specifications as more drainage work is let to contract. It was also suggested by workshop participants to combine tree trimming contracts with mowing contracts. From the workshop input obtained with respect to mowing shown in Table 11, it can be concluded that mowing is an appropriate activity for outsourcing in that it places high seasonal demands on SCDOT forces. Again, some improvements in contract specifications are needed to more specifically define the contractor's obligations. Chip sealing is an activity which is extremely labor intensive. Several districts prefer to outsource this activity to free in-house forces. Most counties prefer to continue handling herbicide spraying; however, it was mentioned that this activity should be performed in conjunction with mowing. From Table 11, it appears that major painting and thermoplastic marking projects are appropriate for outsourcing, whereas minor painting and symbol marking projects are best performed in-house. Workshop participants cited full depth patching as an appropriate activity for outsourcing, but as more work is let to

contract, there may be an increasing need for additional inspector training. Nearly every district performs wildflower maintenance with in-house forces. However, the majority of each districts' personnel strongly believe this activity should be outsourced. As shown in Table 11, some districts have well trained and equipped bridge replacement crews, and those district personnel would prefer to retain those crews. There was some concern that certified crane operators would be leaving SCDOT for more lucrative employment in the private sector, thus impacting the district's ability to outsource this activity.

Workshop participants were also asked to make suggestions with respect to overall general improvements in the maintenance activity contracting process. As noted in the last column of Table 11, and in the section termed "General" in the district workshop notes, concerns were expressed with respect to equipment utilization policies, training, labor wage rates, the need for improved specifications and inspections, and a need for revised or streamlined procurement and contracting procedures. Additional suggestions obtained from the workshops included initiating a formal maintenance contractor prequalification system and modifications to current contracting procedures including the use of incentives and progress payment retainage.

Workshop participants were able to justify their preferences as to whether or not a given activity was appropriate for outsourcing. The factors that impact outsourcing in one district or county may or may not prevail elsewhere. It appears, therefore, that mandates suggesting or dictating outsourcing of some activities statewide would not be in the best interest of SCDOT or the public.

CHAPTER VI

CONTRACTOR SURVEY

As part of the maintenance outsourcing research project, describe herein, the Research Steering Committee decided it was important to gather survey input of maintenance contractors currently performing work for SCDOT. The objective of this survey was to gather insight as to what kinds of problems, or issues the maintenance contractors may be experiencing with respect to performing work for SCDOT. The Research Steering Committee developed a list of 60 contractors currently performing a significant amount of maintenance work across the state. A Contractor Survey (Appendix D) was drafted by the Clemson University Research Team, which was later approved by the SCDOT Research Committee. The survey was then forwarded to the selected contractors on July 20, 2005. Due to the limited number of responses, the SCDOT research committee began calling the contractors to help facilitate the process. A second attempt to obtain more feedback was made on September 15, 2005, when the contractor survey was again forwarded to those contractors who had not responded. The Clemson University Team, in order to improve the number of responses, then telephoned those contractors.

Contractor Survey Findings

The main goal of surveying contractors was to determine if there were any underlying issues with maintenance outsourcing from the contractors' perspectives. A total of 13 of the 60 contractors responded to the survey. Even with a limited number of

contractors responding, some insight could be gained as to what could be done to help improve the maintenance contracts. The data from the returned surveys is presented in Tables 12, 13, 14, and 15.

Table 12. Contractor current dollar volume of work and potential work volume.

	Service Provided By Contractor	Annual Dollar (\$) Volume, Current	Annual Dollar (\$) Volume, Potential
Contractor 1	Guard Rail or Cable Rail	5,000,000.00	15,000,000.00
Contractor 2	Guard Rail or Cable Rail	1,000,000.00	Unlimited
Contractor 3	Tree Trimming	250,000.00	400,000.00
	Mowing	1,450,000.00	1,800,000.00
	Guard Rail or Cable Rail	0.00	400,000.00
Contractor 4	Mowing	6,000,000.00	12,000,000.00
Contractor 5	Mowing	43,560.00	1,000,000.00
	Rest Area Maintenance	4,857,924.00	5,000,000.00
Contractor 6	Tree Trimming	1,000.00	-----
	Traffic Signals	5,000,000.00	-----
	Pavement Marking/Painting	1,000.00	-----
	Sign Replacement	2,000.00	-----
	Sidewalk Repair/Installation	1,000.00	-----
	Curb & Gutter repair	500.00	-----
Contractor 7	Traffic Signals	4,000,000.00	6,000,000.00
	Sign Replacement	500,000.00	6,000,000.00
Contractor 8	Full Depth Patching	100,000.00	250,000.00
	Bridge Replacement	500,000.00	10,000,000.00
Contractor 9	Drainage Structure Repair	250,000.00	1,000,000.00
	Full Depth Patching	2,000,000.00	3,000,000.00
	Snow/Ice Removal	10,000.00	1,000,000.00
	Sidewalk Repair/Installation	500,000.00	1,000,000.00
	Handicap Ramp Installation	250,000.00	750,000.00
	Curb & Gutter repair	500,000.00	900,000.00
Contractor 10	Bridge Replacement	5,000,000.00	13,000,000.00
Contractor 11	Pavement Marking/Painting	3,000,000.00	6,000,000.00
Contractor 12	Chip Sealing	200,000.00	400,000.00
	Full Depth Patching	1,000,000.00	2,000,000.00
Contractor 13	Chip Sealing	8,000,000.00	12,000,000.00
	Full Depth Patching	2,800,000.00	4,000,000.00

Using the Rating Scale: 1 = Definitely Not; 2 = Probably No; 3 = Neutral or Not Certain; 4 = Probably Yes; and 5 = Definitely Yes, contractors responded to statements relating to support of revised contracting procedures (Table 13)

Table 13. Contractor responses to support of revised contracting procedure statements.

Revised Contracting Procedure Statement	Average Rating	Standard Deviation
Prequalification based on company equipment resources, available personnel, financial strength, and SCDOT satisfaction (performance rating) with previous work.	4.46	1.2
A ten percent retainage, released upon satisfactory work completion.	2.00	1.5
Mandatory pre-bid site visits and mandatory pre-bid conference attendance.	3.54	1.3

Table 14. Contractor responses to maintenance outsourcing statements.

Agree/Disagree Statement	Average Rating	Standard Deviation
Contractors Provide work at lower or equal overall cost as compared to SCDOT execution with their in-house forces	4.1	1.8
Contractors provide higher work quality	4.2	1.1
Contractors provide work to a higher degree of public Satisfaction	4.3	1.2
Contractors have the technical expertise that is less likely to reside within SCDOT	4.2	0.8
Contractors are more likely to have the necessary specialized equipment	4.6	0.7
The SCDOT contractor selection and contract administration process is fair	3.6	1.0
SCDOT contracts and technical specification are clear and not ambiguous	3.3	1.0
SCDOT inspectors are reasonable and fair	3.4	1.2
More contracted Maintenance work would provide good public relations for SCDOT	4.3	1.1

Using the Rating Scale: 1 = Definitely Not; 2 = Probably Not; 3 = Neutral or Not; Certain; 4 = Probably Yes; and 5 = Definitely Yes, contractors responded to statements pertaining to maintenance outsourcing (Table 14). Table 15 is a summary of contractor general comments.

Table 15. Summary of contractor general comments.

	Contractor Comments
1.	Prequalification Process should be stringent enough to rule out companies not capable of meeting SCDOT's demands regarding schedule and quality.
2.	SCDOT Compliance office is responsible for a huge loss of effectiveness with the department.
3.	SCDOT contractor selection process should consist of a joint panel with contractors and SCDOT representatives that help give recommendations for what is or is not working.
4.	Inspectors need more training, noting that SCDOT is beginning to improve.
5.	Purchasing in Columbia is over worked, which delays PO's and as a result delays work.
6.	Most SCDOT service contracts have been awarded on a "Drop Dead" low bid basis. This has on occasion resulted in sub-standard performance due to lack of qualifications. A "Best Value" award, considering factors in addition to price will enhance SCDOT's probability of receiving exceptional performance.
7.	Need for detailed pay item list with consistency.
8.	Maintenance jobs let for bid at various times of the year make it difficult for a contractor to schedule crews and resources.
9.	SCDOT should have mandatory pre-bid meetings for contracts that have new or different bid items and sub-contractors should be penalized as severely as contractors for non-performance.
10.	SCDOT needs to advance employees based on experience, expertise and merit more than schooling, degrees earned, P.E's ect.
11.	Inspectors and districts have there own way of doing things, regardless of the specification. This inconsistency makes it difficult on field crews.
12.	Need for more properly trained inspectors.
13.	Continue to work on vague specifications though joint committee. Realization needs to be made that one size may not fit all.

An analysis of the contractor survey data clearly indicated that there seemed to be several patterns present. When contractors were questioned about the amount of work they currently perform, and how much they could perform in the future, they all agreed they could significantly perform more work (Table 12). However, is this possible, or are contractors being over optimistic? Most contractors even felt they could almost double their current workload.

When asked if they would support several different kinds of contracting procedures, contractors favored prequalification procedures (Table 13). Currently SCDOT does not pre-qualify maintenance contractors, but does pre-qualify contractors for construction operations. SCDOT and the contractors recognized the need to sort out the poor performance contractors from the good contractors. Contractors also seem to favor the idea of taking part in mandatory pre-bid visits and pre-bid conferences. Contractors were not, however, in favor of withholding 10% of the contracted amount as retainage (Table 13).

As shown in Table 14, contractors were asked to respond to several statements concerning maintenance outsourcing. Contractors “somewhat agreed” to the majority of the statements. They strongly agree that contractors are more likely to have the necessary specialized equipment. This seems to be one of the more common reasons that state agencies are choosing to outsource maintenance activities. This finding concurs with the previous findings in the literature review. It is apparent some contractors do not feel SCDOT contracts and technical specifications are clear and not ambiguous (Table 14). This finding was also noted at district workshop meetings. There seems to be a need for clearer contracts or even uniform specifications state wide. For the most part, contractors

found inspectors to be reasonable and fair, although it was noted during district workshops that seasonal demand puts pressure on inspector workloads.

Un-sourced Maintenance Activities

Contractors were presented with different maintenance activities that are currently not being outsourced, and asked if they would be interested in performing this work. The 13 contractors responding to the survey made it clear they were not interested in performing any of the following maintenance activities:

1. Pothole Patching
2. Roadway Edge Patching
3. Machining Earth Roads
4. Shoulder Repair (High or Low)
5. Ditch Cleaning (Roadside)
6. Ditch Cleaning (Outfall)
7. Pipe Installation (For Drive Entrance)
8. Drive Entrance Paving
9. Litter Control (Dead Animal Removal)

CHAPTER VII

CONCLUSIONS

State departments of transportation throughout the US have recognized the need to better administer the maintenance outsourcing process. The literature review conducted as part of this research project revealed that outsourcing highway maintenance activities can, depending on prevailing circumstances, be justified on the basis of anticipated or proven cost savings, some unique technical expertise of the contractor, limited agency resources, and other factors. A survey of other states conducted as part of this research, indicated that the primary driving forces for outsourcing maintenance activities in other states were lack of agency equipment or expertise, and a recently expanded maintenance workload. However, the literature also cited numerous examples of less than positive maintenance outsourcing experiences in other states. In some cases anticipated cost savings were not attained, litigation issues arose, and pilot programs were cancelled.

Cost Data Analysis

The primary objective of this research project was to examine the cost of performing maintenance activities with SCDOT forces as opposed to performing them through outsourcing or external contract. It can be concluded from an analysis of available cost data that SCDOT can, in fact, compete with contractors on the basis of unit installed cost for maintenance activities in such categories as drainage pipe installation, mowing, chip sealing, sign installation, and full depth patching. For some maintenance

activities the available cost data reflected much higher unit costs for either in-house or outsourced projects. This was due to the fact that the magnitude or scope of work for the projects in the two categories were dissimilar. For example, drainage structure projects that are let to contract are much more complex, and in-house pavement striping tends to be small template marking projects with minimal linear feet of cost reporting measurement. SCDOT raised pavement marking projects were mostly smaller marking replacement projects which tend to have higher costs per installed marker.

Some maintenance activities included in the scope of the research could not be compared on a cost basis because those activities have historically been exclusively let to contract and not performed by SCDOT forces. Cable rail maintenance and rest area maintenance are two such examples.

Non-Cost Related Decision Factors

A secondary objective of this research project was to examine a number of critical non-cost related decision factors. These factors included

1. SCDOT personnel and equipment availability.
2. The unique expertise of contracting firms.
3. The ability of the contractor to provide quality work.
4. Contract administration issues.

These decision factors were explored primarily through workshops that were conducted in the seven SCDOT district offices. Professional personnel attending these workshops expressed uniform and strong opinions emphasizing the unique environment within each district and county, and the importance of retaining autonomy with respect to outsourcing

decisions at the local level. Workshop participants agreed that cable rail maintenance and rest area maintenance should remain totally outsourced. Mowing, chip sealing, tree trimming, herbicide treatment, and bridge replacement activities should be performed either in-house or through external contract depending on maintenance work loads, availability of SCDOT personnel and equipment, availability of local contractor personnel and equipment, and the ability of local contractors to execute work acceptable to SCDOT. SCDOT maintenance professionals are, therefore, with apparent justification, strongly opposed to statewide mandates for maintenance outsourcing in any maintenance category areas other than rest area maintenance and cable rail maintenance.

A number of other important issues surfaced as part of the district workshop sessions. Equipment utilization polices have in some cases impacted the ability to perform maintenance activities that could and should be performed by SCDOT forces. It was also uniformly suggested that the SCDOT procurement office respond in a more timely manner to field requests. Numerous other suggestions were documented, including the need for improved or revised (to reflect performance) specifications and improved contacting procedures. Suggestions for improved contracting procedures included requirements for maintenance contractor prequalification, contract retainage, and mandatory pre-bid site visits.

Contractors

A third research objective was to determine to what extent contractors would be capable of undertaking additional work, and to obtain their perceptions for improving the maintenance outsourcing process. Limited conclusions could be ascertained from the

limited survey response, but it appears that the contractors agree to many suggested improvements, including mandatory pre-bid inspections and a prequalification process. As suspected, contractors are opposed to contract retainage.

APPENDICES

Appendix AState DOT Survey Instrument**MAINTENANCE OUTSOURCING QUESTIONNAIRE**

South Carolina Department of Transportation

INTRODUCTION

The South Carolina Department of Transportation (SCDOT) currently uses a combination of in-house forces and contracts with outside firms (“outsourcing”) to perform maintenance activities. SCDOT has initiated a research project with the Department of Civil Engineering, Clemson University, to examine the relative benefits and constraints associated with a maintenance outsourcing strategy.

As part of this research project, SCDOT is distributing the brief questionnaire survey that appears below. All responses to this questionnaire will remain confidential. Persons completing the questionnaire will receive a summary of all questionnaire responses. The summary will not identify the agencies providing questionnaire data by name.

Responses can be mailed or emailed to either Terry Swygert at SCDOT, or Dr. Lansford Bell at Clemson University. Contact Dr. Bell if you have questions related to survey execution.

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Appendix A

State DOT Survey Instrument (continued)

SURVEY QUESTIONNAIRE

1. Please complete the following table with the appropriate information. Check all the activities or which you have or have had significant experience. For each activity checked, please list the percent of work outsourced and for the activities checked, provide a “satisfaction rating” or each category. Rate the activities on a 1-5 scale where, 1=numerous problems, 3=acceptable experience, 5=very favorable experience

Activities	Amount of Work Outsourced %	(1-5) Rating Scale		
		Cost Effectiveness	Contractor Quality	Safety
Mowing				
Guardrail Maintenance				
Cable Rail Maintenance				
Chip Sealing				
Pavement Striping				
Catch Basin Repairs				
Sidewalk Repair				
Sweeping - Streets, Bridges				
Fence Repair				
Tree Removal				
Rest & Welcome Area Operations and Maintenance				
Signal Installation				
Sign Lighting				
Wildflower Planting and Maintenance				
Vehicle and Equipment Shop Maintenance				
Crack Sealing				
Pot Hole Patching				
Grade and Repair Shoulders and Ditches				
Sign Maintenance/Sign Management				
Roadside Features Inventory For Maintenance Management or Other System				

Appendix A

State DOT Survey Instrument (continued)

1. (Cont.) Rate the activities on a 1-5 scale where, 1=numerous problems, 3=acceptable experience, 5=very favorable experience.

Activities	(1-5) Rating Scale				
	Public Criticism	Oversight Expenses	Contractor Resources	Response Time	Overall Rating
Mowing					
Guardrail Maintenance					
Cable Rail Maintenance					
Chip Sealing					
Pavement Striping					
Catch Basin Repairs					
Sidewalk Repair					
Sweeping - Streets, Bridges					
Fence Repair					
Tree Removal					
Rest & Welcome Area Operations and Maintenance					
Signal Installation					
Sign Lighting					
Wildflower Planting and Maintenance					
Vehicle and Equipment Shop Maintenance					
Crack Sealing					
Pot Hole Patching					
Grade and Repair Shoulders and Ditches					
Sign Maintenance/ Sign Management					
Roadside Features Inventory For Maintenance Management or Other System					

Appendix A

State DOT Survey Instrument (continued)

2. Rate your “overall” experience with outsourcing maintenance activities on the same 1-5 rating scale.
1=Numerous Problems, 3=Acceptable experience, 5=Very favorable experience.

Rating: _____

3. Please check your reason(s) for initiating maintenance outsourcing.

- DOT downsizing or retirements
- Political mandate or politically mandated budget restrictions
- Anticipation of cost savings
- Lack of equipment within DOT
- Lack of unique expertise within DOT
- Expansion of maintenance workload

Other: _____

Comments: _____

4. Have any outsourcing activities been discontinued where the DOT resumes responsibility? If so, please explain the reason why the activity was discontinued.

- 5a. Has there been any cost savings or cost escalations which have resulted from outsourced work and have they been simply estimated or quantified? Please be specific listing individual activities.

Appendix A

State DOT Survey Instrument (continued)

5b. Could you provide internal reports or other documents (which will remain confidential) addressing this cost issue if we contact you at a later date?

Y/N _____

6. Were cost analysis reports prepared prior to initiating outsourcing? Did they prove to be accurate?

7. Has performance based contracting (results and/or long term performance contractually stated as opposed to methods) been utilized, if so to what extent, and has it proven to be successful? Please be specific stating the activities for which performance based contracting has been used.

8. Do you currently employ any contractually stipulated incentives/disincentives with any of your outsourced maintenance activities? If so, please list the activity, type of incentive or disincentive used with the activity.

Appendix AState DOT Survey Instrument (continued)

9. Please provide the following information:

NAME: _____

TITLE: _____

TELEPHONE NUMBER: _____

E-MAIL ADDRESS: _____

10. Could we contact you by phone or e-mail for further information? _____

11. Would you be willing to host a half-day meeting at your facility to explore your maintenance outsourcing experiences with Clemson University researchers and personnel from the South Carolina Department of Transportation?

Y/N_____

12. Do you have internal publications or contract forms related to Maintenance Outsourcing that you would be willing to share with the South Carolina Department of Transportation?

Y/N_____

Appendix BSCDOT COST DATA

Cost data for in-house maintenance activities is captured in the SCDOT Highway Maintenance Management System (HMMS).

Cost data for outsourced contracts resides within both the SCDOT Procurement Department (contracts less than \$50,000) and the SCDOT Construction Office (contracts more than \$50,000).

Table B-1. SCDOT HMMS cost data for work performed in-house.

HMMS (Work Performed In-House) Fiscal Year: July03 - June04							
Activity Description	Amount	UOM	Labor (\$)	Equipment (\$)	Material (\$)	Total (\$)	Unit Cost (\$)
Bridge Replacement	40467.631	SQFT	917,055.00	996,557.00	3,488,242.00	5,401,854.00	133.49
Chip Sealing	14,749,648.00	SY	1,007,752.00	881,332.00	2,738,877.00	4,627,961.00	0.31
Crack Sealing	42.67	LN MI	59,272.00	27,131.00	12,503.00	98,906.00	2,318.09
Drainage Slopes	44,495.41	SQ YDS	182,260.00	157,990.00	61,810.00	402,060.00	9.04
Shoulders/Ditches	45,186,097.25	LF	9,762,877.00	9,693,128.00	444,121.00	19,890,126.00	0.44
Drainage Structures	4,231.46	EACH	877,166.00	816,462.00	388,408.00	2,182,036.00	515.67
Drainage Pipe	68,859.38	LF	1,028,972.00	947,908.00	717,613.00	2,694,493.00	39.13
Full Depth Patching	175,488.86	SQ YDS	1,433,848.00	1,402,097.00	1,572,679.00	4,408,624.00	25.12
Guardrail Maintenance	23,397.11	LF	190,759.00	151,566.00	472,219.00	814,544.00	34.81
Installing Fence	3,454.00	LF	11,620.00	6,355.00	5,338.00	23,313.00	6.75
Mowing	289,198.59	ACRES	2,938,352.00	3,900,938.00	0.00	6,839,290.00	23.65
Pavement Striping	50,257,617.09	LF	543,171.00	426,513.00	8,545,308.00	9,514,992.00	0.19
Pot Hole Patching	43,867.82	TONS	4,562,690.00	2,947,298.00	1,977,358.00	9,487,345.00	216.27
Raised Pavement Markers	6,167.00	EACH	31,359.00	11,912.00	63,275.00	106,546.00	17.28
Tree Trimming	6,120.61	SH MI	656,242.00	576,845.00	0.00	1,233,087.00	201.46
Side Walk Repair	85,736.24	LF	192,905.00	134,179.00	41,296.00	368,380.00	4.30
Sign Installation	35,736.00	EACH	626,537.00	276,721.00	0.00	903,258.00	25.28
Sweeping Bridges	31,207.10	PHOURS	497,659.00	290,006.00	6,597.00	794,262.00	25.45
Sweeping Streets	35,760.95	MILES	292,260.00	273,102.00	0.00	535,362.00	14.97
Traffic Signal	19,771.10	EACH	1,270,050.00	715,766.00	395,473.00	2,381,289.00	120.44
Tree Removal	71,454.04	EACH	2,103,699.00	1,380,345.00	0.00	3,484,044.00	48.76
Vehicle and Equipment/Maint.	279,159.07	PHOURS	5,169,687.00	886,759.00	0.00	6,056,446.00	21.70
Wildflower planting	448.82	ACRES	40,664.00	30,330.00	16,241.00	87,235.00	194.37

Table B-1. SCDOT HMMS cost data for work performed in-house (continued).

HMMS (Work Performed In-House) Fiscal Year: July04-June05							
Activity Description	Amount	UOM	Labor (\$)	Equipment (\$)	Material (\$)	Total (\$)	Unit Cost (\$)
Bridge Replacement	5781.32	SQFT	975,770.00	1,024,486.00	3,114,641.00	5114897	88.83
Chip Sealing	2,859,018.00	SY	267,503.00	203,304.00	947,151.00	1,417,958.00	0.50
Crack Sealing	58.16	LN MI	18,998.00	10,426.00	1,059.00	30,483.00	524.12
Drainage Slopes	82,515.15	SQ YDS	245,872.00	218,733.00	77,679.00	542,284.00	6.57
Shoulders/Ditches	2,709,623.27	SQ YDS	1,787,523.00	1,488,457.00	221,011.00	3,496,991.00	1.29
Drainage Structures	3,587.00	EACH	1,114,476.00	859,806.00	264,160.00	2,238,442.00	624.04
Drainage Pipe	59,011.14	LF	1,079,520.00	913,296.00	465,455.00	2,458,271.00	41.66
Full Depth Patching	151,082.92	SQ YDS	1,751,772.00	1,559,889.00	1,608,215.00	4,919,876.00	32.56
Guardrail Maintenance	20,840.02	LF	185,554.00	125,011.00	526,140.00	836,707.00	40.15
Installing Fence	3,505.00	LF	12,346.00	5,861.00	5,271.00	23,478.00	6.70
Mowing	230,581.29	ACRES	2,344,846.00	2,867,168.00	-----	5,212,014.00	22.60
Pavement Striping	49,983,835.70	LF	533,286.00	377,248.00	4,113,926.00	5,024,460.00	0.10
Pot Hole Patching	38,517.25	TONS	5,283,428.00	3,097,122.00	1,697,034.00	10,077,584.00	261.64
Raised Pavement Markers	2,762.00	EACH	36,145.00	14,744.00	19,260.00	70,149.00	25.40
Tree Trimming	9,120.27	SH MI	959,084.00	819,177.00	-----	1,778,261.00	194.98
Side Walk Repair	144,167.25	LF	219,716.00	140,771.00	46,521.00	407,008.00	2.82
Sign Installation	34,747.00	EACH	633,691.00	289,430.00	0.00	923,121.00	26.57
Sweeping Bridges	33,009.88	PHOURS	575,658.00	319,242.00	3,002.00	897,902.00	27.20
Sweeping Streets	40,186.03	Miles	595,000.00	492,887.00	0.00	1,087,887.00	27.07
Traffic Signal	16,351.00	EACH	1,228,138.00	620,830.00	323,574.00	2,172,542.00	132.87
Tree Removal	56,512.01	EACH	2,885,632.00	1,807,279.00	0.00	4,692,911.00	83.04
Vehicle and Equipment/Maintenance	305,679.95	PHOURS	5,977,657.00	842,559.00	0.00	6,820,216.00	22.31
Wildflower planting	751.35	ACRES	49,370.00	37,521.00	68,618.00	155,509.00	206.97

Table B-2. SCDOT procurement cost data.

Procurement Handled Maintenance Activities						
Maintenance Activity	Contract #	Vendor Name	Amount	UOM	Unit Price (\$)	Total Amount (\$)
Install Drainage Pipe	13201-322014		250	LF	39.04	9,760.00
Install Drainage Pipe	70901-321399		64	LF	7.53	482.00
		Total	314	LF		10,242
				Average	32.62	Per LF
Drainage Structure Catch Basin Type 16	A00008888	Lawrence Construction Services	22	EACH	2,800.00	61,600.00
Drainage Structure Catch Basin Type 17	A00008888	Lawrence Construction Services	16	EACH	3,200.00	51,200.00
Drainage Structure Catch Basin Type 18	A00008888	Lawrence Construction Services	14	EACH	3,800.00	53,200.00
Drainage Structure Catch Basin Type 16	A00008888	Lawrence Construction Services	20	EACH	2,000.00	40,000.00
Drainage Structure Catch Basin Type 17	A00008888	Lawrence Construction Services	13	EACH	2,500.00	32,500.00
Drainage Structure Catch Basin Type 18	A00008889	Lawrence Construction Services	15	EACH	3,000.00	45,000.00
Drainage Structure Catch Basin Type 16	61001-321982		1	EACH	2,170.00	2,170.00
Drainage Structure Catch Basin Type 17	61001-321982		16	EACH	2,268.00	36,288.00
Drainage Structure Catch Basin Type 16	14001-321464		29	EACH	1,715.00	49,735.00
		Total	146	EACH	-	371,693.00
				Average	2,545.84	Each
Steel Beam Guardrail Rad	A00008809	Renolds Fence & Guardrail Inc.	50	LF	16.00	800.00
Steel Beam Guardrail Thrie Radius	A00008809	Renolds Fence & Guardrail Inc.	50	LF	28.00	1,400.00
Steel Beam Guardrail Add length	A00008809	Renolds Fence & Guardrail Inc.	100	LF	6.00	600.00
Steel Beam Guardrail Removal	A00008809	Renolds Fence & Guardrail Inc.	3,000	LF	1.00	3,000.00
Steel Beam Guardrail	A00008809	Renolds Fence & Guardrail Inc.	3,500	LF	15.00	52,500.00
Steel Beam Guardrail Thri	A00008809	Renolds Fence & Guardrail Inc.	500	LF	35.00	17,500.00
Steel Beam Critical Thrie Beam	A00008809	Renolds Fence & Guardrail Inc.	100	LF	65.00	6,500.00
		Total	7,300	LF	-	82,300.00
				Average	\$11.27	Per LF

Table B-2. SCDOT procurement cost data (continued).

Procurement Handled Maintenance Activities						
Maintenance Activity	Contract #	Vendor Name	Amount	UOM	Unit Price (\$)	Total Amount (\$)
Mowing (Interstate)	A00009204C	Schultz Farm	2,626.00	Acre	33.00	86,658.00
Mowing (Ditch)	A00009204C	Schultz Farm	4.30	Acre	50.00	215.00
Mowing (Secondary)	A00009204G	Carolina Gleaners	8,048.50	Acre	21.88	176,101.18
Mowing (Primary)	A00009204I	Carolina Gleaners	1,507.70	Acre	21.88	32,988.48
Mowing (Secondary)	A00009204I	Carolina Gleaners	4,192.15	Acre	21.88	91,724.24
Mowing (Ditch)	A00009280A	Netmoco Inc.	291.00	Acre	86.43	25,151.13
Mowing (Ditch)	A00009280B	Netmoco Inc.	300.00	Acre	20.22	6,066.00
Mowing	A00009280C	Netmoco Inc.	813.39	Acre	17.03	13,852.03
Mowing (Ditch)	A00009280D	Netmoco Inc.	291.00	Acre	21.85	6,358.35
Mowing (Primary)	A00009029	Dixie Lawn Service	202.54	Acre	23.75	4,810.33
		Total	18,277	Acre	-	443,924.73
				Average	24.29	Per Acre
Pavement Striping	A00008856	Oglesby Construction Inc.	1,849,881.00	LF	0.033	61,046.07
Pavement Striping	A00008856	Oglesby Construction Inc.	89,437.00	LF	0.033	2,951.42
Pavement Striping	A00008856	Oglesby Construction Inc.	2,731,600.00	LF	0.031	84,679.60
Pavement Striping	A00008856	Oglesby Construction Inc.	64,033.00	LF	0.067	4,290.21
Pavement Striping	A00008857	Interstate Road Marking Corp.	2,950,175.00	LF	0.035	102,961.11
Pavement Striping	A00008857	Interstate Road Marking Corp.	360,265.00	LF	0.035	12,573.25
Pavement Striping	A00008861	Interstate Road Marking Corp.	146,179,095.20	LF	0.029	4,224,575.85
		Total	154,224,486.00	LF	-	4,493,077.51
				Average	0.029	Per LF
Sign Lighting	A00008961B	Wolff and Sons Electric Inc.	1.00	Year	130,120.110	130,120.11
		Total	1.00	Year	-	130,120.11
				Average	130,120.110	Per Year

Table B-2. SCDOT procurement cost data (continued).

Procurement Handled Maintenance Activities						
Maintenance Activity	Contract #	Vendor Name	Amount	UOM	Unit Price (\$)	Total Amount (\$)
Bridge Sweeping Abbeville	A00008830	Carolina Pavement Cleaning Svc.	13,812.00	LF	0.40	5,524.80
Bridge Sweeping EdgeField	A00008831	Carolina Pavement Cleaning Svc.	6,326.00	LF	0.40	2,530.40
Bridge Sweeping Greenwood	A00008832	Carolina Pavement Cleaning Svc.	13,358.00	LF	0.40	5,343.20
Bridge Sweeping Laurens	A00008833	Carolina Pavement Cleaning Svc.	40,023.00	LF	0.40	16,009.20
Bridge Sweeping McCormick	A00008834	Carolina Pavement Cleaning Svc.	14,008.00	LF	0.40	5,603.20
Bridge Sweeping Newberry	A00008835	Carolina Pavement Cleaning Svc.	27,206.00	LF	0.40	10,882.40
Bridge Sweeping Saluda	A00008836	Carolina Pavement Cleaning Svc.	9,410.00	LF	0.40	3,764.00
		Total	124,143.00	LF	-	49,657.20
				Average	0.40	Per LF
Tree Trimming	A00009204C	Schultz Farm	40.90	Mile	450.00	18,405.00
Tree Trimming	A00009204G	Carolina Gleaners	10.00	Mile	1,425.00	14,250.00
Tree Trimming	A00009280A	Netmoco Inc.	35.66	Mile	855.00	30,489.30
Tree Trimming	A00009280B	Netmoco Inc.	5.00	Mile	855.00	4,275.00
Tree Trimming	A00009280C	Netmoco Inc.	23.08	Mile	863.40	19,927.27
Tree Trimming	A00009188G	Dixie Lawn Service	10.00	Mile	410.00	4,100.00
		Total	124.64	Mile	-	91,446.57
				Average	733.69	Per Mile
Wild Flower (Excluding Seed)	A00220684	Shultz Farm	44.58	Acre	1,074.821	47,915.50
		Total	44.58	Acre	1,074.821	47,915.50
				Average	1,074.821	Per Acre

Table B-3. SCDOT Construction Office cost data.

Maintenance Activities Handled By Construction Office							
Maintenance Activity	Lead File	Letting Date	Vendor Name	Quantity	UOM	Unit Price (\$)	Total Amount (\$)
Chip Seal	2.22032	July 8,2003	J.S. Myers Co. Inc.	733,360.00	SY	0.55	401,912.21
Chip Seal	4.22031	July 8,2003	F & R Asphalt Inc.	47,185.60	SY	1.67	78,672.00
Chip Seal	42.22031	July 15,2003	Carnes South Carolina Inc.	153,401.00	SY	0.51	77,632.48
Chip Seal	8.22031	July 15,2003	Carnes South Carolina Inc.	407,616.01	SY	2.12	863,337.41
Chip Seal	32.22033	Sept. 9,2003	Carnes South Carolina Inc.	777,484.00	SY	0.61	473,714.71
Chip Seal	32.22034	Sept. 9,2003	Carnes South Carolina Inc.	799,373.53	SY	0.75	602,145.21
Chip Seal	26.22041	Nov. 11, 2003	APAC, Altantic Inc.	41,268.00	SY	2.03	83,636.48
Chip Seal	37.22032	Nov. 11, 2003	Carnes South Carolina Inc.	670,127.00	SY	1.30	872,429.16
Chip Seal	1.22041	March 9,2004	Carnes South Carolina Inc.	2,076,002.38	SY	0.53	1,104,265.20
Chip Seal	19.22041	April 13,2004	J.S. Myers Co. Inc.	2,073,326.98	SY	0.52	1,083,070.84
Chip Seal	23.22041	April 13,2004	J.S. Myers Co. Inc.	402,089.67	SY	1.67	672,556.31
			Total	8,181,234.16	SY	-	6,313,372.01
					Average	0.77	Per SY
Crack Seal	07.7805.01	Aug 10,2004	Slurry Pavers	68,950.00	LB	1.86	128,251.50
Crack Seal	28.7805.01	Aug 10,2004	Gordon Co.Pavement	152,985.00	LB	1.08	164,563.79
Crack Seal	32.7805.02	Aug 10,2004	Gordon Co. Pavement	105,228.00	LB	1.40	147,319.20
Crack Seal	32.7805.01	Aug 10,2004	Gordon Co. Pavement	150,000.00	LB	1.49	223,500.00
			Total	477,163.00	LB		663,634.49
					Average	1.39	Per LB
Full Depth Patching	2.29039	Sept. 9,2003	C.R. Jackson, Inc.	44,321.00	SY	33.00	1,462,653.00
Full Depth Patching	28.29039	Sept. 9,2003	APAC, Altantic Inc.	24,895.00	SY	34.08	848,314.94
Full Depth Patching	1.29039	Sept. 9,2003	Satterfield Const. Co.	21,102.00	SY	31.21	658,686.25
Full Depth Patching	19.29039	Sept. 9,2003	Satterfield Const. Co.	23,467.00	SY	37.44	878,649.02
Full Depth Patching	4.29039	Sept. 9,2003	Ashmore Brothers, Inc.	48,399.00	SY	20.46	990,396.81

Table B-3. SCDOT Construction Office cost data (continued).

Maintenance Activities Handled By Construction Office							
Maintenance Activity	Lead File	Letting Date	Vendor Name	Quantity	UOM	Unit Price (\$)	Total Amount (\$)
Full Depth Patching	11.29039	Sept. 9,2003	F & R Asphalt Inc.	25,600.00	SY	33.50	857,513.25
Full Depth Patching	13.39039	Sept. 9,2003	Boggs Paving	29,800.00	SY	33.70	1,004,302.40
Full Depth Patching	16.29039	Sept. 9,2003	Palmetto Paving Corp.	23,540.65	SY	38.30	901,629.34
Full Depth Patching	22.29039	Sept. 9,2003	Palmetto Paving Corp.	28,436.30	SY	35.85	1,019,358.49
Full Depth Patching	7.29039	Sept. 9,2003	Banks Const. Co.	17,700.00	SY	34.61	612,532.75
Full Depth Patching	8.29039	Sept. 9,2003	Banks Const. Co.	26,900.00	SY	32.55	875,585.01
Full Depth Patching	14.29039	Dec. 9,2003	APAC, Altantic Inc.	7,300.00	SY	44.76	326,725.95
Full Depth Patching	1.69051	April 13,2004	Satterfield Const. Co.	23,618.00	SY	33.80	798,236.62
Full Depth Patching	1.69041	April 13,2004	Satterfield Const. Co.	11,599.88	SY	32.04	406,856.20
Full Depth Patching	4.69041	Apr. 13,2004	Ashmore Brothers, Inc.	12,700.00	SY	25.26	346,100.35
Full Depth Patching	23.69041	Apr. 13,2004	Ashmore Brothers, Inc.	12,350.00	SY	19.26	304,272.50
Full Depth Patching	11.69041	Apr. 13,2004	F & R Asphalt Inc.	13,700.00	SY	25.42	495,440.00
Full Depth Patching	13.69041	Apr. 13,2004	LCI-Lineberger Const.,Inc.	15,775.00	SY	30.46	520,878.00
Full Depth Patching	16.69041	Apr. 13,2004	Palmetto Paving Corp.	19,436.00	SY	51.81	735,681.50
Full Depth Patching	22.69041	Apr. 13,2004	APAC, Altantic Inc.	16,759.00	SY	23.24	682,497.95
Full Depth Patching	4.69051	May. 11,2004	F & R Asphalt Inc.	12,700.00	SY	23.38	296,900.00
Full Depth Patching	23.69051	May. 11,2004	F & R Asphalt Inc.	12,350.00	SY	28.52	352,216.29
Full Depth Patching	11.69051	May. 11,2004	Boggs Paving	13,700.00	SY	35.15	481,526.50
Full Depth Patching	13.69051	May. 11,2004	Boggs Paving	15,800.00	SY	36.62	578,674.72
Full Depth Patching	16.69051	May. 11,2004	Palmetto Paving Corp.	19,488.00	SY	36.58	712,915.90
Full Depth Patching	22.69051	May. 11,2004	Southern Asphalt, Inc.	17,098.00	SY	36.15	618,163.00
Full Depth Patching	14.69051	May. 11,2004	APAC, Altantic Inc.	14,200.00	SY	33.81	480,154.50
Full Depth Patching	3.69051	May. 11,2004	Banks Const. Co.	29,367.00	SY	37.80	1,110,116.57
			Total	582,101.83	SY	-	19,356,977.81
					Average	33.25	Per SY

Table B-3. SCDOT Construction Office cost data (continued).

Maintenance Activities Handled By Construction Office							
Maintenance Activity	Lead File	Letting Date	Vendor Name	Quantity	UOM	Unit Price (\$)	Total Amount (\$)
Remove & Install Guardrail	4751.122	July 8,2003	Bagwell Fence Co.	22,000.00	LF	11.50	253,000.00
Remove & Install Guardrail	4752.122	July 8,2003	Bagwell Fence Co.	12,000.00	LF	11.50	138,000.00
Remove & Install Guardrail	4753.121	July 8,2003	Bagwell Fence Co.	33,803.00	LF	11.50	388,734.50
Remove & Install Guardrail	4754.121	July 8,2003	Reynolds Fence & Guardrail	1,640.62	LF	32.00	52,499.94
Remove & Install Guardrail	4751.13	July13, 2004	Bagwell Fence Co.	23,026.00	LF	11.35	261,345.10
Remove & Install Guardrail	4752.128	July13, 2004	Bagwell Fence Co.	16,000.00	LF	12.10	193,600.00
Remove & Install Guardrail	4753.129	July13, 2004	Bagwell Fence Co.	62,672.00	LF	11.35	711,327.20
Remove & Install Guardrail	4754.128	July13, 2004	Bagwell Fence Co.	17,500.00	LF	13.60	238,000.00
Remove & Install Guardrail	4755.126	July13, 2004	Bagwell Fence Co.	10,190.48	LF	12.60	128,400.05
Remove & Install Guardrail	4756.125	July13, 2004	Bagwell Fence Co.	5,638.00	LF	12.10	68,219.80
Remove & Install Guardrail	4757.125	July13, 2004	Bagwell Fence Co.	4,993.00	LF	11.10	55,422.30
			Total	209,463.10	LF	-	2,488,548.88
					Average	11.88	Per LF
Raised Pavement Markers	2.22032	July 8,2003	J.S. Myers Co. Inc.	4,175.00	EACH	3.70	15,447.50
Raised Pavement Markers	4.22031	July 8,2003	F & R Asphalt Inc.	510.00	EACH	4.50	2,295.00
Raised Pavement Markers	32.22033	Sept. 9,2003	Carnes South Carolina Inc.	4,462.00	EACH	3.00	13,386.00
Raised Pavement Markers	32.22034	Sept. 9,2004	Carnes South Carolina Inc.	4,638.00	EACH	3.00	13,914.00
Raised Pavement Markers	37.22032	Nov. 11, 2003	Carnes South Carolina Inc.	6,660.00	EACH	3.00	19,980.00
Raised Pavement Markers	23.22041	April 13,2004	J.S. Myers Co. Inc.	6,091.00	EACH	3.50	21,318.50
Raised Pavement Markers	4751.528b	Apr. 13,2004	Roadmark Corporation	66,000.00	EACH	2.68	176,980.00
Raised Pavement Markers	4752.118b	Apr. 13,2004	The Barbour Company	618,000.00	EACH	2.57	1,587,800.00
Raised Pavement Markers	4753.127b	Apr. 13,2004	Saleem Lawn Services	46,200.00	EACH	2.78	128,506.00
Raised Pavement Markers	4754.126b	Apr. 13,2004	The Barbour Company	72,600.00	EACH	2.57	186,460.00
			Total	829,336.00	EACH	-	2,166,087.00
					Average	2.61	Each

Table B-3. SCDOT Construction Office cost data (continued).

Maintenance Activities Handled By Construction Office							
Maintenance Activity	Lead File	Letting Date	Vendor Name	Quantity	UOM	Unit Price (\$)	Total Amount (\$)
Pavement Striping	39.20021	July 8,2003	Oglesby Construction, Inc.	4,264,956.00	LF	0.028	121,170.45
Pavement Striping	13.20031	July 8,2003	Peek Pavement Marking Inc.	4,707,895.00	LF	0.030	139,583.42
Pavement Striping	46.20031	July 8,2003	Peek Pavement Marking Inc.	3,277,451.00	LF	0.030	96,832.71
Pavement Striping	7.20031	July 15,2003	Interstate Road Management	11,285,986.20	LF	0.029	323,799.13
			Total	23,536,288.20	LF	-	681,385.71
					Average	0.029	Per LF

Appendix C

District Workshop Meeting Notes

WORKSHOP NOTES: DISTRICT “A”

DRAINAGE

The decision to perform drainage work by contract is generally dictated by the magnitude of the project. Contracts have been let, with reasonable cost and acceptable performance, in the areas of basin repair, basin conversions and cleaning, confined space inspections, and pipe cleaning.

TREE TRIMMING

Tree trimming has recently been combined with the mowing activity with good results. Tree trimming contracts previously utilized an hourly compensation for the contractor which is not preferred. There are issues with respect to the how contracts should be issued for trimming including a guaranteed minimum amount of work for the contractor. For example, a contractor may receive compensation for one mile of work as a minimum when the actual amount of work is less. Contractors justify the minimum on the basis of a claim that traffic control is included in the tree trimming pay item.

MOWING

The decision as to whether or not to contract mowing may be county specific, based on the work load. Larger counties may prefer contracting, whereas small counties may not. Available equipment and manpower are important issues. One county has had good experience contracting Interstate mowing and now plans to contract all mowing activities. A disadvantage of contracting mowing is the fact that contractors do not have “ownership” – for example it is not their signs that are damaged when the activity is not performed correctly. It takes time for a contractor to become familiar with the unique mowing requirements of a given section of roadway. As mowing (and other) contract specifications change, it will take time for the contracting parties to adjust to those changes. Mowing effectiveness is impacted by operator expertise. To enable the outsourcing contractor to retain experienced mowing operators, it is suggested that SCDOT attempt to give that contractor year round work to retain its qualified personnel. Mowing contract specifications are evolving and problems experienced previously are being addressed. Mowing contracts are now let for a two-year period of time – the district would like to dismiss one or more contractors when the current contract expires. The overall workload within the district dictates that mowing be let to contract in the future. There are differing opinions within the district as to whether mowing should be compensated by shoulder mile or acre – there are disadvantages to both specifications.

Appendix C

District Workshop Meeting Notes (Continued)

CHIP SEALING

As stated below, the keys to successfully outsourcing any activity are adequate inspection and specific contract provisions. Previously performed chip sealing work that was let to contract is a good example. Contractors in the past were permitted to perform this activity when ambient temperatures were not appropriate. AC applications may not have been adequate. SCDOT may have permitted single treatment chip sealing work to be performed in subdivisions (or on high ADT, or on previously hot mix paved surfaces) when other alternatives may have been more appropriate. Work quality was excellent when chip sealing was performed in-house, however, this is believed to be a good activity to perform with outside forces.

GUARD RAIL AND CABLE RAIL

Cable rail contract work has been excellent. Guard rail contracts should stipulate a response time for breaches, say 7 days. The district needs more funds for guard rail work

TRAFFIC SIGNALS

The district utilizes on-call contracts to perform this activity. This contract arrangement has been very successful. SCDOT provides the installed equipment to insure standardization throughout the state. If an on-call contractor can not respond within the required period of time, another is selected. This concept may have application to other maintenance activities, although the appearance of favoring one contractor over another must be avoided. The specifications utilized in North Carolina formed the basis for the on-call contracts.

HERBICIDE TREATMENT

Most all work is successfully performed in-house. However, equipment utilization requirements may drive this to be outsourced in the future.

REST AREAS

All work is contracted by "lots" which permits some flexibility in structuring the contracts to meet local needs and contractor availability.

PAVEMENT MARKINGS

The district is moving toward more thermoplastic contracts. When small items are included in the contracts, costs escalate. Centerline painting contracts in the past experienced some problems. Raised pavement marking is contracted through the Construction office. There is a need to let raised pavement marking contracts earlier to insure a full year of service before snow and ice removal operations may begin.

Appendix C

District Workshop Meeting Notes (Continued)

SIGNS

Temporary agencies were utilized to perform the sign inventory. Routine sign management activities are best performed in-house. In anticipation of a requirement that signs be replaced with high intensity sheeting (within the next 7 years), a pilot contract has been let to perform sheeting replacement in one county. The SCDOT Traffic Office is responsible for most overhead signs.

CRACK SEALING

This activity was successfully performed in the past with good results. Contracts are now in force utilizing a new specification (rubberized asphalt that does not require a sand treatment). These contracts are being monitored for effectiveness. Contracts for this work activity need to address the issue of contractor pay item. A pay item specifying pound placed may encourage the contractor to place more quantity than what is required.

FULL DEPTH PATCHING

The district performs a substantial amount of work. Administration/inspection of full depth patching contracts is performed by the Construction Office and is evidently time consuming. Inspectors need to be qualified to approve quality work – has the sub-base been adequately replaced for example.

WILDFLOWERS

Most of this activity is performed in-house which is the preference. Some outside contractors may not have the required expertise.

BRIDGES

District crews are effective in performing bridge replacement activities. Approximately half of the district bridge replacements are performed in-house, half let to contract. Most bridge maintenance is performed in-house. Continuing bridge replacement with district forces very much depends on paying crane operators a competitive wage. State forces are much more capable of performing replacement operations at less cost and within a reasonable time period. In-house crews can replace a bridge within 5-6 weeks (or less) whereas a contracted project may require a year.

ROW FENCING

One county has recently let a major fencing contract and is monitoring contractor performance.

LITER PICKUP

The Department of Corrections provides good assistance.

Appendix C

District Workshop Meeting Notes (Continued)

SNOW AND ICE REMOVAL

Contracts are in place to ensure county, municipality, and contractor assistance if needed. The contracts specify Davis-Bacon wage rate compensation for standby and emergency operation time.

EQUIPMENT AND VEHICLE MAINTENANCE

Approximately 15-30% of work is outsourced at present – body work, air conditioning and tires. Contractor response time would be a critical constraint to totally outsourcing this activity.

FEATURES INVENTORY

Major features inventory activities are a good candidate for outsourcing because the activity is labor intensive. It should be recognized that features data are dynamic – a count obtained one day may not be valid the next.

GENERAL

There is a strong believe in this district that the key to outsourcing maintenance activities is the ability of SCDOT to provide adequate contractor oversight inspection. Contracts in excess of \$75,000 are administered by the Construction Office. With the recent increases in the amount of work let to contract, SCDOT Construction may have had difficulty providing adequate inspection. An alternative may be to train additional inspectors within Maintenance or more freely use consultant engineering and inspection.

There are problems with respect to interactions between the counties/district and SCDOT Procurement. Procurement has minimal engineering/maintenance expertise, nor sufficient manpower to process district requests. Differences of opinion have arisen with respect to contract pay items. Whereas Procurement may wish to impose uniform contracts statewide, the district believes there are unique circumstances that justify tailoring contracts to meet their requirements.

As more outsourcing is utilized, it is important that scope of work and quality expectations somehow be conveyed to the contractor. Partnering sessions are utilized on larger contracts administered by Construction. Partnering sessions may have the potential for addressing scope of work and quality expectation issues.

For outsourced work, some strict contractor prequalification is desperately needed.

Inspectors need to adopt uniform contract interpretations and contract interpretations. If one inspector makes “loose” interpretations, contractors expect similar interpretations from other inspectors.

Appendix CDistrict Workshop Meeting Notes (Continued)

The success of outsourcing contracts is very much impacted by personnel turnover, at the SCDOT county level, SCDOT district level, and within the contractor organization. When turnover is minimized, all parties become familiar with contract expectations.

There is a need to examine specifications utilized in other states, the mowing specification utilized in Tennessee in particular.

Maintenance contracts should give inspectors more interpretation discretion. The SCDOT Standard Specifications frequently utilizes the term “as directed by the Engineer” – maintenance contracts should incorporate similar language.

Appendix C

District Workshop Meeting Notes (Continued)

WORKSHOP NOTES: DISTRICT "B"

DRAINAGE

Most activities related to drainage performed in-house. There is a district drainage plan that includes inspection. The District has more drainage problems than can be addressed and still perform other work. Shoulder and ditch related work could perhaps be outsourced. If so, the contractor would need to have direction related to maintaining good public relations. It was suggested that it would be better to outsource other "less public sensitive" activities rather than drainage. Opening outfall pipes can generate public reactions. Driveway pipe installation could perhaps be outsourced.

Curb and gutter sweeping, performed two times a year, is now outsourced. This is performed in conjunction with a herbicide treatment. The same firm that sweeps the interstates is used.

Catch basin cleaning is best performed in-house. Drainage structure repair is frequently outsourced, as is curb and gutter repair, and sidewalk repair. These are good candidates for outsourcing .

Cross line pipe replacement (18" to 120") that has been necessitated by aging metal pipes is a problem and could be outsourced.

TREE TRIMMING

This activity has been outsourced and should continue to be outsourced. The District has had good experience with tree trimming contractors.

MOWING

All mowing work is let to contract. The contract specifies the number of mowing cycles, trimming expectations, and a time table for performance in each county. Enforcing the contract provisions has been an issue. There appears to be a sufficient number of qualified contractors bidding mowing work, some from out of state.

CHIP SEALING

This activity has been placed on hold by the SCDOT administration. If and when this activity is resumed, it needs to be outsourced. All counties have performed this activity in the past, and some problems were encountered – obtaining and storing asphalt products, public complaints, and the inability to justify an equipment fleet that was used only for seasonal work. Cost to perform this activity at present is about \$0.95/SY. Cost to the District when it was performed with in-house resources was about \$0.43/SY.

Appendix C

District Workshop Meeting Notes (Continued)

GUARD RAIL AND CABLE RAIL

These activities should be outsourced. Keeping required materials in stock is a problem. Guard rail work on interstates can only be performed at night, which generates in-house scheduling problems. SCDOT should retain the duties of cable rail inspections. Cable rail is inspected daily and the contractor must respond to reported problems within 96 hours. Guard rail damage is reported in a timely manner either by SCDOT or Highway Patrol personnel. Contractors performing guard rail and cable rail work are available and competent.

HERBICIDES

All counties have a good in-house program that includes training. This needs to be retained by the counties but each county needs its own truck. There have been no public perception problems. There is a provision in mowing contracts that the contractor can herbicide spot treat and that needs to remain in the contract.

REST AREAS

This activity is outsourced and should continue to be outsourced. Welcome center, and perhaps even rest area maintenance should be transferred to PRT. One contractor used in the past for rest area maintenance performed well at first but service soon deteriorated and the contract was not renewed.

THERMOPLASTIC AND RAISED MARKERS

This work is contracted out and should remain so. Cold laid markers have been installed by the counties, hot liquid markings are always outsourced. It was suggested that the districts have an on-call contract with a guaranteed minimum amount of work for the contractor.

ROADWAY PAINT MARKING

This work is contracted out and should remain so. The District no longer has the equipment to perform painting. Tracking the work performed is time consuming.

SIGN MANAGEMENT

Some counties within the District are still performing the required sign inventory. The District is considering contracting for the remaining work. Only a large scale mandated sign replacement program should be let to contract. Routine sign maintenance is best performed in-house. The State should retain operation of the three state sign shops.

CRACK SEALING

The District does not perform this activity with either in-house or outsourced forces. It is not cost effective.

Appendix C

District Workshop Meeting Notes (Continued)

POT HOLE PATCHING

This activity needs to be retained in-house. Contracting, with the necessity to measure quantities in place, would be a major headache.

FULL DEPTH PATCHING

This should remain as an outsourced activity. However, contractor quality can be a problem. Performance specifications are needed – perhaps a straightedge requirement.

WILDFLOWERS

This activity was previously let to contract, then performed in-house. The District now prefers that it again be contracted out. This activity places a heavy demand on District resources and there appears to be administrative pressure to plant more acres.

EQUIPMENT AND VEHICLE MAINTENANCE

District personnel feel strongly that this activity needs to remain an in-house responsibility, with the exception of what is outsourced now – major engine work, body work and painting, and tire replacement. SCDOT personnel are more familiar with their equipment than available local contractors. Also, equipment availability is often critical and repair schedules need to be controlled by SCDOT.

ENVIRONMENTAL COMPLIANCE

Environmental inspections are requiring more District personnel time, but these activities can not be effectively outsourced. Statewide environmental planning needs to remain the domain of consultants.

FEATURES INVENTORIES/HMMS

Features inventory work is a good candidate for outsourcing. The guard rail features inventory was outsourced with good results. Some personnel believe that the features inventory information now residing in HMMS may not be accurate due to the unrealistic time constraints that were placed on the field to compile this data. Future adjustments to data accuracy could be outsourced. It was the consensus that foremen spend far too much time generating reports to feed HMMS. District personnel use HMMS to identify problems in production or inventory matters. However, the system is time consuming and expensive to manage and maintain. It is important to keep foremen in the field for a greater part of the day and not tie them down with entering system data.

BRIDGE MAINTENANCE

Most bridge maintenance is performed in-house. So-called maintenance bridges (precast/prestressed, less than 100 feet) can be replaced with county forces, but equipment is not available. In urban areas, the District can not compete with private industry with respect to salaries paid to certified crane operators and welders.

Appendix CDistrict Workshop Meeting Notes (Continued)**ROW FENCING**

This activity is now being performed in-house but should be outsourced. There is a backlog of needed work due to rotting of timber posts and other problems.

LITTER PICKUP

Debris is removed from the interstates daily by employees partoling their sections. DOT crews also schedule litter pick up in the Spring and Fall. Isolated littering or illegal dumping problems are addressed as they are discovered. The Department of Corrections provides good litter pickup service on the Interstates.

GENERAL

Contracts for seasonal work need to be put in place well in advance of the seasonal schedule.

Maintenance at county shops (landscaping, mowing, minor building repairs) would be a good candidate for outsourcing.

The concept of asset management would be very expensive to implement. Contracting specifics would be difficult to draft. The contractor would likely place a high contingency on a lump sum contract.

A list of contractors providing contract services to the district was generated.

Appendix CDistrict Workshop Meeting Notes (Continued)

WORKSHOP NOTES: DISTRICT “C”

DRAINAGE

Most drainage related activities are performed in-house. However, work for catch basin repair and conversion has been let to contract. Contracts for catch basin repair and replacement should be approved at the county or district level prior to the bidding process. Uniform state-wide specifications are needed. Basin cleaning and vacuuming activities present unique problems – including debris disposal. Landfills charge for debris disposal. Some problems have been encountered when contractors attempt to replace catch basins with prefabricated units when casting in place would have been a better option. It is difficult to determine a unit of measure for roadside ditch cleaning thus it would be preferred to retain this activity in-house.

TREE TRIMMING

The district would prefer to have all mowing and trimming under a single contract. One county now performs all tree trimming work under contract. Contractor reimbursement is on the basis of lane miles. An improved tree trimming specification is needed to more explicitly specify expected work performance and this is evidently under development in the SCDOT Maintenance Office. The improved specification will produce higher quality work, but may increase bid costs.

MOWING

In general mowing has been satisfactorily performed under contract. It required some time for the contractors to adjust to performance expectations. An improved “final cleanup” specification is being drafted. Contracted mowing work requires extensive inspection. If there are two or more mowing contracts in a county, this stretches the inspection capabilities of the county. Mowing contractors need to provide SCDOT with more specific notifications as to daily work locations to facilitate inspection coordination. There is a need for additional mowing inspectors in the field. Mowing contractors have damaged electrical equipment and cable rails, and it is often difficult to prove who damaged what or when.

CHIP SEALING

When this work was discontinued, it was being performed under contract. There may have been some problems with respect to contractor performance, but it is believed these could be resolved. As in other districts, it is believed that this is an important maintenance activity that should be resumed. When chip sealing was performed in the past in-house, work was satisfactory. The SCDOT Construction Office and not the Maintenance Office oversees this activity. The Maintenance Office may have more expertise to oversee chip sealing contracts. Operator skill is the key to a successful chip-sealing project.

Appendix C

District Workshop Meeting Notes (Continued)

GUARD AND CABLE RAIL

This work is being performed successfully by contract and should continue to be contracted. Bid costs have been reasonable.

HERBICIDES

This work is performed in-house but it may be an appropriate activity for contracting large scale projects. Mowing and herbicides should be addressed in the same contract. Issues including chemical handling and storage could favor outsourcing. The ability to continue to perform this (and other) activities is impacted by equipment utilization requirements. The district is now in danger of losing its herbicide spraying trucks because they can not be utilized throughout the year.

REST AREAS

Rest area work is let to contract and work has been generally satisfactory.

MARKINGS

All work except symbol markings are let to contract. Centerline painting is being let to contract with good results.

SIGNS

Routine sign maintenance frequently requires an immediate response time and therefore is not a good candidate for outsourcing. Some counties in the district have not completed the sign inventory. The district does not have the required equipment to adequately maintain large (interstate and urban area) overhead signs.

CRACK SEALING

The district has just begun to contract some crack sealing work but as yet has not had sufficient experience with this option to form an opinion.

POT HOLE PATCHING

This activity is performed in-house.

FULL DEPTH PATCHING

Most full depth patching is let to contract with good results. More of this work is needed throughout the district. There is some concern that costs will escalate when more full depth patching is performed throughout the state. However, as the 24/7 program approaches conclusion, this may provide a sufficient pool of contractors who will submit reasonable bids.

Appendix C

District Workshop Meeting Notes (Continued)

WILDFLOWERS

This work is performed in-house but the district would prefer to let it to contract. The contract should give total bed preparation, planting and maintenance responsibility to the contractor.

BRIDGE WORK

No bridge work is let to contract other than major rehabilitation projects administered through the SCDOT Construction Office. One district-wide crew has been extremely effective. Contracting bridge work is not a preferred option due to the long time required to get the work under contract. Some routine bridge maintenance activities (bearing replacements for example) will be contracted in the near future.

ROW FENCING

Only minor work is performed in-house. Bid prices in the past have been disappointing – only 2 of 6 invited bidders submitted bids for a past contract.

LITTER

District personnel respond to public requests of dumping, but the counties otherwise rely on Adopt-A-Highway and the Department of Corrections. Some counties have had good response from the Department of Corrections, whereas some have not.

INTERSTATE SWEEPING

This is a good activity to let to contract. Contracted work has been performed well, but there was a learning curve for the contractor.

SNOW AND ICE REMOVAL

On-call contracts are in place with local contractors, counties, and municipalities to perform assistance with a major weather event.

EQUIPMENT AND VEHICLE MAINTENANCE

Some counties within the district contract more work than others. Total privatization of this activity may not work well if the contractor did not adequately respond to equipment down time priorities. Contractor availability may be better in urban as opposed to rural areas. There may also be an issue of trust in that the private company may be tempted to perform unnecessary work. There is a wide range of equipment used from different manufacturers that may pose a difficult challenge for the private firm. There is a pressing need for sophisticated diagnostic equipment and mechanic training in the district.

Appendix C

District Workshop Meeting Notes (Continued)

ENVIRONMENTAL ISSUES

Environmental issues are now having more of an effect on maintenance work. In response to this, training courses have and will continue to be developed. DHEC responds adequately to environmental incidents such as highway spills.

FEATURES INVENTORY

If or when HMMS is updated with more accurate information, this inventory work should be outsourced. The guard rail inventory was very labor intensive.

DRIVEWAY INSTALLATIONS

Driveway paving has been successfully let to contract. It may be preferable to let contracts for all aspects (not just paving) of driveway installations.

GENERAL

Specifications for contracted work in some areas need to be improved. Input into specification drafting should be obtained from the field.

Some problems have been encountered whereby contractors do not fully comprehend SCDOT expectations. Contractors are required to send a representative to pre-bid meetings, but the appropriate person may not be the one attending. The contractor is required to visit the site before bidding, but contractors may or may not take this obligation seriously. Scope of work discussions could perhaps be addressed at a “pre-construction” meeting or in partnering sessions. Imposing considerable retainage in the contracts could help impress on the contractors the need to fully comply with SCDOT expectations.

Many maintenance activities require some degree of traffic control. The contractor experienced in performing the maintenance activity may not be able to, or wish to, also provide traffic control. Issuing two contracts, one for the primary activity and another for traffic control, imposes coordination and potential delay claim liability on SCDOT. A district-wide traffic control crew may be a possible solution.

Additional personnel may be needed within SCDOT administrative offices in Columbia to speed the contract procurement process. Requisition processing frequently requires more than 6 months.

District personnel provided names of major contractors that are performing maintenance activities in the district.

Appendix CDistrict Workshop Meeting Notes (Continued)

WORKSHOP NOTES: DISTRICT “D”

DRAINAGE

Drainage consists of multiple activities and is the number one priority. Activities include shoulder pulling, setting ditches and pipe back, cleaning ditches, repairing drainage structures, clearing. Problems are compounded by required environmental permits (silt fences installation and inspection, etc.) This is “gravy work” for local contractors, and there is no real competition. The district is somewhat limited in available equipment – only 3 excavators.

SCDOT has the equipment and expertise to perform shoulder work better, faster, and probably cheaper than outside contractors. Shoulder pulling is an activity that needs to be performed promptly in response to alerts received from SCDOT personnel or the public – to eliminate water ponding and other problems. SCDOT crews do a good job with this activity.

Catch basin repair is a good candidate for outsourcing.

TREE TRIMMING

Tree trimming is performed to maintain utility clearance (although work is not performed for the utilities), to improve visibility, and facilitate mowing. This is a good candidate for outsourcing because specialized equipment needed – boom truck, chipping machine, hydraulic saws. Competence of outsourcing contractors varies considerably. In the past outsourcing services were contracted by 1000 hours of effort within the district, now contracted by road designation, with compensation for every 200 hours of effort. It would be better to contract by shoulder miles because some contractors have more productive and reliable equipment.

When a contractor does not perform to expectations, the District personnel can notify SCDOT Procurement, but this is not always effective in preventing ineffective contractors from bidding. More stringent prequalification through the SCDOT Procurement Office is needed. More uniform contracts are needed that clearly spell out actions SCDOT district personnel can take to assure quality work. State Maintenance Engineers Office now inserts special conditions in contracts. Local contractors take more pride in their work.

Appendix C

District Workshop Meeting Notes (Continued)

MOWING

This district outsources interstate mowing only. Some would prefer to outsource interstate mowing because it is extremely dangerous. Others are frustrated with the amount of inspection, lack of control and the end product of the contractor's work. They would prefer to perform mowing on other routes in house because SCDOT personnel do a better job – pick up trash before mowing, etc. Previous experience indicated that SCDOT could perform local mowing at ½ the cost and the public was more satisfied. Damage claims from outsourced work still must be processed through SCDOT, which is time consuming. The district normally budgets 5 mowing cycles, contractor is paid less if less mowing is required.

CHIP SEALAING

It is the consensus that SCDOT can perform this work better and at less cost. This district does not contract this out. Frustration was expressed in response to an administrative moratorium on performing chip seal work. Chip sealing is an important cost effective preventative maintenance activity that should not be discontinued. If the work is poorly performed, safety issues can arise – loose gravel on the roadway, etc. Chip sealing is an activity that consumes most all county maintenance forces for about 30 days when the work is performed.

GUARD RAIL AND CABLE RAIL MAINTENANCE

This activity is contracted out because it requires specialized equipment and expertise. However, there are a limited number of local qualified contractors. Contracts are often let when more than one area needs attention because there is a mobilization cost regardless of the magnitude of the project. Contracts are administered by the SCDOT Construction Office.

HERBICIDE SPRAYING

This is not contracted out in this district. Mowing and herbicide treatment are and need to be coordinated. Contracting out could transfer liability, but overspray has not been a problem recently.

REST AREAS

This activity is outsourced with general satisfaction. There is a learning curve in that the contractor learns what is needed to comply with SCDOT satisfaction. Contractor cleans, landscapes, and performs minor repairs. Lump sum payments are made monthly. Contracts are administered from Columbia, county units inspect their facilities three times per week, while Cola personnel conduct random inspections. Payment includes a bonus provision. Shift scheduling is a problem that is best transferred to the contractor. "Loafing" employees, if noted by the public, are obviously contractor employees and not those of SCDOT. Some of the previous vendors that held rest area contracts in this district did not perform satisfactorily.

Appendix C

District Workshop Meeting Notes (Continued)

THERMOPLASTIC PAVEMENT MARKINGS

Long line work is contracted out while in-house forces generally apply specialized markings. There are few qualified local contractors. The current contractor is performing well. Lane markings are contracted per linear foot, whereas arrows etc. are contracted each. The district would like to see more thermoplastic contracts.

RAISED PAVEMENT MARKERS – DELINEATORS

The district does not want to perform this activity in-house. Contracts are routinely let by the SCDOT Traffic Office. District personnel believe this is an extremely important activity, costs about \$400 per mile, and contractor quality has generally been satisfactory.

SIGN MAINTENANCE

Routine replacement is best performed in house because response time is critical. However, any large scale sign replacement effort, say to install improved sheeting materials, would be appropriate for outsourcing.

FEATURES INVENTORY

Concern was expressed as to what extent the districts would be responsible for performing features inventory activities to feed various SCDOT management systems. Sign and guardrail features inventories have been performed by the district to date. Outsourcing features inventory related activities could permit central coordination with SCDOT data processing and insure single point data entry. Some other SCDOT data collection and data processing activities may also be candidates for outsourcing.

WILDFLOWER PLANTING AND MAINTENANCE

The district personnel feel strongly that this activity should be outsourced. Soils testing and other related functions are best performed by contractors.

EQUIPMENT AND VEHICLE MAINTENANCE

Equipment work is satisfactorily performed in house. Major engine repairs are contracted out to specialists. Oil changes and specialized vehicle work is also contracted out to local vendors.

PLANNING AND ENVIRONMENTAL COMPLIANCE

Many planning and environmental compliance activities should be outsourced to the private sector, or outsourced to other offices within SCDOT. Environmental compliance is somewhat frustrating for some district personnel.

Appendix CDistrict Workshop Meeting Notes (Continued)

PLANNING AND ENVIRONMENTAL COMPLIANCE (Continued)

Compliance with Stormwater Pollution Plans (SWP3) and the Spill Prevention Control and Countermeasures (SPCC) were specifically cited. SWP3 plan development is outsourced, but it is suggested that plan related inspections, record keeping, and personnel training be outsourced also. SWP3 relates to hazardous materials runoff, SPCC relates to petroleum product pollution at such places as county shops.

CRACK SEALING

This activity is not outsourced in this district but may be a good candidate.

POT HOLE PATCHING

This activity is not outsourced in this district and should not be outsourced because response time is critical.

GENERAL COMMENTS

Activities that require SCDOT material purchase or supply are not good candidates for outsourcing – delay claims are a possibility. Contractor availability should be carefully examined before expanding maintenance outsourcing within the state.

Any increased outsourcing efforts should be implemented gradually through pilot programs, with careful evaluation.

Appendix CDistrict Workshop Meeting Notes (Continued)

WORKSHOP NOTES: DISTRICT "E"

DRAINANGE

Catch basin repair and large diameter pipe replacement work is outsourced. Ditch work and small pipe replacement is performed in-house. Shotcrete pipe repairs are outsourced. Outsourced contracts have been effectively let to herbicide and sweep curbs and gutters. Capable contractors are available in the area. Bids are reasonable but catch basin repair bids may be somewhat high. Catch basin repair contracts are let on a per item basis, with additional unit costs specified for such items as mobilization, traffic control, sidewalk and curb and gutter work, etc.

TREE TRIMMING

Most work is performed in-house. Each county has a limb-trimming target and equipment availability is not a problem. Some trimming is performed by contract as part of interstate mowing.

MOWING

Only interstate mowing is contracted. Contracting interstate mowing is a statewide mandate. Routine mowing was at one time contracted but contractor performance was poor. Contractor mowing of interstates results in good quality work at present. The district has an adequate fleet of equipment to perform routine mowing. The district has experienced some problems in the past related to forced acceptance of "low bidder" mowing equipment. A program is now in place (TERMS) to help track life cycle costs of equipment, which should help in obtaining quality and reliable equipment.

CHIP SEALING

This work was performed the last two years by outsourcing because it is very labor intensive. It is probably about 10% more expensive to contract this work as opposed to performing it in-house. The District no longer has the equipment to perform this in-house. Contractor performance has varied. There is a need for more stringent contractor pre-qualification to perform this (and other) work.

GUARD RAIL AND CABLE RAIL

It is believed the same contractor used in this district performs work in about half of the state. All repairs and installations are performed by contract. The contractor is very timely in responding to cable rail notifications, somewhat less timely in responding to guard rail notifications.

Appendix C

District Workshop Meeting Notes (Continued)

HERBICIDES

Herbicide spraying for brush control is mostly performed in-house. The district had a very disappointing experience with one contractor during the last spraying cycle. The contractor was grossly unqualified and performance bordered on downright fraud. The only way to keep this contractor from bidding future work appears to be adjusting contract specifications (requiring computer assisted equipment) such that the contractor will be excluded from bidding.

REST AREAS

All work is contracted with satisfying results. Some vandalism occurs when contractor forces leave the areas at 11:30 PM.

THERMOPLASTIC MARKINGS, PAINTING, RAISED MARKERS

Edge and centerline markings are contracted through the SCDOT Construction Office. Roadway painting needs to be retained in-house for quick response time. Raised marker work is contracted because it is labor intensive.

SIGN MANAGEMENT

Sign inventory work was completed using temporary employees. All sign work except large signs on the interstates is performed appropriately in-house.

CRACK SEALING

This activity is not at present conducted within this district. District personnel would like to begin performing this activity on primary routes, under contract, if the budget permits.

POT HOLE PATCHING

Performed in-house. It is difficult to specify and measure quantities in a contract.

FULL DEPTH PATCHING

Some work is performed in-house, some by contract. More has been contracted out in the last two years. This activity may become more important if chip sealing work is not resumed. Cost of contracted work now is in the range of \$35-\$55/SY. The contractors who were previously retained to perform chip sealing are not capable of performing full depth patching. There is a shortage of contractors capable of performing full depth patching, and the problem may be compounded if more patching is required to address what was previously addressed by chip sealing.

WILDFLOWERS

This work is currently performed in-house but the district would prefer to perform it by contract and is planning this as outsourced work for the future.

Appendix C

District Workshop Meeting Notes (Continued)

BRIDGE MAINTENANCE AND REPAIR

There is a district-wide bridge crew that has proven to be very effective. This crew mostly addresses problems related to rotting timber piles. However, most bridge work is let to contract and this is the preference.

ROW FENCING

An outside contract was let a number of years ago, and if funds are available, another contract may be needed.

LITTER PICKUP

Inmate crews can be utilized throughout the district. This is a low priority maintenance activity and the district becomes involved only in Adopt-A-Highway or mandated programs.

SNOW AND ICE REMOVAL

The district's motor grader fleet has been depleted in recent years, and thus has on-call contracts with local contractors. The district is negotiating what appears to be a very effective contract with the National Guard to perform these services if needed in the future. The district reimburses the Guard only for operator salaries, fuel, and blades.

EQUIPMENT AND VEHICLE MAINTENANCE

All work is performed in-house except for major engine work, air conditioning, and tires. In-house work permits faster response times. Some equipment dealers appear to be more responsive to private sector customers than the SCDOT, knowing they may not have a long term relationship with a government entity that is bound by low bid contracts in the future.

FEATURES INVENTORY

If additional features inventory information will be required, this activity should be let to outside contract. The SCDOT HMMS system is helpful to district personnel.

GENERAL

Equipment utilization regulations have required this district to turn in about one-half of its equipment fleet in the last 5 years. This has caused some problems, particularly the ability to respond to emergency situations, and the ability to pull less utilized equipment from a yard when a primary unit is down for repair. Bucket trucks, sweepers, and paving machines have been turned in but would have served a useful purpose had they been retained.

Appendix CDistrict Workshop Meeting Notes (Continued)

WORKSHOP NOTES: DISTRICT "F"

DRAINAGE

A pressing need in this district is to widen roads to a 24 foot pavement width with 2 foot paved shoulders and adequate earth bank shoulders. This work would be a good candidate for outsourcing contracts. Catch basin repair and updating would also be a good candidate for outsourcing. It is difficult to draft drainage scope of work in contracts, thus cost reimbursable (time and materials) contracts may be appropriate. Metal pipes are deteriorating and repair or replacement needs to be addressed, preferably through outside contracts.

TREE TRIMMING AND REMOVAL

Some work is performed in-house, some is outsourced. Outsourcing appears to be preferred to clear vegetation encroaching the ROW. Competitive prices have been obtained from contractors performing ROW clearing. Removing large trees in the vicinity of power lines should be outsourced because of safety issues.

MOWING

Approximately 95% of mowing in the district is contracted out. Mowing is labor intensive, and performing this work by contract frees up personnel to perform other activities. The decision to outsource mowing was impacted somewhat by equipment utilization limitations imposed on the district. Mowing contracts need to be written to clearly specify the obligations of the contractor and the unit price pay item. In this district specifying an acre as the pay line item caused some problems. The contract utilized previously also did not adequately specify exactly what was required of the contractor for the year-end clean-up mowing. In general the cost to outsource mowing vs. perform in-house is about the same.

CHIP SEALING

This is one of the most important maintenance activities performed in this district. There is a perception of the public that chip-sealed roads devalue their property. When this activity was discontinued, most work was let to contract, but it is believed that work performed in-house was of better quality. The district had invested in new equipment that facilitated quality performance. It is suggested that work quality, and the perceptions of the public, could be improved by utilizing a lightweight aggregate chip-sealing with a double or triple treatment. The ability to perform this in a cost effective manner may be constrained by haul distances.

Appendix C

District Workshop Meeting Notes (Continued)

GUARD AND CABLE RAIL

All cable rail and 95% of guard rail maintenance is outsourced. This can be justified by the equipment and expertise of outside contractors. Contractor performance has been satisfactory, but on occasion contractor response time has been an issue.

HERBICIDES

Most herbicide work has been performed in-house, but there are good arguments to perform this activity by contract. Material storage, equipment calibrations, and other factors could perhaps best be assigned to a contractor with the appropriate expertise.

REST AREAS

This activity has been contracted out and should remain so.

PAVEMENT MARKINGS

All centerline markings are contracted. Some “by hand pre cut” markings are best performed in-house to respond to critical needs. Some centerline painting is contracted, but the district has an excellent district-wide paint crew that is serving 3.5 counties. Outsourcing decisions are often made on the basis of whether or not competent crews can function within the district. In this case, the painting crew is extremely competent and it should therefore be retained. If the district should disband the in-house painting crew, consideration should be given to whether or not there is a good competitive climate for outsourced contracts. Raised marker placement is outsourced with good results.

SIGN MANAGEMENT

It is not clear as to what extent the central administration vs. the district should retain responsibility for interstate signs. It may be best to give the district more autonomy to respond to critical needs on the interstates – an “on-call” contract may be appropriate. Signs other than those on the interstates are maintained by the counties. Most counties have completed the sign management system inventory.

CRACK SEALING

A small amount of work is performed in-house.

POT HOLE PATCHING

This activity is performed in-house.

FULL DEPTH PATCHING

Since contracting out mowing, crews formerly performing the mowing function can now address patching. Approximately 60% is performed in-house. Outside contractors perform well but occasionally do not extract poor subgrade material.

Appendix C

District Workshop Meeting Notes (Continued)

SWEEPING

The district has let a contract for sweeping a section of interstate that has an extensive barrier wall. The district would like to initiate sweeping contracts for urban areas and interstates on a 2-4 month activity performance basis.

PAVEMENT RECLAMATION

Approximately 90% of this work is let to contract.

WILDFLOWERS

This work is presently performed in-house but the district would like to see how other districts have successfully outsourced this work. District personnel are now well trained to perform this activity.

BRIDGES

There are now two district-wide crews performing bridge replacements. Contractor availability may impact the cost of performing additional work in the future. The Construction Office in Columbia outsources bridge replacements so the district does not have cost data. The requirement for certified crane operators will seriously impact the ability of the district to perform this work in-house if crane operators are not paid a competitive wage.

FENCING

Only minor repairs can be performed in-house.

LITTER

Strategies differ within the counties. Some counties utilize Department of Corrections personnel, some utilize personnel sentenced to perform community service work.

SNOW AND ICE REMOVAL

In the past contractors have assisted with this activity but have been unreliable. This needs to remain an in-house activity. The district has the expertise. The ability to effectively perform this activity has been impacted by imposed equipment utilization rates.

EQUIPMENT AND VEHICLE MAINTENANCE

Some utilities in the state (Bell South) have successfully outsourced this activity and therefore it should be examined within SCDOT.

Appendix CDistrict Workshop Meeting Notes (Continued)

FEATURES INVENTORY

Most counties have completed the sign management inventory. Future inventories should perhaps be outsourced to insure conformity statewide. On the other hand, it is believed that district personnel do a better job of performing features inventories. The district personnel benefit from HMMS and see no requirements for additional features inventories being imposed on the district.

GENERAL

A competitive wage rate must be paid not only to crane operators, but to motor grader and back hoe operators as well. The SCDOT invests significant funds to train equipment operators and they will leave for private sector employment if not adequately compensated. This will result in “de-facto” outsourcing.

The contract administration process could be improved. It is important to state appropriate units of measure in the contracts. Contractors should be required to perform pre-bid site visits to verify actual quantities of work. Outsourcing contracts should be prepared well in advance of the activity start dates to facilitate bids from contractors that do not include unrealistic contingency.

OSHA has imposed some stringent safety requirements on some maintenance activities, including the inspection entry of catch basins and culverts. SCDOT does not have personnel in the counties that meet OSHA qualifications. It may be an outsourcing opportunity to have consultants available to oversee confined space entry.

Appendix C

District Workshop Meeting Notes (Continued)

WORKSHOP NOTES: DISTRICT "G"

DRAINAGE

Most drainage maintenance is performed with in-house forces. The district plans to let some basin conversions to contract in the near future. Catch basin repair contracts have been let previously by several counties. One county has let a ditch cleaning contract. Some cities perform sweeping related activities under contract.

TREE TRIMMING

Tree removal has been let as on-call contracts to small local contractors. One county has included tree trimming in the mowing contract.

MOWING

The district counties are attempting to contract all mowing activities. Boom mowing (back slopes and ditches – year end cleanup) is performed in-house but the necessary equipment is limited. There are political pressures to mow some areas more often than planned. It is preferred that contractors be compensated for mowing by shoulder miles as opposed to acres. Compensation on the basis of acres generates disputes. As more mowing is let to contract, there appears to be more marginally qualified contractors attempting to secure this work. A prequalification and rating system is suggested to prevent unqualified contractors from bidding.

CHIP SEALING

If this work is continued, it would be preferred to let the work to contract in order to free in-house forces to perform other work. However, when this activity was performed in-house, higher quality was attained, in most instances. Chip sealing should be resumed to preserve the local road system. In the past chip sealing may have been performed before the roadway was adequately prepared, i.e. base failure problems were not addressed. Chip seal specifications will need revisions if this pavement preservation technique is continued. The counties need additional guidelines as to when a double treatment should be applied. Chip seal contracts have been let for all counties over the past three years.

GUARD RAIL

The majority of the District guard rail maintenance is let to contract and should remain so. Minor guardrail repair is performed with Department personnel. There is more guard rail work that needs to be addressed than can be completed under the current district-wide on-call contract. A major comprehensive repair contract is needed and budgeting issues need to be addressed. Minor repairs can be performed in-house.

Appendix C

District Workshop Meeting Notes (Continued)

CABLE RAIL

All work is let to contract and current administrative procedures should remain in place.

HERBICIDE TREATMENT

In-house performance works well when equipment is available. It is preferred to keep this activity in house. If it is contracted, herbicide treatment should be combined with mowing. Previous contracts for mowing have given the contractor herbicide spraying options.

REST AREAS

All maintenance is contracted with adequate contractor performance. It is suggested that 24 hour security is needed and it would be preferred that rest area and welcome center responsibilities be transferred to PRT.

PAVEMENT MARKINGS

Thermoplastic activities are let to contract. Most symbol markings are place in-house. It would be preferred to let symbol placement to contract if the current contracts are properly executed.

CENTERLINE PAINTING

Approximately half of centerline painting is let to contract, half performed in-house. In-house work is more flexible in that the district can respond with twice a year painting in areas that experience high ADT, or areas that receive public requests. The cost for both in-house and contracted work is approximately \$0.03/LF. The District desires to maintain the capability of painting with Department forces because of the ability to address needs as they occur on a timely basis.

RAISED PAVEMENT MARKINGS

Most of this work is contracted and this is preferred. This is a good expenditure of maintenance funds.

SIGNS

Large overhead sign repair is let to contract. The contracts are structured to address signs in groups to minimize contractor mobilization expenses. An on-call contract would not be cost effective. Routine sign maintenance should remain an in-house responsibility. The sign inventory is nearing completion. Outside assistance would have been helpful to perform the inventory.

CRACK SEALING

Some crack sealing is performed in the district and more work is needed. One county would like to perform this work by contract if clear specifications could be drafted.

Appendix C

District Workshop Meeting Notes (Continued)

FULL DEPTH PATCHING

This work is performed both in-house and by contract. There are no strong feelings as to which is preferred. Work quality is perhaps better when performed in-house. The cost for in-house work is \$57.76/SY. If the current quantity of work will be continued, contracting the repairs will be necessary because the Department does not have personnel or time to complete all of this work.

WILDFLOWERS

All work is currently performed in-house, but is time consuming. If this activity is let to contract, the contract should be structured such that the contractor is given total responsibility for bed preparation, planting, and maintenance. Contractor performance in the past has been marginal.

BRIDGES

Two district-wide bridge replacement crews perform effectively. The district would prefer to retain this capability. Bridge maintenance is performed in-house. There may not be a sufficient number of locally qualified contractors to perform bridge maintenance, and contracting this activity would probably not be cost effective.

ROW FENCING

Some counties are now drafting contracts for fencing repair.

LITTER PICKUP

Department of Corrections and County facilities assist in two counties. The traditional twice a year and Adopt-A-Highway cleanups are executed.

SNOW AND ICE REMOVAL

Contractors would not invest in the required equipment to outsource this activity on a large scale. On-call agreements are in place for major events, which call for essentially renting equipment and compensating operators.

EQUIPMENT AND VEHICLE MAINTENANCE

All except major work is performed in-house. The district is opposed to a wholesale outsourcing of this activity.

FEATURES INVENTORIES/HMMS

HMMS may require updating to better determine features locations. Some future features inventory activities should be considered for outsourcing, but it should be recognized that SCDOT personnel are more familiar with features locations and could therefore better perform this activity. A significant amount of sign inventory data had to be corrected for after the initial field work was performed.

Appendix C

District Workshop Meeting Notes (Continued)

FEATURES INVENTORIES/HMMS (Continued) Sufficient time being allowed for this type work would make it easier for completion with Department personnel.

TRAFFIC SIGNALS

The on-call contracts that are being executed are acceptable. Contracts could be improved to more realistically penalize the contractor for down time or maintenance of signals under contract..

DRIVEWAYS

Some driveway paving has been let to contract. There is not sufficient demand to let total driveway installation to contract. Driveway paving work costs are about \$578/EA.

TRAFFIC CONTROL

Some contractors, cities, and utilities have not performed this activity to SCDOT expectations.

TRAINING

Training in the areas of work zone safety, and equipment operator training have been successfully outsourced.

GENERAL

The district would like to outsource two activities that are their legal responsibility – operation of swing bridges and operation of a ferry.

SCDOT has standardized brands for traffic signal installed equipment. The cities are free to select other brands. This may cause problems in the future if the cities need State assistance in maintaining or replacing this equipment in an emergency situation.

Pre-bid conferences are effective in improving contractor performance.

The concept of contract retainage has merit. It is believed that the SCDOT Standard Specifications do not call for retainage, but retainage could be imposed in the contract Supplemental Specifications.

The concept of contract incentives has merit and should be investigated.

As the district installs more electronic equipment, such as message boards and monitoring cameras, it may be cost effective to contract electronic equipment maintenance on an on-call basis.

A list of maintenance contractors performing work in the district was supplied.

Appendix DContractor Survey Instrument**CONTRACTOR QUESTIONNAIRE**

South Carolina Department of Transportation

All responses will remain confidential. Survey responses will be compiled by Clemson University and only summary data will be forwarded to SCDOT.

I. Please indicate the approximate annual dollar volume of work you are performing for SCDOT in the areas listed below. Also estimate your capability of providing to SCDOT (without a significant increase in bid price) additional work.

<u>Activity</u>	<u>Annual dollar volume, current</u>	<u>Annual dollar volume, potential</u>
Drainage structure repair or replacement	_____	_____
Tree trimming	_____	_____
Mowing	_____	_____
Chip sealing	_____	_____
Guard or cable rail installation or maintenance	_____	_____
Traffic signals	_____	_____
Herbicide treatment	_____	_____
Rest area maintenance	_____	_____
Pavement marking or painting	_____	_____
Sign replacement	_____	_____
Crack sealing	_____	_____
Full depth patching	_____	_____
Wildflower planting or maintenance	_____	_____

Appendix D

Contractor Survey Instrument (continued)

Bridge replacement	_____	_____
ROW fencing	_____	_____
Litter pickup	_____	_____
Snow/ice removal	_____	_____
Vehicle/equipment maintenance	_____	_____
Sidewalk repair/installation	_____	_____
Handicap ramp installation	_____	_____
Curb & gutter repair	_____	_____

II. Would you support revised contracting procedures that would include the following?
Use the following scale for your response.

- 1 = Definitely not
- 2 = Probably not
- 3 = Neutral or not certain
- 4 = Probably yes
- 5 = Definitely yes

____ Prequalification based on company equipment resources, available personnel, financial strength, AND SCDOT satisfaction (performance rating) with previous work

____ A ten percent retainage, released upon satisfactory work completion

____ Mandatory pre-bid site visits and mandatory pre-bid conference attendance

III. Assess the extent to which you agree or disagree with the following statements as they pertain to the type of work you perform. Use the following scale for your response.

- 1 = Strongly disagree
- 2 = Somewhat disagree
- 3 = Neutral or no opinion
- 4 = Somewhat agree
- 5 = Strongly agree

Appendix D

Contractor Survey Instrument (continued)

____ Contractors provide work at lower or equal overall installed cost as compared to SCDOT execution with their in-house forces

____ Contractors provide higher work quality

____ Contractors provide work to a higher degree of public satisfaction

____ Contractors have the technical expertise that is less likely to reside within SCDOT

____ Contractors are more likely to have the necessary specialized equipment

____ The SCDOT contractor selection and contract administration process is fair

____ SCDOT contracts and technical specifications are clear and not ambiguous

____ SCDOT inspectors are reasonable and fair

____ More contracted maintenance work would provide good public relations for SCDOT

IV. Would you have an interest in performing the following type of work for SCDOT?
If so, please list the pay item you would recommend if different from the existing pay item.

- 1 = Strongly disagree
- 2 = Somewhat disagree
- 3 = Neutral or no opinion
- 4 = Somewhat agree
- 5 = Strongly agree

<u>Activity Description</u>	<u>Existing Pay Item</u>	<u>Recommended Pay Item</u>
____ Pothole Patching	Ton	_____
____ Roadway Edge Patching	Ton	_____
____ Machining Earth Roads	Mile	_____
____ Shoulder Repair (High or Low)	Linear Foot	_____

Appendix DContractor Survey Instrument (continued)

_____ Ditch Cleaning (Roadside)	Linear Foot	_____
_____ Ditch Cleaning (Outfall)	Linear Foot	_____
_____ Pipe Installation (for Drive Entrance)	Linear Foot	_____
_____ Drive Entrance Paving	Square Yard	_____
_____ Litter Control (Dead Animal Removal)	Pound	_____

V. Please comment on the aspects of the SCDOT contractor selection, contract administration and inspection processes that need improvement. Provide suggestions for improving contract documents and technical specifications if appropriate.

VI. General comments.

May a member of the Clemson University research team contact you for additional information (Y/N) _____

Survey executed by:

Name and title: _____

Company and office location: _____

Telephone: _____ Email: _____

Appendix DContractor Survey Instrument (continued)

Return this survey to:

Dr. Lansford Bell
Department of Civil Engineering
Clemson University
Clemson, SC 29634-0911

For questions and clarifications, contact Dr. Bell at:

Tel: 864-656-3330

E-mail lance.bell@ces.clemson.edu

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