Executive Summary

The use of surveys to elicit public opinions and attitudes is not new to public institutions such as the South Carolina Department of Transportation (SCDOT). Public opinion surveys address many topics such as satisfaction with highway interchanges, needs assessment, traffic congestion, and highway planning issues including design, just to name a few. Though public opinion surveys concerning highway maintenance have been conducted in other states, this is the first of its type in South Carolina conducted by SCDOT. The primary focus of this survey was to elicit the public’s assessment of importance of highway maintenance programs in South Carolina, the public’s grade for highway maintenance activities, and the public’s assessment of how SCDOT funds should be allocated across highway maintenance activities.

In mid-2003, surveys were mailed to about 29,000 potential respondents living in South Carolina. The mailing list was purchased from InfoUSA®. About 3,600 completed surveys were returned, yielding a 12.7 percent response rate. Data were processed for analysis using standard verification techniques, and data processing was conducted using SPSS for Windows®.

The main body of the report presents the results of the survey for the state as a whole. The appendices provide the results by SCDOT’s service districts as seen in the map.

The illustrations that follow summarize the results. Respondents were asked to rate an assortment of maintenance activities in terms of the activity’s importance to the respondent. The mean importance ratings by maintenance activity category are shown in Illustration 1. The maintenance activities that are most important to South Carolinians are (i) bridges; (ii) signage; and (iii) highway surface, in that order. Least important is beautification activities.
Similarly, respondents were asked to assign a letter grade ("A", "B", "C", "D", or "F") to the same set of maintenance activities. These results are shown in Illustration 2. Signage, which had received a high importance rating, also received a high grade (highest among the maintenance activity categories). Note that the two lowest grades were given to highway surface work and roadside work; both had high importance ratings.

Developing a problem score (combination of importance and grade) allows SCDOT to determine the value to the consumer for correcting or fixing a perceived problems. This research in no way identifies the causes for the perceived problems. Nor does the research focus on underlying causes for problems perceived by the consuming public. In other words, a high “problem score” for patching potholes would not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying problem associated with the soil under the roadway. Illustration 3 shows the problems scores by the maintenance activity categories. Four categories—Highway Surface, Roadside, Bridges, and Driveways—have notably higher problem scores than the remaining categories, and Highway Surface and Roadside are the highest. This would lead SCDOT to the conclusion that focusing maintenance activities in these two categories will be more positively received by South Carolinians than activities in any of the other categories.

This conclusion is affirmed by the results to the question of allocating maintenance dollars to maintenance categories (Illustration 4). South Carolinians would put about one-fifth of their “maintenance” budget toward pavement resurfacing and pavement patching. Bridges would use 15 percent of the “maintenance” budget.

Overall, SCDOT is maintaining South Carolina’s highways at a B level. South Carolinians perceive certain maintenance activities to be more important and, thereby, should receive greater attention than other maintenance activities. Focusing greater effort within the four maintenance categories of Highway Surface, Roadside, Bridges, and Driveways will likely result in South Carolinians being even more satisfied with maintenance activities throughout the state.

The research was conducted at The University of South Carolina by the Division of Research of The Moore School of Business (Principal Investigator: Sandra J. Teel, 803-777-2510; steel@moore.sc.edu). For further information, contact Terry Swygert at SCDOT (803-737-6652; swygerttl@scdot.org).
# Results of Highway Maintenance Survey

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Results of Highway Maintenance Survey

Background

The use of surveys to elicit public opinions and attitudes is not new to public institutions such as the South Carolina Department of Transportation. Public opinion surveys address many topics such as satisfaction with highway interchanges, needs assessment, traffic congestion, and highway planning issues including design, just to name a few. Nationally, public satisfaction with most often used highways improved between 1995 and 2000 (about 65 percent are satisfied). At the same time, dissatisfaction also increased, meaning that neutral attitudes declined. This study focused on categories of the nation’s highways and their maintenance: visual appeal, safety, bridge conditions, travel amenities, pavement conditions, work zones, maintenance response time, and traffic flow. One of this study’s conclusions is that the “survey will help FHWA [Federal Highway Administration] focus its resources . . . to better meet the needs” of the public. In a survey conducted in 1996, Montana found highway maintenance to be important to about two-thirds of its public. Fewer than 1 percent rated highway maintenance as “not important”. The public opinion survey for the Kansas Department of Transportation ranged widely from opinions about Kansas’ highways to satisfaction with state employment salaries and wages. The survey conducted about Wyoming highways covered maintenance, public safety, drivers’ licenses, communication between the department of transportation and the public, and commercial flights in Wyoming. Louisiana’s and Minnesota’s surveys are more like the survey reported herein in that they focus primarily on road maintenance. And, many other departments of transportation around the nation regularly survey the general public.

In 1999 the Transportation Research Board published *Report 422: Maintenance QA Program Implementation Manual*, which serves as guidelines for conducting research to maintain or improve the quality of maintenance programs of departments of transportation. These surveys serve two purposes: (i) to offer the public the opportunity for input in developing strategies for the department and (ii) to facilitate communication between the department and the public. Assessments of the public’s rankings for South Carolina’s Department of Transportation maintenance efforts have been based primarily upon anecdotal information such as telephone and letter communication. To date, a survey to address the issue of ranking various highway maintenance targets in terms of their importance to the general public has not been done. Thus, the Division of Research of the Moore School of Business at the University of South Carolina (Columbia Campus) conducted a survey to elicit information from persons around the state, assuring that SCDOT seven regions are fairly represented.
Problem

Allocation of resources is important in maintaining the highway systems. Identifying what the users of the highway system in South Carolina want and expect would be a valuable asset in the development of maintenance programs.

Study Objectives

The primary objective of the project is to survey South Carolina residents (18+ years old who drive) about their opinions on alternative SCDOT highway maintenance programs; to analyze that data; and to report the findings to SCDOT for their use in establishing funding priorities consistent with a public consensus. A secondary objective will be developing a profile of similar studies conducted by departments of transportation in the United States.

Methodology

In mid-2003, a mail survey was sent to 29,000 potential respondents living in South Carolina. The survey recipients were selected at random from the population on file with InfoUSA, a list development and preparation company. The sample was drawn to yield 4,000 names from each of S.C. Department of Transportation engineering districts (see map previous page). Within each district, the sample was drawn by county with each county’s proportion of the total in the district the same as the county’s proportion of the total population in that district. The sample list contained not only name and address, but moderate detail on each listing that included household size, gender, median income (for selected entries). The latter permitted the research team to verify some of the responses seen. Less than 1 percent of the surveys were returned as an improper address or unknown addressee, which leaves about 28,700 potential respondents.

To elicit a greater than “normal” return rate, the S.C. Department of Transportation offered a monetary incentive to respondents such that, if the respondent returned the survey by a specified date, the respondent’s identification would be included in a drawing for $200 and $100. A total of 3,649 surveys were returned and included in the data analysis that forms the basis for this report. About 50 surveys were returned indicating that the addressee was deceased, did not drive, or otherwise would not complete the survey, which leaves about 28,650 potential respondents. Given these numbers, the response rate for the survey was 12.7 percent, well above average for mail surveys.

Data were processed for analysis using standard verification techniques. This component of the work was conducted by student workers under the direction of the principal investigator, Sandra J. Teel. The analysis was accomplished with the SPSS for Windows.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents
assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allow development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material together is reserved for the Conclusions section of the report.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits 1 through 7, respectively.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit 1) and “Keeping Roads Safe to Drive on” (Exhibit 5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” It is easier to compare the activities when mean ratings are examined (Exhibit 8). Here, Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. Though respondents rates removing snow and ice the lowest in this category, it is still well above the “somewhat important” rate. Over all the activities in this category, the mean is 4.57 or “Very Important.”

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
• Controlling vegetation (like grass and weeds);
• Maintaining sidewalks (includes handicapped ramps);
• Keeping road shoulders in good condition; and
• Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits 9 through 14. Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the previous group of assessments. The most important activity appears to be “Leveling drop-offs or ruts at edge of pavement and shoulder.” Exhibit 15 (next page) shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs” and the least important in this group are “Controlling Vegetation” and “Cleaning Ditches and Gutters.” The mean importance rating for the category as a whole was 4.32 or “Somewhat Important.”
The third set of activities is labeled “Beautification/Attractiveness” and contains only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits 16, 17, and 18, respectively. These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.66 or close to “Somewhat Important.”
There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
- Providing adequate number of traffic lights;
- Maintaining visibility of raised reflective pavement markers; and
- Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits 19 through 26. In this category, the evaluations are most tightly clustered on “Very Important” for both “Keeping traffic signals clearly visible” and “Keeping traffic signals working.” Responses for “Maintaining visibility of raised reflective pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance in this category.
The mean importance ratings for Signage/Signals/Markers are shown in Exhibit 27. Here, one can see that almost all of these activities are above a mean of 4.5, that is, “Very Important.” The least important in this category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this category is 4.67.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits 28 through 30, with Exhibit 31 showing the mean importance rating for this category.
From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.29, or “Somewhat Important.”

The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.79 for the category overall), the former is more important (Exhibits 32, 33, and 36).
The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this category is 4.05, or “Somewhat Important” (Exhibit 36). However, a glance at Exhibits 34 and 35 show that the individual ratings are virtually identical.

To summarize this section (Exhibit 37), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Keeping traffic signals working” and “Keeping traffic signals clearly visible,” in that order. The two individual maintenance activities in the category “Beautification/Attractiveness” (namely, “maintaining wildflowers” and “satisfactory landscape appearance”) were rated lowest among all individual maintenance activities.
Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same categories of activities noted in Section I were used and presented to respondents in the same order as in Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits 38 through 44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. There are greater percentages of Bs and As for “Keeping roads safe to drive
on” and “Removing Snow and Ice.” The mean grade for Highway Surface Work considering all the activities together was 3.35, or a C+ (Exhibit 45).11

For the maintenance activities included as Roadside Work, the distribution of grades is shown in Exhibits 46 through 51. In the case of the grade for “Removing litter” (Figure 47), the percentage of respondents assigning an “F” is nearly the same as the percentage of respondents who assigned an “A”.
Figure 52 shows the mean grade respondents assigned to the activities in this category. Here, the highest given is a 3.5, a C+, for maintaining sidewalks. The mean grade overall is 3.34, a C+.

The mean grades for the “ Beautification/Attractiveness maintenance activities is higher than those previously reported (Exhibits 53 through 55). Specifically, the overall grade is 3.71, a B, and there is little difference in the grade distributions between “Maintaining wildflowers” and “Providing satisfactory landscape appearance” (Exhibits 53 and 54, respectively).

The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are Exhibits 56 through 63. Exhibit 60, the grade for “Keeping traffic signals working,” shows that the percentage of respondents assigning an A to this maintenance activity is nearly equal to the percent of
Exhibit 56. Grade for Maintaining Adequate Signage (Speed Limit, Stop, Work Zone), Statewide

Exhibit 57. Grade for Providing Adequate Number of Signs, Statewide

Exhibit 58. Grade for Maintaining Visibility of Pavement Markings, Statewide

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Exhibit 62. Grade for Maintaining Visibility of Raised Reflective Pavement Markers, Statewide

Exhibit 63. Grade for Providing Adequate Number of Raised Reflective Pavement Markers, Statewide
respondents assigning a B. In contrast, the percentage of respondents assigning a B is most pronounced for “Maintaining adequate signage” and “Providing adequate number of signs” (Exhibits 56 and 57, respectively).

The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit 64. It is clear that respondents give an average of a B to these activities, with the lowest grade for “Maintaining visibility of pavement markings” and the highest grade for “Keeping traffic signals working.”

The grades for “Rest Area/Welcome Center” maintenance activities are slightly lower than the set of maintenance activities just reported. Exhibits 65 through 67 show the distributions of responses for the individual activities in this category. The percentage of respondents assigning a C is more prominent for “Staffing rest areas” than for the other two activities.

Overall, the mean grade for all the activities in this category 3.90, or a B (Exhibit 68). Among the activities in this group, the highest grade assigned was for “Providing satisfactory appearances of rest areas.”
Grades for the bridge maintenance activities were somewhat lower (Exhibits 69 and 70). A somewhat greater percentage of respondents assigned an “F” to “Replacing bridges in a timely manner.”

The mean overall grade was 3.55, or a B (Exhibit 73, next page). The mean grade for “Keeping bridges repaired” was higher than that for “Replacing bridges in a timely manner.”

The two maintenance activities in the “Residential Driveways” category received nearly identical grades, as seen in the individual Exhibits 71 and 72 (next page) and Exhibit 73 (next page).
Exhibit 74 summarizes the grades given for the maintenance categories. Here, one can see that, overall, Signage received a higher grade (3.96) than the other categories, and Highway Surface, Roadside, and Residential Driveways received about the same grade (C+).

Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public. In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying unidentified problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. Exhibits 75 through 80 show the problem scores for each maintenance activity by S.C. Department of Transportation category.
From Exhibit 75 on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement.” As will be see upon review of the remaining exhibits in this group, this maintenance activity has the largest problem score among all activities. In essence, this means that more people will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes. The overall problem score for “Highway Surface Work” is 7.53.

For “Roadside Work” (Exhibit 76), “Leveling drop-offs or ruts at edge of pavement and shoulder” has the highest problem score in the category. The category of “Roadside Work” has an overall problem score of 7.18.

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (Exhibit 77). The problem score for “Providing satisfactory landscape appearance” is somewhat higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 4.74.

Exhibit 78 shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 4.82 problem score. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 6.0.
Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (Exhibit 79). The overall score for this category is 4.69.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (Exhibit 80). “Bridges” overall have a 6.94 problem score.

There is little difference in problem scores between the two maintenance activities included in the “Residential Driveways” category (Exhibit 80). Both are slightly higher than 6.0, making the overall score for the category 6.21.

Exhibit 81 summarizes the Problem Scores by maintenance category. This shows that, overall, greater attention to four categories is likely to be more satisfactory to more South Carolinians. These are “Highway Surface,” “Roadside,” “Bridges,” and “Driveways.” As noted earlier, individual maintenance activities within each category have divergent problem scores. For example, all activities in “Highway Surface” work have higher problem scores than all maintenance activities in “Beautification/Attractiveness,” “Signage/Signals/Markers,” and “Rest Area/Welcome Center,” with the exception of “Maintaining visibility of pavement markings” in “Signage/Signals/Markers.”

Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if $100 were all there was to spend. The results are shown in Exhibit 82. Though the categories are not perfectly consistent with the categories discussed previously, the results are consistent with the earlier findings. In particular, the categories that
respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest district in South Carolina when population is considered is District 3 in the upstate (Exhibit 83), followed by District 1, then District 6. Based upon respondents in the sample data, the largest group is District 1, followed by District 2, then District 6. To balance the differences between sample proportions and population proportions, all data were weighted by the population proportions.

Exhibit 84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 70 percent of respondents are married (with 30 percent being unmarried). About one-fourth are retired, and slightly more than half are male. About 65 percent of respondents are employed, with 80 percent of these being employed full time. About 45 percent of respondents report they live in an urban community (as opposed to a rural community).

Exhibits 85 and 86 show size of household, respondent age, and household income. As is clear, the average household size is 2.7 persons. The largest proportion of respondents are between 35 and 49 years, and about 15 percent are 65 years and older. The largest percentage of respondents live in households with annual incomes between $40,000 and $59,999. Almost one-fifth are from households with less than $25,000 annual income.
Conclusions

The objective of this project was to determine opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this report describes in some detail the findings of the survey.

Looking only at the overall importance scores for categories of maintenance activities (Exhibit 37, page 10), the top three categories in terms of importance to respondents are: (i) Bridges; (ii) Signage/Signals/Markers; and (iii) Highway Surface Work. Within the “Bridges” category, “Keeping bridges repaired” was the most important maintenance activity. Within “Signage/Signals/Markers,” “Keeping traffic signals working” was the most important. In the “Highway Surface Work” category, “Keeping roads safe to drive on” and “Patching potholes” are most important.

Exhibit 74 on page 17 shows the grades for the maintenance activities’ categories. Here we see the lowest grades given to “Residential Driveways,” “Highway Surface Work,” and “Roadside Work.” Within “Residential Driveways,” “Keeping driveway aprons repaired up to property line” received the lowest grade. In the “Highway Surface Work” category, two activities are nearly tied for the lowest grade: (i) Removing dips, bumps, or irregularities in pavement, and (ii) Keeping roads in same condition statewide. “Leveling drop-offs or ruts at edge of pavement and shoulder” had the lowest grade within the “Roadside Work” category, though several other activities are close to the former’s grade.

The tallest bars in Exhibit 81 (page 19) show where the S.C. Department of Transportation should put its emphasis. In other words, the public will more positively perceive greater attention to maintenance of the activities with the tallest bars to maintenance of the activities with the shorter bars. Specifically, these are: (i) Highway Surface Work; (ii) Roadside Work; (iii) Bridges; and (iv) Residential Driveways. Even within the categories, greater maintenance of certain individual activities will have a more positive effect on the public.

Endnotes
8 See, for example, reports from Denver (at www.transitalliance.org), Atlanta Regional Commission (at www.atlreg.com), State of New Jersey (at www.state.nj.us/transportation/), Austin (at www.ci.austin.tx.us/campo/), State of Montana (at www.I-15HelenaEIS.com), Rutgers University (at eagletonpoll.Rutgers.edu/tran.htm), State of Washington (at www.wsdot.wa.gov) and many others.
The letter grades for the mean grades were assigned as follows: an A was assigned to means of 4.5 and above; a B+ was assigned to means of 4.3 through 4.5; a B was assigned to means of 3.5 through 4.3; a C+ was assigned to means of 3.3 through 3.5; a C was assigned to means of 2.5 through 3.3; a D+ was assigned to means of 2.3 through 2.5; a D was assigned to means of 1.5 through 2.3; and an F was assigned to means below 1.5.
Appendices

The appendices report the results of the maintenance survey for each SCDOT district. The appendix number corresponds to the district whose results are reported therein.
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Appendix 1
Results of Highway Maintenance Survey
District 1

Introduction

The results of the Highway Maintenance Survey as they pertain to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 1 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology

In mid-2003, 3,593 surveys were mailed to potential respondents in District 1. District 1 is composed of Aiken, Kershaw, Lee, Lexington, Richland, and Sumter counties. In this district, 648 respondents returned completed questionnaires, yielding an 18 percent response rate.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allows development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material together is reserved for the Conclusions section of the report.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”. ) The activities were grouped into the eight categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface Work, Beauti-
The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits D1-1 through D1-7.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D1-1) and “Keeping Roads Safe to Drive on” (Exhibit D1-5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” It is easier to compare the activities when mean ratings are examined (Exhibit D1-8). Here, Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. Though respondents rate removing snow and ice the lowest in this category, it is still well above the “somewhat important” rate. Overall for the activities in this category, the mean is 4.53 or “Very Important,” which is slightly below the average for the state as a whole.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D1-9 through D1-14 (next page). Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the previous group of assessments. A greater percentage of respondents select “very important” for
“Leveling drop-offs or ruts at edge of pavement and shoulder” than for the other activities in this category. **Exhibit D1-15** shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs” and the least important in this group are “Controlling Vegetation” and “Cleaning Ditches and Gutters.” The mean importance rating for the category as a whole was 4.25 or “Somewhat Important,” which is below the statewide average.

The third set of activities is labeled “Beautification/Attractiveness” and contains only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in **Exhibits D1-16, D1-17, and D1-18**, respectively. These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.68 or close to “Somewhat Important,” equal to the statewide average.

There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
- Providing adequate number of traffic lights;

**Highway Maintenance Survey, District 1, D1-5**
• Maintaining visibility of raised reflective pavement markers; and
• Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits D1-19 through D1-26. In this category, the evaluations are most tightly clustered on “Very Important” for both “Keeping traffic signals clearly visible” and “Keeping traffic signals working.” Responses for “Maintaining visibility of raised reflective pavement markers” are also highly rated, with a majority of respondents rating it as “Very Important.”
pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance in this category.

The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D1-27. Here, one can see that almost all of these activities are above a mean of 4.0, that is, close to “Very Important.” The least important in this category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this category as a whole is 4.63, only slightly below the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits D1-28 through D1-30 (next page), with Exhibit D1-31 showing the mean importance rating for this category.

From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.26, or “Somewhat Important,” and again slightly below the statewide response.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.76 for the category overall), the former is more important (Exhibits D1-32, D1-33, and D1-36).
The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this category is 3.98, or close to “Somewhat Important” (Exhibit D1-36). A glance at Exhibits D1-34 and D1-35 show that the distributions of ratings are virtually identical.

To summarize this section (Exhibit D1-37), the maintenance activity category of “Bridges” received the highest importance rating among the seven maintenance categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Keeping traffic signals working” and “Patching potholes” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”. ) The same
categories of activities noted in Section I were used and presented to respondents in the same order as in Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits D1-38 through D1-44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. A greater proportion of District 1 respondents assign a C to “Patch- ing Potholes,” “Re-paving Roads,” “Removing dips, bumps, and irregularities in the pavement,” and “Keeping the same conditions statewide” than to the other activities in the maintenance category. There are greater percentages of Bs and As for “Keeping roads safe to drive on” and “Removing Snow and
Ice.” The mean grade for Highway Surface Work considering all the activities together was 3.42, or a C+ (Exhibit D1-45). District 1 respondents grade these activities higher than the statewide average.

For the maintenance activities included as Roadside Work, the distribution of grades is shown in Exhibits D1-46 through D1-51. In most of the activities, the percentage of respondents assigning a B or C grade is almost equal or approaching close to equality. Exhibit D1-52 shows the mean grade respondents
assigned to the activities in this category. Here, the highest given is a 3.6, a B, for “Maintain Sidewalks”. The mean grade overall is 3.43, a C+, and is above the statewide average.

The mean grades for the “Beautification/Attractiveness” maintenance activities is higher than those previously reported (Exhibits D1-53 through D1-55). Specifically, the overall grade is 3.76, a B, and there is little difference in the grade distributions between “Maintaining wildflowers” and “Providing satisfactory landscape appearance” (Exhibits D1-53 and D1-54, respectively).
The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are Exhibits D1-56 through D1-63. In all of the activities, the percentage of respondents assigning a B was higher than those assigning other grades. More than 50 percent of respondents assign a B to “Providing adequate number of signs” (Exhibit D1-57), “Keeping traffic signals clearly visible” (Exhibit D1-59), and “Keeping traffic signals working” (Exhibit D1-60).
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D1-64. It is clear that respondents give an average of a B (4.00) to these activities, with the lowest grade for “Maintaining visibility of pavement markings” and the highest grade for “Keeping traffic signals working.” The average grade overall for these maintenance activities is nearly the same as that for the statewide average.
The grades for “Rest Area/Welcome Center” maintenance activities are shown in Exhibits D1-65 through D1-67. For all activities, the percentage of respondents assigning a B is higher, as is the mean value (Exhibit D1-68). Nevertheless, the overall mean of B is lower than the statewide average.

Grades for the bridge maintenance activities were somewhat lower (Exhibits D1-69, D1-70, and D1-73). A somewhat greater percentage of respondents assigned an F to “Replacing bridges in a timely manner”. Grade B is more prominent in both the categories. The mean overall grade was 3.66, or a B, slightly higher than the statewide average (Exhibit D1-73). The mean grade for “Keeping bridges repaired” was higher than that for “Replacing bridges in a timely manner.”
The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D1-71, D1-72, and D1-73), and the overall average for District 1 is slightly higher than that for the state.

Exhibit D1-74 shows the summary of grades of all the maintenance categories for District 1. The overall grade was 3.67, a B, and only slightly higher than the statewide average. District 1 respondents gave “Signage” the highest grade.
**Problem Scores.** Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. *This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public.* In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying unidentified problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. **Exhibits D1-75 through D1-80** show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From **Exhibit D1-75** on “Highway Surface Work,” the largest problem score is “Patching potholes in pavement.” As will be seen upon review of the remaining exhibits in this group, this maintenance activity has the largest problem score of all. In essence, this means that more people will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes. The overall problem score for “Highway Surface Work” is 7.18, somewhat below the average for the state.

For “Roadside Work” (**Exhibit D1-76**), “Leveling drop-offs or ruts at edge of pavement and shoulder” has the highest problem score in this maintenance category, followed closely by “Removing litter.” The category of “Roadside Work” has an overall problem score of 6.65, again below the statewide average.

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (**Exhibit D1-77**). The problem score for “Providing satisfactory landscape appearance” is somewhat higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 4.58, below the statewide score.
Exhibit D1-78 shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 4.59 problem score, also below the state average. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 5.87.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (Exhibit D1-79). Overall, the score for this category of 4.80 is slightly above that for the state.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (Exhibit D1-80). “Bridges” overall have a 6.35 problem score, below the statewide average.

There is little difference in problem scores between the two maintenance activities included in the “Residential Driveways” category (Exhibit D1-80). The overall score for this category is 5.86, also below the statewide average.

Exhibit D1-81 shows the summary of problem scores for District 1. This shows that overall, greater attention to four categories is likely to be more satisfactory to more South Carolinians in District 1. These are “Highway Surface,” “Roadside,” “Bridges,” and “Driveways.” As noted earlier, individual maintenance activities within each category have divergent problem scores. A scan of the summary exhibits shows that all “Highway Surface” work has a higher problem score than all maintenance activities in “Beautification/Attractiveness,” “Signage/Signals/Markers” and “Rest Area/Welcome Center.” The overall score for these categories was 5.83. Exhibit D1-81 also shows that the District 1 averages are lower than the statewide averages for all maintenance categories except “Rest Areas.”
Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all there were to spend was $100. The results are shown in Exhibit D1-82. Though the categories are not perfectly consistent with the categories discussed previously, the results are consistent with the earlier findings. In particular, the categories that respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance than on the other categories. Pavement patching and pavement resurfacing would receive $20 each.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

Exhibit D1-83 shows the percentages of respondents in each county in District 1. As would be expected when population is considered, Lee County had the fewest respondents, and Richland had the greatest number of respondents.

Exhibit D1-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 65 percent of respondents are married (with 35 percent being unmarried). About one-fourth are retired, and nearly 60 percent are male. More than 75 percent of respondents are employed, with more than 80 percent of these being employed full time. About 55 percent of respondents report they live in an urban community (as opposed to a rural community).

Exhibits D1-85 and D1-86 show size of household, respondent age, and household income for District 1 respondents. The average household size is 2.7 persons. The largest proportion of respondents are between 50 and 64 years, and more than 20 percent are 65 years and older. The largest percentage of respondents lives in households with annual incomes of $40,000 to $59,999, followed closely by the percentage of respondents
from households with $25,000 to $39,999 annual income. Almost 15 percent are from households with less than $25,000 annual income.

Conclusions

The objective of this project was to determine opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this appendix describes, in some detail, the findings of the survey.

Exhibit D1-37 summarizes the importance scores. The three highest importance ratings are “Highway Surface,” “Signage,” and “Bridges.” In “Highway Surface,” the top rated activities, in terms of importance to the respondent, are “Patching potholes” and “Safe Roads.” In the “Signage” category, the top rated activities are “Providing working signals” and “Maintaining visible signals.” In “Bridges,” “Repairing bridges” is most important to respondents.

Exhibit D1-81 summarizes the problem scores. Looking only at the overall problem scores for categories of maintenance activities, the top three categories are: (i) Highway Surface Work; (ii) Roadside; and (iii) Bridges. Within the “Highway Surface Work” category, “Patching potholes” has the highest problem score. In the “Roadside” category, “Leveling drop-offs” and “Removing litter” have the highest problem scores. In “Bridges” category, “Replacing bridges in a timely manner” has the highest problem score. The problem scores suggest that the S.C. Department of Transportation will have a greater and more positive impact if maintenance activities are focused (first) on these activities.
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Appendix 2
Results of Highway Maintenance Survey
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Introduction
The results of the Highway Maintenance Survey as they pertain to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 2 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology
In mid-2003, 4,351 surveys were mailed to potential respondents in District 2. District 2 is composed of Abbeville, Edgefield, Greenwood, Laurens, McCormick, Newberry, and Saluda counties. In this district, 662 respondents returned completed questionnaires, yielding an 15.2 percent response rate.

Results
The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allow development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material is reserved for the Conclusions section of the report.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface
Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits D2-1 through D2-7.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D2-1) and “Keeping Roads Safe to Drive on” (Exhibit D2-5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” It is easier to compare the activities when mean ratings are examined (Exhibit D2-8). Here, Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. The lowest rated categories “removing snow and ice,” “repave roads,” and “keeping same conditions statewide” are still well above the “somewhat important” rate. Over all for the activities in this category, the mean is 4.58 or “Very Important.” This average is nearly equivalent to the statewide average.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D2-9 through D2-14. The “very important” rating is highest for “Leveling drop-offs or ruts at edge of pavement and shoulder.” For “Removing Litter (Trash),” the ratings for “very important” and “important” are about equal. Exhibit
D2-15 shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs,” and the least important in this group is “Cleaning Ditches and Gutters.” The mean importance rating for the category, as a whole was 4.33 or “Somewhat Important,” the same as the statewide average.

The third set of activities is labeled “Beautification/Attractiveness” and contains only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits D2-16, D2-17, and D2-18, respectively.

These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category, 3.61 or close to “Somewhat Important,” is a bit below the statewide average.

There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
- Providing adequate number of traffic lights;
- Maintaining visibility of raised reflective pavement markers; and
- Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in **Exhibits D2-19 through D2-26**.

In this category, the evaluations are most tightly clustered on “Very Important” for both “Keeping traffic signals clearly visible” and “Keeping traffic signals working.” Responses for “Maintaining visibility of raised reflective pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance in this maintenance category.
The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D2-27. Here, one can see that almost all of these activities are above a mean of 4.0, that is, close to “Very Important.” The least important in this category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this category overall is 4.70, slightly above the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits D2-28 through D2-30, with Exhibit D2-31 showing the mean importance rating for this category.

From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category, and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.32, or “Somewhat Important.” This puts the district-wide average higher than the statewide-average.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.81 for the category overall), the former is more important (Exhibits D2-32, D2-33, and D2-36). The district-wide average is about the same as the statewide average.

The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this
category is 4.21, or “Somewhat Important” (Exhibit D2-36), and above the statewide average. Further, a glance at Exhibits D2-34 and D2-35 show that the distributions of responses are virtually identical.

To summarize this section (Exhibit D2-37), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping traffic signals working,” followed closely by “Keeping roads safe to drive on” and “Patching potholes,” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same categories of activities noted in Section I were used and presented to respondents in the same order as in
Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits D2-38 through D2-44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. The percentage of respondents assigning a B is greatest for all activity assignments except “Keeping the same conditions statewide.” D and F grades are more prevalent for “Keeping roads the same condition statewide” and “Re-Paving Roads” than for the other activities in this category. The mean grade for Highway Surface Work considering all the activities together was 3.45, or a C+ (Exhibit D2-45). Note that the district-wide grade is higher than the statewide grade.
For the maintenance activities included as Roadside Work, the distribution of grades is shown in 
Exhibits D2-46 through D2-51. In most of these activities, the percentage of respondents assigning a B 
or C grade is almost equal. Exhibit D2-52 shows the mean grade respondents assigned to the activities in 
this category. Here, the highest given is a 3.55, a B. The mean grade overall of 3.36, a C+, is almost 
equal to the statewide overall grade.
The mean grades for the “Beautification/Attractiveness” maintenance activities is higher than those previously reported (Exhibits D2-53 through D2-55). The overall grade is 3.68, a B, somewhat below the statewide average (Exhibit D2-55). Grades B and C are almost equally distributed for “Maintaining wildflowers”, whereas grade B is more prominent for “Providing satisfactory landscape appearance” (Exhibits D2-53 and D2-54, respectively).
The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are **Exhibits D2-56 through D2-63**. Grades A and B are almost equally distributed for “Keeping traffic signals working” and “Providing adequate number of traffic lights”. The percentage of respondents assigning a “B” is most pronounced for “Maintaining visibility of pavement markings”.
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D2-64. Respondents give an average of a “B” (4.05) to these activities, with the lowest grade assigned to “Maintaining visibility of pavement markings” and the highest grade to “Keeping traffic signals working.” The district-wide mean is somewhat above the statewide mean.
Exhibits D2-65 through D2-67 (below) show the distributions of responses for the individual activities in this category. For each activity, the percentage of respondents assigning a B is higher than the percentages of respondents assigning any other grade. Overall, the mean grade for all the activities in this category 3.95, or a B (Exhibit D2-68), and is the same as the statewide average. Among the activities in this group, the highest grade assigned was for “Providing satisfactory appearances of rest areas.”

Grades for the bridge maintenance activities were somewhat lower (Exhibits D2-69 and D2-70). A somewhat greater percentage of respondents assigned an “F” to “Replacing bridges in a timely manner”. Grade B is more prominent in both the categories. The mean overall grade was 3.61, or a B (Exhibit D2-73), a little higher than the statewide average. The mean grade for “Keeping bridges repaired” was higher than that for “Replacing bridges in a timely manner.”
The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D2-71 and D2-72, previous page). Exhibit D2-73 shows the summary of grade of all the categories for the District 2. The overall grade of 3.47, a C+, is somewhat above the statewide average.

The mean score for each maintenance activity category is shown in Exhibit D2-74. Overall the average is 3.67 or a B and is about the same as the statewide average. In District 2, the highest grade was earned by “Signage,” and the lowest was “Roadside.”
Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. *This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public.* In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying unidentified problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. **Exhibits D2-75 through D2-80** show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From **Exhibit D2-75** on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement” followed closely by “Remove Irregularities”. As will be seen upon review of the remaining exhibits in this group, “Patching potholes” has the largest problem score of all. In essence, this means that more people will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes and removing dips, bumps, and irregularities than will be the effect of maintenance on any other single activity. The overall problem score for “Highway Surface Work” is 7.08, which is below the average statewide problem score for this maintenance activity category.

For “Roadside Work” (**Exhibit D2-76**), “Leveling drop-offs” has the highest problem score in the category followed closely by “Controlling vegetation”. In District 2, “Roadside Work” has an overall problem score of 7.09, which slightly below the statewide average for this category.

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (**Exhibit D2-77**). The problem score for “Providing satisfactory landscape appearance” is somewhat higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 4.78, slightly above that for the statewide average.
Exhibit D2-78 shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 4.46 problem score, which is somewhat below the statewide average for this category. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 5.38.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (Exhibit D2-79). The overall score for this category of 4.52 is only slightly below the statewide average.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (Exhibit D2-80). “Bridges” overall has a 6.69 problem score, somewhat below the statewide average.

There is little difference in problem scores between the two maintenance activities included in the “Residential Driveways” category (Exhibit D2-80). The overall score for this category is 6.43, but is higher than the statewide average.

Exhibit D2-81 summarizes Problem Scores by maintenance category. Thus, overall, greater attention to four categories is likely to be more satisfactory to more South Carolinians. These are “Highway Surface,” “Roadside,” “Bridges,” and “Driveways.” As noted earlier, individual maintenance activities within each category have divergent problem scores. A scan of the summary exhibits shows that all “Highway Surface” work has a higher problem score than all maintenance activities in “Beautification/Attractiveness,” “Signage/Signals/Markers” and “Rest Area/Welcome Center.” Note that because the District 2 average problem scores are higher than the statewide average for beautification and driveways, maintenance efforts in these two categories would be more positively received in District 2. Regardless, these two categories do not have the highest problem score averages.
Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all there were to spend was $100. The results are shown in Exhibit D2-82. Though the categories are not perfectly consistent with the categories discussed previously, the results are consistent with the earlier findings. In particular, the categories that respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest county in District 2 when population is considered is Laurens (Exhibit D2-83), followed by Greenwood, then Saluda.

Exhibit D2-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 75 percent of respondents are married (with 25 percent being unmarried). About 30 percent are retired, and nearly 60 percent are male. More than 70 percent of respondents are employed, with more than 80 percent of these being employed full time. More than 75 percent of respondents report they live in an urban community (as opposed to a rural community).

Exhibits D2-85 and D2-86 show size of household, respondent age, and household income. As is clear, the average household size is 2.8 persons. The largest proportion of respondents are between 35 and 49 years, and more than 15 percent are 65 years and older. The largest percentage of respondents lives in households with annual incomes of $40,000 to $59,999. Almost 20 percent are from households with less than $25,000 annual income.
Conclusions

The objective of this project was to determine opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this appendix describes in some detail the findings of the survey.

Exhibit D2-37 summarizes the importance findings. The top three categories in terms of importance to respondents are: (i) Highway Surface Work; (ii) Signage; and (iii) Bridges. Within the “Highway Surface Work” category, “Patching potholes” and “Providing Safe Roadways” are most important. In the “Signage” category, “Maintaining working signals” and “Providing visible signals” are most important. In “Bridges” category, “Repairing bridges” is the most important maintenance activity.

The tallest bars in Exhibit D2-81 show where the S.C. Department of Transportation should put its emphasis. In other words, the public will more positively perceive greater maintenance effort on the activities with the tallest blue bar. Specifically, these are: (i) Highway Surface Work; (ii) Roadside Work; (iii) Bridges; and (iv) Residential Driveways. Even within these categories, greater maintenance of certain individual activities will have a more positive effect on the public.
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Importance—Roadside Work
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Appendix 3
Results of Highway Maintenance Survey
District 3

Introduction

The results of the Highway Maintenance Survey as they pertains to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 3 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology

In mid-2003, 3,986 surveys were mailed to potential respondents in District 3. District 3 is composed of Anderson, Greenville, Oconee, Pickens, and Spartanburg counties. In this district, 542 respondents returned completed questionnaires, yielding a 13.6 percent response rate.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allow development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material is reserved for the Conclusions section of the report.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface

Highway Maintenance Survey, District 3, D3-1
Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits D3-1 through D3-7.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D3-1) and “Keeping Roads Safe to drive on” (Exhibit D3-5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” It is easier to compare the activities when mean ratings are examined (Exhibit D3-8). Here, Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. The lowest rated categories “Remove irregularities”, “repave roads” and “keeping same conditions statewide” are still well above the “somewhat important” rate. Overall for the activities in this category, the mean is 4.57 or “Very Important,” which is the same as the statewide mean.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D3-9 through D3-14. Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the
Exhibit D3-9: Importance Rating of Cleaning Ditches and Gutters, District 3

Exhibit D3-10: Importance Rating of Removing Litter (Trash), District 3

Exhibit D3-11: Importance Rating of Controlling Vegetation (Like Grass and Weeds), District 3

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Exhibit D3-15: Mean Importance Ratings of Roadside Work (4.30 Overall), District 3
previous group of assessments. The percentage of respondents indicating “important” is greater for “Cleaning ditches and gutters” and “Controlling vegetation” (Exhibits D3-9 and D3-11, respectively) than for the other maintenance activities. Exhibit D3-15 shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs,” and the least important in this group is “Cleaning Ditches and Gutters.” The mean importance rating for the category in District 3 as a whole was 4.30 or “Somewhat Important.” The overall rating was slightly lower than that for the state.

The third set of activities is labeled “Beautification/Attractiveness” and contains only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits D3-16 and D3-17, respectively.

Exhibit D3-16: Importance Rating of Maintaining Wildflowers, District 3

Exhibit D3-17: Importance Rating of Providing Satisfactory Landscape Appearance, District 3

Exhibit D3-18: Mean Importance Ratings of Beautification/Attractiveness (3.63 Overall), District 3

These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.63, “Somewhat Important,” and slightly below the statewide average.

There are eight activities in the Signage/Signals/Markers category:

• Maintaining adequate signage (like speed limit posting, stop sign, work zone);
• Providing adequate number of signs (like speed limit posting, stop signs, work zone);
• Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
• Keeping traffic signals clearly visible;
• Keeping traffic signals working;
• Providing adequate number of traffic lights;
• Maintaining visibility of raised reflective pavement markers; and
• Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits D3-19 through D3-26. In this category, the evaluations are most tightly clustered on “Very Important” for both “Keeping traffic signals clearly visible” and “Keeping traffic signals working.” Responses for “Maintaining visibility of raised reflective pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance among activities in this maintenance category.
The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D3-27. Here, one can see that almost all of these activities are above a mean of 4.0, that is, close to being “Very Important.” The least important in this category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this maintenance category is 4.67, the same as the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits D3-28 through D3-30, with Exhibit D3-31 showing the mean importance rating for this category.

From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.25, or “Somewhat Important,” and just below the statewide mean.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.77 for the category overall), the former is more important (Exhibits D3-32, D3-33, and D3-36).

The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this category is 4.01, or “Somewhat Important” (Exhibit D3-36). However, a glance at Exhibits D3-34 and D3-35 show that the distributions are virtually identical. The mean ratings for both bridges and driveways for District 3 are below the statewide means.
To summarize this section (*Exhibit D3-37*), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Keeping traffic signals working” and “Patching potholes,” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

**Section II.** In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same
categories of activities noted in Section I were used and presented to respondents in the same order as in Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits D3-38 through D3-44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. In most of the activities, the percentages of respondents assigning a
Bs or Cs were almost the same. The mean grade for Highway Surface Work considering all the activities together was 3.43, or a C+, and somewhat below the statewide average (Exhibit D3-45).

For the maintenance activities included as Roadside Work, the distribution of grades is shown in Exhibits D3-46 through D3-51. “Removing Litter” and “Leveling Drop-Offs” has the highest percentages of Fs among the activities in this maintenance category. Exhibit D3-52 shows the mean
grade respondents assigned to the activities in this category. Here, the highest given is a 3.57, a B. The mean grade overall is 3.42, a C+. This is somewhat below the statewide mean.

The mean grades for the “ Beautification/Attractiveness” maintenance activities is higher than means previously reported (Exhibits D3-53 through D3-55). Specifically, the overall grade is 3.86, a B. The distribution of responses for both activities are nearly the same (Exhibits D3-53 and D3-54).
The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are Exhibits D3-56 through D3-63. Grades A and B have about the same percentage of respondents for “Keeping traffic signals working,” “Keeping traffic signals clearly visible,” and “Providing adequate number of traffic lights”. The percentage of respondents assigning a B is most pronounced for “Maintaining visibility of raised reflective pavement markers”.

Exhibit D3-55: Mean Grade for Beautification/Attractiveness (3.86 “B” Overall), District 3

Exhibit D3-56: Grade for Maintaining Adequate Signage (Speed Limit, Stop, Work Zone), District 3

Exhibit D3-57: Grade for Providing Adequate Number of Signs, District 3

Exhibit D3-58: Grade for Maintaining Visibility of Pavement Markings, District 3

Exhibit D3-59: Grade for Keeping Traffic Signals Clearly Visible, District 3
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D3-64. It is clear that respondents give an average of a B (4.03) to these activities taken as a group; the lowest grade is for “Maintaining visibility of pavement markings,” and the highest grade is for “Keeping traffic signals working.”
The grades for “Rest Area/Welcome Center” maintenance activities are above 3.5 (B). Exhibits D3-65 through D3-67 shows the distributions of responses for the individual activities in this category. In all the categories, the percentage of respondents assigning a “B” is higher than the percentages assigning another grade. Grade A is close behind for “Providing satisfactory appearance of rest areas” and “Providing clean restroom and picnic facilities.” Overall, the mean grade for all the activities in this category is 3.98, a B (Exhibit D3-68), and is slightly higher than the statewide average grade. Among the activities in this group, the highest grade assigned was for “Providing satisfactory appearances of rest areas.”

Grades for the bridge maintenance activities were somewhat lower (Exhibits D3-69, D3-70, and D3-73). Grade B is more prominent in both the activities. The mean overall grade was 3.61, or a B. The mean grade for “Keeping bridges repaired” was higher than that for “Replacing bridges in a timely manner.”
The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D3-71, D3-72, and D3-73). A greater percentage of respondents assigned an F to “Installing Aprons” than those who assigned an F to “Keeping Aprons Repaired.”

The summaries for District 3 on bridges and driveways are shown in Exhibit D3-73. Here, we see that the district-wide average for both maintenance categories is higher than the statewide averages for both.

Exhibit D3-74 shows the summary of grade of all the categories for the District 3. The overall grade was 3.69, a B, somewhat above the statewide average. In District 3, signage, beautification, and rest areas earned the highest grade among the maintenance categories.
Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public. In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying unidentified problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. Exhibits D3-75 through D3-80 show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From Exhibit D3-75 on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement” followed by “Remove Irregularities.” As will be seen upon review of the remaining exhibits in this group, “Patching potholes” has the largest problem score of all activities. In essence, this means that more people will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes. The overall problem score for “Highway Surface Work” is 7.15, and is somewhat lower than the statewide average. This means that District 3 respondents do not perceive highway surface work as problematic as do respondents for the state as a whole.

Exhibit D3-75: Problem Scores for Highway Surface Work (7.15 Overall), District 3

For “Roadside Work” (Exhibit D3-76), “Leveling drop-offs or ruts at edge of pavement and shoulder” has the highest problem score in the category. The next activity is “Remove litter” followed closely by “Keeping shoulders in good condition”. The category of “Roadside Work” has an overall problem score of 6.81, which is below the statewide average.

Exhibit D3-76: Problem Scores for Roadside Work (6.81 Overall), District 3

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem scores (Exhibit D3-77), and they are
The “Beautification/Attractiveness” category has an overall problem score of 4.15, well below the statewide average.

**Exhibit D3-78** shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 4.51 problem score, which is somewhat below the statewide average. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 5.61, and is above the other activities in this category.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (**Exhibit D3-79**). The overall score for this category of 4.30 is well below the average for the state.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (**Exhibit D3-80**), and is substantially higher than “Repairing bridges.” The “Bridges” category overall has a 6.63 problem score, which is somewhat below the statewide average for “bridges.”

The problem scores for the two maintenance activities included in the “Residential Driveways” category are virtually identical (**Exhibit D3-80**). The overall score for “Residential Driveways” is 6.91. The average for District 3 respondents is somewhat below the average for the state as a whole.

**Exhibit D3-81** summarizes the Problem Scores by maintenance category. Maintenance attention focused on four categories—“Highway Surface,” “Roadside,” “Bridges,” and “Driveways”—will likely evoke greater satisfaction than will maintenance attention addressing the other categories. This is the same for District 3 as for the state as a whole. Note, however, that in no instance is the mean problem score for District 3 maintenance categories higher than it is for the state as a whole. Individual maintenance activities within each category have divergent problem
scores. A scan of the summary exhibits shows that most of the activities in “Highway Surface” work have a higher problem score than all maintenance activities in “Beautification/Attractiveness,” “Signage/Signals/Markers” and “Rest Area/Welcome Center.” The overall problem score for District 3 is 5.78.

Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all they were to spend was $100. The results are shown in Exhibit D3-82. Though the categories are not perfectly consistent with the categories discussed previously, the results are consistent with the earlier findings. In particular, the categories that respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest county in District 3 when sample population is considered is Greenville (Exhibit D3-83), followed by Anderson, then Spartanburg.

Exhibit D3-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 75 percent of respondents are married (with 25 percent being unmarried). About 25 percent are retired, and nearly more than 55 percent are male. More than 75 percent of respondents are employed, with close to 80 percent of these being employed full time. More than 45 percent of respondents report they live in an urban community (as opposed to a rural community).

Exhibits D3-85 and D3-86 show size of household, respondent age, and household income. As is clear, the average household size is 2.65 persons. The largest proportion of respondents is between 35 and 49 years. The
largest percentage of respondents lives in households with annual incomes of $40,000 to $59,999. Almost 16 percent are from households with less than $25,000 annual income.

Conclusions

The objective of this project was to determine opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this appendix describes in some detail the findings of the survey for District 3.

Looking only at the overall importance scores for categories of maintenance activities (Exhibit D3-27, page D3-10), the top three categories in terms of importance to respondents are: (i) Highway Surface Work; (ii) Signage; and (iii) Bridges. Within the “Highway Surface Work” category, “Patching potholes” and “Providing Safe Roads” are most important. In the “Signage” category, “Providing working signals” and “Maintaining visibility of signals” are most important. In “Bridges” category, “Repairing bridges” is the most important maintenance activity.

The tallest bars in Exhibit D3-81, showing the problem scores, indicate where the S.C. Department of Transportation should put its emphasis. In other words, the public will more positively perceive greater attention to maintenance of the activities within the tallest bar maintenance categories. Specifically, these are: (i) Highway Surface Work; (ii) Roadside Work; (iii) Bridges; and (iv) Residential Driveways. Even within these categories, greater attention to certain individual activities will have a more positive effect on the public.
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Appendix 4
Results of Highway Maintenance Survey
District 4

Introduction

The results of the Highway Maintenance Survey as it pertains to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 4 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology

In mid-2003, 3,879 surveys were mailed to potential respondents in District 4. District 4 is composed of Cherokee, Chester, Chesterfield, Fairfield, Lancaster, Union, and York counties. In this district, 379 respondents returned completed questionnaires, yielding a 9.8 percent response rate.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allows development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material is reserved for the Conclusions section of the report.

The results of the survey for SCDOT District 4 are represented below.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight
categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contained seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits D4-1 through D4-7.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D4-1) and “Keeping Roads Safe to drive on” (Exhibit D4-5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” It is easier to compare the activities when mean ratings are examined (Exhibit D4-8). Here, Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. Though respondents rate “Repaving roads” the lowest in this maintenance category, it is still well above the “somewhat important” rate. Overall for the activities in “Highway Surface Work,” the mean is 4.62, “Very Important,” and slightly above the statewide mean.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D4-9 through D4-14 (next page). Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the previous group of assessments. Only “Leveling drop-offs or ruts at edge of pavement and
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Exhibit D4-9: Importance Rating of Cleaning Ditches and Gutters, District 4

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shoulder” (Exhibit D4-14) and “Keeping road shoulders in good condition” (Exhibit D4-15) have almost no responses in the “neither” and lower categories. Exhibit D4-15 shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs” and the least important in this group are “Controlling Vegetation” and “Cleaning Ditches and Gutters.” The mean importance rating for the category, as a whole was 4.37, “Somewhat Important,” and is the same as the state average.

The third set of activities was labeled “Beautification/Attractiveness” and contained only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits D4-16, D4-17, and D4-18, respectively. These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.49 or close to “Somewhat Important” and well below the statewide average.
There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
- Providing adequate number of traffic lights;
- Maintaining visibility of raised reflective pavement markers; and
- Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits D4-19 through D4-26.
In this category, the evaluations are most tightly clustered on “Very Important” for “Keeping traffic signals working,” and tightly clustered on “Very Important” (80 percent of responses) on three other activities: (i) “Maintaining adequate signage,” (ii) “Maintaining visibility of pavement markings,” and (iii) “Keeping traffic signals clearly visible.” The remaining maintenance activities in this group exhibit greater variance in responses.

The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D4-27. Here, one can see that almost all of these activities are above a mean of 4.0, and is close to “Very Important.” This exhibit echoes the results noted in the previous paragraph. The least important in this category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this maintenance category is 4.66, and equal to the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits D4-28 through D4-30, respectively, with Exhibit D4-31 showing the mean importance ratings for this category.
From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.25, “Somewhat Important,” and slightly below the statewide average.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.79 for the category overall and equal to the statewide average), the former is most important (Exhibits D4-32, D4-33, and D4-36).

The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this category is 4.10, or close to “Somewhat Important” but below the statewide average (Exhibit D4-36). However, a glance at Exhibits D4-34 and D4-35 show that the ratings are virtually identical.

To summarize this section (Exhibit D4-37), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these
categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Patching potholes” and “Keeping traffic signals working,” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same categories of activities were used and presented to respondents in the same order. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits D4-38 through D4-44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work.
For four of the activities—(i) Patching potholes, (ii) Removing dips, bumps, or irregularities, (iii) Keeping the same conditions statewide, and (iv) Re-Paving Roads—the percentage of respondents assigning an F is much higher than for the other three activities. The mean grade for Highway Surface Work considering all the activities together was 3.22, or a C (Exhibit D4-45). The District 4 mean grade was somewhat above the statewide mean grade.

For the maintenance activities included as Roadside Work, the distributions of grades are shown in Exhibits D4-46 through D4-51. In most of the activities, a greater percentage of respondents assign a C
grade than any other grade assigned. For “Maintaining sidewalks” a B grade is prominent. Exhibit D4-52 shows the mean grade assigned to the activities in this maintenance category. Here, the highest given is a 3.48, a B, though the mean grade overall is 3.22, a C. The mean grade is somewhat below the statewide average.

The overall grade for the “Beautification/Attractiveness maintenance activities (Exhibits D4-53 through D4-55) is 3.31, a C, and there is little difference in the grade distributions between “Maintaining wildflowers” and “Providing satisfactory landscape appearance” (Exhibits D4-53 and D4-54, respectively).
The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are **Exhibits D4-56 through D4-63**. In all of the activities, the percentage of respondents assigning a B was higher than those assigning other grades. The percentage of respondents assigning a B is most pronounced for “Providing adequate number of traffic lights” followed closely by “Keeping traffic signals working.”
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D4-64. It is clear that respondents give an average of a B (3.83) overall for these activities. This average is somewhat below the statewide average. “Maintaining visibility of pavement markings” earned lowest marks, and “Keeping traffic signals working” earned the highest marks.
The grades for “Rest Area/Welcome Center” maintenance activities are above 3.5 (somewhat important). Exhibits D4-65 through D4-67 shows the distributions of responses for the individual activities in this category. In all the categories, the percentage of respondents assigning a B is higher than those assigning another grade. Overall, the mean grade for all the activities in this category is 3.83, or a B (Exhibit D4-68). This average is slightly below the statewide average. Among the activities in this group, the highest grade assigned was for “Providing satisfactory appearances of rest areas.”

Grades for the bridge maintenance activities are shown in Exhibits D4-69, D4-70, and D4-73. Grade B is more prominent for both the activities. The mean overall grade of 3.44, or a C (Exhibit D4-73) is slightly below the statewide average. The mean grade for “Keeping bridges repaired” was higher than that for “Replacing bridges in a timely manner.”

The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D4-71, D4-72, and D4-73). The mean grade was 3.41 overall, a C, and is slightly below the statewide average.
Exhibit D4-74 shows the summary of grade of all the categories for District 4. The overall grade was 3.49, a C. “Signage” was given the highest grade by District 4 respondents, followed closely by “Rest Area Maintenance.” Note that the average District 4 grade is well below the statewide average.

Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. *This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public.* In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. **Exhibits D4-75 through D4-80** show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From **Exhibit D4-75** on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement.” As will be seen upon review of the remaining exhibits in this group, this maintenance activity has the largest problem score of all. In essence, this means that more people will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes. The overall problem score for “Highway Surface Work” is 8.28, well above the statewide average for this maintenance category.

For “Roadside Work” (**Exhibit D4-76**), “Leveling drop-offs or ruts at edge of pavement and shoulder” have the highest problem score in the category followed in order by “Keeping road shoulders in good condition” and “Removing litter”. The category of “Roadside Work” has an overall problem score of 7.77. As with the previous maintenance category, this district-wide average is well above the statewide average for this category.
In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (Exhibit D4-77). The problem score for “Providing satisfactory landscape appearance” is only slightly higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 5.00, which is above the statewide average.

Exhibit D4-78 shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 5.40 problem score. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 6.80. As with the previous categories, the district-wide average is well above the statewide average.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (Exhibit D4-79). The overall score for this category of 4.94 is above the statewide average.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (Exhibit D4-80). “Bridges” overall have a 7.46 problem score, which is well above the statewide average.

In the “Residential Driveways” category, the problem score for repairing aprons is highest (Exhibit D4-80). The overall score for this category is 6.50, and, again, is above the statewide average.
Exhibit D4-81 summarizes the Problem Scores by maintenance category. Note that across the board the problem scores for District 4 are higher than that for the state as a whole. Further, the gap between the two is greatest for highway surface work. Thus, overall, greater attention to four categories is likely to be more satisfactory to more South Carolinians in District 4. These are “Highway Surface,” “Roadside,” “Bridges,” and “Driveways.” As noted earlier, individual maintenance activities within each category have divergent problem scores. A scan of the summary exhibits shows that almost all “Highway Surface” work has a higher problem score than all maintenance activities in “Beautification/ Attractiveness,” “Signage/Signals/Markers” and “Rest Area/Welcome Center.” The overall problem score for District 4 was 6.69.

Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all there was to spend was $100. The results are shown in Exhibit D4-82. Though the categories are not perfectly consistent with the categories we have discussed previously, the results are consistent with the earlier findings. In particular, the categories that respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance. Relative to Districts 1, 2 and 3, District 4 respondents want a greater investment in pavement re-surfacing.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest county in District 4 when sample population is considered is York (Exhibit D4-83), followed by Lancaster, then Chester.

Exhibit D4-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 70 percent of respondents are married (with 25 percent being unmarried). About
20 percent are retired, and nearly 60 percent are male. More than 70 percent of respondents are employed, with more than 80 percent of these being employed full time. About 30 percent of respondents report they live in an urban community (as opposed to a rural community).

**Exhibits D4-85 and D4-86** show size of household, respondent age, and household income. As is clear, the average household size is 2.82 persons. The largest proportion of respondents is between 35 and 49 years. The largest percentage of respondents lives in households with annual incomes of $40,000 to $59,999 (25 percent) followed closely by $25,000 to $39,000 (23 percent). Almost 20 percent are from households with less than $25,000 annual income.

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### Exhibit D4-85: Mean Size of Household and Respondent Age, District 4

![Exhibit D4-85](image)

### Exhibit D4-86: Annual Household Income, District 4

![Exhibit D4-86](image)

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**Conclusions**

The objective of this project was to develop opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this report describes in some detail the findings of the survey.

Looking only at the overall importance scores for categories of maintenance activities, the top three categories in terms of importance to respondents are: *(i)* Highway Surface Work; *(ii)* Roadside; and *(iii)* Bridges. Within the “Highway Surface Work” category, “Patching potholes” and “Removing irregularities” is most important. In the “Roadside” category, “Leveling drop offs,” “Keeping shoulders in good condition,” and “Removing litter” are most important. In “Bridges” category, “Replacing bridges in a timely manner” was the most important maintenance activity.

The tallest bars in **Exhibit D4-81** show where the S.C. Department of Transportation should put its emphasis to generate the greatest perceived impact. In other words, the public will more positively perceive greater attention to maintenance of the activities within the tallest bar categories. Specifically, these are: *(i)* Highway Surface Work; *(ii)* Roadside Work; *(iii)* Bridges; and *(iv)* Residential Driveways. Even within the categories, greater maintenance of certain individual activities will have a more positive effect on the public.
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Results of Highway Maintenance Survey
District 5

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Appendix 5
Results of Highway Maintenance Survey
District 5

Introduction

The results of the Highway Maintenance Survey as they pertain to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 5 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology

In mid-2003, 4,288 surveys were mailed to potential respondents in District 5. District 5 is composed of Darlington, Dillon, Florence, Georgetown, Horry, Marion, Marlboro, and Williamsburg counties. In this district, 377 respondents returned completed questionnaires, yielding a 8.8 percent response rate.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allow development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material is reserved for the Conclusions section of the report.

The results of the survey for SCDOT District 5 are represented below.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight
categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in **Exhibits D5-1 through D5-7**.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D5-1) and “Keeping Roads Safe to drive on” (Exhibit D5-5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” It is easier to compare the activities when mean ratings are examined (Exhibit D5-8). Here, Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. Though respondents rate “removing snow and ice” the lowest in this category (4.17), it is still well above the “somewhat important” rate. Over all for the activities in this category, the mean is 4.60 or “Very Important.” This is virtually identical with the statewide mean for this maintenance category.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D5-9 through D5-14. Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the previous group of assessments. The most important activity appears to be “Leveling drop-offs or ruts at...
Exhibit D5-9: Importance Rating of Cleaning Ditches and Gutters, District 5

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edge of pavement and shoulder.” Exhibit D5-15 shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs” and the least important in this group are “Controlling Vegetation” and “Cleaning Ditches and Gutters.” The mean importance rating for the category, as a whole, was 4.40, “Somewhat Important,” and is slightly higher than the statewide average for the same set of maintenance activities.

The third set of activities is labeled “Beautification/Attractiveness” and contains only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits D5-16, D5-17, and D5-18. These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.76, close to “Somewhat Important.” The district mean is above the statewide mean.

There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
- Providing adequate number of traffic lights;
• Maintaining visibility of raised reflective pavement markers; and
• Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits D5-19 through D5-26. The evaluations are tightly clustered on “Very Important” for “Keeping traffic signals working” and “Keeping traffic signals clearly visible” among all activities in this category. Responses for “Maintaining visibility of raised reflective pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance in this category.
The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D5-27. Here, one can see that most of these activities are above a mean of 4.5, that is, close to “Very Important.” The least important in this category is “Providing an adequate number of raised reflective pavement markers.” The mean importance rating for this maintenance category is 4.71, which is both close to “Very Important” and above the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings begin with Exhibit D5-28 and continue through Exhibit D5-31, which shows the mean importance rating for this category.

From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.36, or “Somewhat Important,” and is above the statewide average for this maintenance category.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. These assessments are shown in Exhibits D5-32 through D5-36.

Both of the “Bridges” activities are very important to respondents, although the former is most important. A glance at Exhibits D5-34 and D5-35 show that the ratings for the “Driveways” activities are
virtually identical. The district-wide means for both bridge activities and driveway activities are above the statewide average.

To summarize this section (Exhibit D5-37), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Keeping traffic signals working” and “Keeping bridges repaired,” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same categories of activities noted in Section I were used and presented to respondents in the same order as in
Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

**Exhibits D5-38 through D5-44** show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. In most of the activities, the percentage of respondents assigning a B is nearly equal to the percentage of respondents assigning a C. Grade C is more prominent only in “Removing dips, bumps or irregularities in pavement”. The mean grade for Highway Surface Work
considering all the activities together was 3.19, or a C (Exhibit D5-45). The District 5 mean for this maintenance category is somewhat above the statewide average.

For the maintenance activities included as Roadside Work, the distribution of grades is shown in Exhibits D5-46 through D5-51. In most of the activities, the percentage of respondents assigning a B is almost equal to the percentage of respondents assigning a C grade, with the exception of “Cleaning Ditches and Gutters,” “Controlling vegetation” and “Keeping road shoulders in good condition.”
Exhibit D5-52 shows the mean grade respondents assigned to the activities in this category. Here, the highest grade given is a 3.44, a B. The mean grade overall is 3.18, a C, and is somewhat below the statewide average.

The mean grades for the “Beautification/Attractiveness maintenance activities is higher than those grades previously reported (Exhibits D5-53 through D5-55). Specifically, the overall grade is 3.48, a C+, and there is little difference in the grade distributions between “Maintaining wildflowers” and “Providing satisfactory landscape appearance.” The district-wide mean is below the statewide mean.
The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are Exhibits D5-56 through D5-63. In all of the activities, the percentage of respondents assigning a B was higher than those assigning other grades. The percentage of respondents assigning a B is most pronounced for “Providing adequate signage” followed closely by “Providing adequate number of signs.”
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D5-64. It is clear that respondents give an average of a B (3.86) to these activities, with the lowest grade for “Maintaining visibility of pavement markings” and the highest grade for “Keeping traffic signals working.”

Exhibits D5-65 through D5-67 shows the distributions of responses for the individual activities in Rest Area/Welcome Center maintenance category. In all the categories, the percentage of respondents assigning a B is higher. Overall, the mean grade for all the activities in this category is 3.78, or a B
Among the activities in this group, the highest grade assigned was to “Providing satisfactory appearances of rest areas.”

Grades for the bridge maintenance activities were somewhat lower (Exhibits D5-69, D5-70, and D5-73). “Keeping bridges repaired” received a higher grade than “Replacing bridges in a timely manner.”

The mean overall grade was 3.49, or a “C+” (Exhibit D5-73). The mean grade overall for District 5 is slightly below the statewide average.

The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D5-71, D5-72, and D5-73). The district-wide average for driveways (C+) is slightly below the statewide average.
Exhibit D5-74 shows the summary grades for all categories for District 5. The overall grade of 3.48, a C+, is somewhat below the statewide average. District 5 respondents gave signage the highest grade; the next highest grade was given to “Rest area maintenance.”

Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the
importance of an issue and the consumer’s satisfaction with the same issue. This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public. In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying, unidentified problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. Exhibits D5-75 through D5-80 show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From Exhibit D5-75 on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement.” As will be seen upon review of the remaining exhibits in this group, this maintenance activity has the largest problem score of all maintenance activities examined. In essence, this means that more people in District 5 will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes. The overall problem score for “Highway Surface Work” is 8.35, which is higher than most other districts and the statewide average.

For “Roadside Work” (Exhibit D5-76), “Leveling drop-offs or ruts at edge of pavement and shoulder” has the highest problem score in the category followed closely by “Removing Litter,” “Cleaning ditches and gutters,” and “Keeping shoulders in good condition.” The “Roadside Work” maintenance category has an overall problem score of 8.00. Like the score for the previously discussed maintenance category, this mean is higher than other districts and the statewide mean.

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (Exhibit D5-77). The problem score for “Providing satisfactory landscape appearance” is somewhat higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 5.72, well above the statewide average.
Exhibit D5-78 shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 5.37 problem score, somewhat above the statewide average. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 6.72.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (Exhibit D5-79). The overall score for this category is 5.31, and is above the statewide average for “Rest Area/Welcome Center” activities.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (Exhibit D5-80). “Bridges” overall have a 7.30 problem score. There is little difference in problem scores between the two maintenance activities included in the “Residential Driveways” category (Exhibit D5-80). The overall score for this category is 6.72. Both bridges and driveways exhibit mean scores that are above the statewide average.

Exhibit D5-81 summarizes the Problem Scores by maintenance category. Note that all the maintenance categories have mean problem scores that are above the statewide average. Thus, maintenance attention to any of the maintenance categories will likely be more satisfactory to District 5 South Carolinians. Note also that three of the four categories identified as problematic when the entire state is considered—“Highway Surface,” “Roadside,” and “Driveways”—have markedly higher problem scores in District 5. Further, the
“Beautification/Attractiveness” problem score for District 5 is markedly higher than its counterpart for the state.

Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all there were to spend was $100. The results are shown in Exhibit D5-82. Though the categories are not perfectly consistent with the categories discussed previously, the results are consistent with the earlier findings. In particular, the category that respondents would put the most dollars on is pavement resurfacing. The second category is pavement patching followed by bridge maintenance. Unlike the other districts, these three categories have significant differences in their importance.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest county in District 5 when population is considered is Horry (Exhibit D5-83), followed by Florence, then Darlington.

Exhibit D5-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 70 percent of respondents are married (with 30 percent being unmarried). About 30 percent are retired, and nearly 55 percent are male. Seventy percent of respondents are employed, with more than 80 percent of these being employed full time. About 40 percent of respondents report they live in an urban community (as opposed to a rural community).

Exhibits D5-85 and D5-86 show size of household, respondent age, and household income. As is clear, the average household size is 2.7 persons. The largest proportion of respondents is between 35 and 49 years. The percentage of respondents living in households with annual
incomes of under $25,000, $25,000 - $39,999 and $40,000 to $59,999 are almost the same (close to 24%).

Conclusions

The objective of this project was to determine opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this appendix describes in some detail the findings of the survey.

Looking only at the overall importance scores for categories of maintenance activities (Exhibit D5-37, page D5-9), the top three categories in terms of importance to respondents are: (i) Highway Surface Work; (ii) Signage; and (iii) Bridges. Within the “Highway Surface Work” category, “Patching potholes” and “Having safe roads” are most important. In the “Signage” category, “Providing working signals” is the most important followed by “Providing visible signals” and “Providing visible pavement markers.” In the bridge category “Repairing bridges” is the most important maintenance activity.

The tallest bars in Exhibit D5-81 (page 18) show where the S.C. Department of Transportation should put its maintenance emphasis. In other words, the public will more positively perceive greater attention to maintenance of the activities within the tallest bar categories. Specifically, these are: (i) Highway Surface Work; (ii) Roadside Work; (iii) Bridges; and (iv) Residential Driveways. Even within the categories, greater maintenance of certain individual activities will have a more positive effect on the public.
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Appendix 6
Results of Highway Maintenance Survey
District 6

Introduction

The results of the Highway Maintenance Survey as they pertain to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 6 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology

In mid-2003, 5,052 surveys were mailed to potential respondents in District 6. District 6 is composed of Berkeley, Beaufort, Charleston, Colleton, Dorchester, and Jasper counties. In this district, 570 respondents returned completed questionnaires, yielding a 11.3 percent response rate.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allow development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material is reserved for the Conclusions section of the report.

The results of the survey for SCDOT District 6 are represented below.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface
Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits D6-1 through D6-7.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D6-1) and “Keeping Roads Safe to drive on” (Exhibit D6-5). Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” Comparing the mean ratings (Exhibit D6-8), Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. Though respondents rate “removing snow and ice” the lowest in importance, it is still close to the “somewhat important” rate. Overall for the activities in this category, the mean is 4.52 or “Very Important.” This value is below the statewide average.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D6-9 through D6-14. Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the previous group of assessments. The most important activity appears to be “Leveling drop-offs or ruts at edge of pavement and shoulder.” Exhibit D6-15 shows the mean importance rating for each activity in...
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this maintenance category. As seen, the most important activity is “Leveling Drop-offs” and the least important in this group are “Controlling Vegetation” and “Cleaning Ditches and Gutters.” The mean importance rating for the category, as a whole was 4.30 or “Somewhat Important” and is nearly equal to the statewide average.

The third set of activities is labeled “Beautification/Attractiveness” and contains only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits D6-16, D6-17, and D6-18, respectively. These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.69 or close to “Somewhat Important” and slightly above the statewide average.

There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
- Providing adequate number of traffic lights;
• Maintaining visibility of raised reflective pavement markers; and
• Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits D6-19 through D6-26. In this category, the evaluations are most tightly clustered on “Very Important” for both “Keeping traffic signals clearly visible” and “Keeping traffic signals working.” Responses for “Maintaining visibility of raised reflective pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance in this maintenance category.
The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D6-27. Here, one can see that almost all of these activities are above a mean of 4.0, that is, close to “Very Important.” The least important activity in this maintenance category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this category is 4.67. This value is slightly below the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits D6-28 through D6-30, with Exhibit D6-31 showing the mean importance rating for this category.

From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.28, or “Somewhat Important,” nearly equivalent to the statewide average.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.81 for the category overall), the former is more important (Exhibits D6-32, D6-33, and D6-36).

The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this category is 3.99, or close to “Somewhat Important” (Exhibit D6-36). However, a glance at Exhibits D6-34 and D6-35 show that the ratings and distributions are virtually identical.
For both “bridges” and “driveways” maintenance categories, the district-wide average for District 6 is somewhat below the statewide average for the same maintenance categories.

To summarize this section (Exhibit D6-37), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Keeping traffic signals working” and “Patching potholes,” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same categories of activities noted in Section I were used and presented to respondents in the same order as in
Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits D6-38 through D6-44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. In most of the activities, a greater percentage of District 6 respondents assign either a B or C grade. A greater percentages of respondents assign Bs for “Removing Debris from the Roadway” and “Keeping roads safe to drive on”, while a greater percentage assign Cs for “Patching potholes”, “Removing dips, bumps, or irregularities,” “Keeping roads in the same condition statewide,” and “Keeping roads safe to drive on.”
condition statewide,” and “Removing snow and ice.” The mean grade for Highway Surface Work considering all the activities together was 3.32, or a C+ (Exhibit D6-45). For District 6, the mean grade is the same as the statewide average.

For the maintenance activities included as “Roadside Work,” the distribution of grades is shown in Exhibits D6-46 through D6-51. In most of the activities, the percentages of respondents assigning a B or C are about the same. Exhibit D6-52 shows the mean grade respondents assigned to the activities in
this category. Here, the highest given is a 3.48, a B. The mean grade overall—3.30, a C+—is only slightly below the statewide average.

The overall mean grade for the “ Beautification/Attractiveness” maintenance activities (Exhibits D6-53 through D6-55) is 3.71, a B (the same as the statewide average), and there is little difference in the grade distributions between “ Maintaining wildflowers” and “ Providing satisfactory landscape appearance” (Exhibits D6-53 and D6-54, respectively).
The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are Exhibits D6-56 through D6-63. In all of the activities, the percentage of respondents assigning a B was higher than those assigning other grades. The percentage of respondents assigning a “B” is most pronounced for “Maintaining adequate signage” followed closely by “Keeping traffic signals working” and “Maintaining visibility of raised reflective markers.”
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D6-64. It is clear that respondents give an overall average of a B (3.91) to these activities, with the lowest grade for “Maintaining visibility of pavement markings” and the highest grade for “Keeping traffic signals working.” The overall average for District 6 in this maintenance category is lower than the statewide average.
The grades for “Rest Area/Welcome Center” maintenance activities are above 3.5 (B). **Exhibits D6-65 through D6-67** shows the distributions of responses for the individual activities in this category. In all the categories, the percentage of respondents assigning a B is higher than the percentage assigning other grades. Overall, the mean grade for all the activities in this category is 3.94, or a B (Exhibit D6-68). Among the activities in this group, the highest grade assigned was for “Providing satisfactory appearances of rest areas.”

Grades for the bridge maintenance activities were somewhat lower (**Exhibits D6-69, D6-70, and D6-73, next page**). A somewhat greater percentage of respondents assigned an “F” to “Replacing bridges in a timely manner.” Grade B is more prominent in “Keeping bridges repaired.” The mean overall grade was 3.37, or a C+ (Exhibit D6-73). The District-wide average for bridges is somewhat below the statewide average.
The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D6-71 and D6-72). The nearly equivalent scores yield an overall average of 3.44, or a C+. This is the same as the statewide average.

Exhibit D6-74 shows the summary of grades for all categories by District 6 respondents. The overall grade was 3.57, a B, which is somewhat below the statewide average. The highest grades were given to “Signage” and “Rest area maintenance.”
Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. *This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public.* In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying unidentified problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. **Exhibits D6-75 through D6-80** show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From **Exhibit D6-75** on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement.” As will be seen upon review of the remaining exhibits in this group, this maintenance activity has the largest problem score among all activities. In essence, this means that more people in District 6 will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes. The overall problem score for “Highway Surface Work,” 7.60, is slightly higher than the statewide average.

For “Roadside Work” (**Exhibit D6-76**), “Leveling drop-offs or ruts at edge of pavement and shoulder” has the highest problem score in the category followed closely by “Removing litter.” The category of “Roadside Work” has an overall problem score of 7.30, slightly higher than the statewide average.

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (**Exhibit D6-77**). The problem score for “Providing satisfactory landscape appearance” is somewhat higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 4.77, which is virtually identical to the statewide average.
Exhibit D6-78 shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 5.07 problem score. The overall score is above the statewide average. Within the category, however, “Maintaining visibility of pavement markings” has a much higher problem score of 6.30.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (Exhibit D6-79). Here, the overall score for this category of 4.52 is slightly below the statewide average.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (Exhibit D6-80). “Bridges” overall have a 7.83 problem score. There is little difference in problem scores between the two maintenance activities included in the “Residential Driveways” category (Exhibit D6-80). The overall score for this category is 6.23

Exhibit D6-81 summarizes the Problem Scores by maintenance category. Here, one can see that the scores for District 6 are nearly the same as that for the state as a whole with minor exceptions for bridges and less so for signage and highway surface work. The District 6 score is below the state average for rest areas. Thus, greater attention to four categories identified as problems statewide will likely achieve about the same satisfaction for District 6 residents. As noted earlier, individual maintenance activities within each category have divergent problem scores. A scan of the summary exhibits shows that almost all activities in “Highway surface work” have higher problem scores than all maintenance activities in “Beautification/Attractiveness,” “Signage/Signals/Markers” and “Rest Area/Welcome Center.”
Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all there were to spend was $100. The results are shown in Exhibit D6-82. Though the categories are not perfectly consistent with the categories discussed previously, the results are consistent with the earlier findings. In particular, the categories that respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest county in District 6 when sample population is considered is Charleston (Exhibit D6-83), followed by Berkeley, then Dorchester.

Exhibit D6-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. Close to 70 percent of respondents are married (with 30 percent being unmarried). About one-fourth are retired, and more than 55 percent are male. Close to 75 percent of respondents are employed, with more than 80 percent of these being employed full time. About 60 percent of respondents report they live in an urban community (as opposed to a rural community).

Exhibits D6-85 and D6-86 show size of household, respondent age, and household income. As is clear, the average household size is 2.63 persons. The largest proportion of respondents is between 35 and 49 years, and about 15 percent are 65 years and older. The largest percentage of respondents live in households with annual incomes of $25,000 to $39,999. This is slightly different from the other districts wherein the largest percentage lives in households with annual incomes of $40,000 to $59,999. Almost 20 percent of District 6 respondents are from
households with less than $25,000 annual income, and 10 percent are from households in the highest income category used in this survey.

**Conclusions**

The objective of this project was to determine opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this appendix describes in some detail the findings of the survey as they pertain to District 6.

Looking only at the overall importance scores for categories of maintenance activities, the top three categories in terms of importance to respondents are: (i) Bridges; (ii) Highway Surface Work; and (iii) Roadside. Within the “Highway Surface Work” category, “Patching potholes” and “Keeping roads safe” are most important. In the “Roadside” category, “Leveling drop offs” and “Keepig shoulders in good condition” are most important. In tje “Bridges” category, “Keeping bridges repaired” was the most important maintenance activity.

The tallest bars in **Exhibit D6-81** (page 19) show where the S.C. Department of Transportation should put its emphasis. In other words, the District 6 public will more positively perceive greater attention to maintenance of the activities within the tallest bar maintenance categories. Specifically, these are: (i) Highway Surface Work; (ii) Roadside Work; (iii) Bridges; and (iv) Residential Driveways. Even within the categories, greater maintenance of certain individual activities will have a more positive effect on the public.
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District 7

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Appendix 7
Results of Highway Maintenance Survey
District 7

Introduction

The results of the Highway Maintenance Survey as they pertain to the State of South Carolina are described in the main body of the report. The results from SCDOT’s Service District 7 are described in this appendix. The background, problem, study objectives, and methodology remain unchanged from the main body of the report.

Methodology

In mid-2003, 3,964 surveys were mailed to potential respondents in District 6. District 7 is composed of Allendale, Bamberg, Barnwell, Calhoun, Clarendon, Hampton, and Orangeburg counties. In this district, 459 respondents returned completed questionnaires, yielding a 11.6 percent response rate.

Results

The first section of the survey instrument addressed the importance ratings for maintenance activities in South Carolina. The second section used the same maintenance activities, but requested that respondents assign a letter grade to indicate their assessment of the quality of the job done by the S.C. Department of Transportation. These two evaluations allow development of a “problem score,” that is, a way to assess whether maintenance on specific activities have greater value to John Q. Public. Respondents allocated $100 across eight maintenance categories as a way to indicate where monies should be spent. Demographic data concluded the survey. Each section of the survey instrument is considered independently in the discussion that follows. Pulling the material is reserved for the Conclusions section of the report.

The results of the survey for SCDOT District 7 are represented below.

Section I. Respondents were asked to indicate how important a specific work activity was, using a five-point scale ranging from very unimportant to very important. (There was no opportunity for respondents to choose “don’t know” or “not applicable”.) The activities were grouped into the eight
categories that describe the areas the S.C. Department of Transportation maintains: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

The first category, Highway Surface Work, contains seven activities:

- Patching potholes in pavement;
- Removing dips, bumps, or irregularities in pavement;
- Removing debris from roadway (limbs, tire recaps);
- Keeping roads in same condition statewide;
- Keeping roads safe to drive on;
- Re-paving roads; and
- Removing snow and ice.

The responses for each activity are shown in Exhibits D7-1 through D7-7.
As is evident, the responses are heavily clustered on Very Important for “Patching Potholes in Pavement” (Exhibit D7-1) and “Keeping Roads Safe to Drive on” (Exhibit D7-5). “Keeping Roads Safe to Drive on” elicited the greatest percentage of respondents selecting “very important” than any other maintenance activity in this or any other SCDOT service district. Responses are more broadly disbursed for the remaining activities under the category “Highway Surface Work.” Comparing the mean ratings from Exhibit D7-8, we see that Safe Roads and Patching Potholes are clearly more important than any of the other activities in this category. Though respondents rate removing snow and ice the lowest in this category, it is still well above the “somewhat important” rate. Overall for the activities in this category, the mean is 4.66 or “Very Important.” This is somewhat above the statewide average for this maintenance category.

The second grouping, “Roadside Work,” has six activities to be rated:

- Cleaning ditches and gutters;
- Removing litter (trash);
- Controlling vegetation (like grass and weeds);
- Maintaining sidewalks (includes handicapped ramps);
- Keeping road shoulders in good condition; and
- Leveling drop-offs or ruts at edge of pavement and shoulder.

Respondent assessments for these activities are shown in Exhibits D7-9 through D7-14. Considering the ratings as a group, it is evident that the respondents’ assessments do not cluster as tightly as the
previous group of assessments. The most important activity appears to be “Leveling drop-offs or ruts at edge of pavement and shoulder.” Exhibit D7-15 shows the mean importance rating for each activity in this maintenance category. As seen, the most important activity is “Leveling Drop-offs” and the least important in this group are “Controlling Vegetation” and “Cleaning Ditches and Gutters.” The mean importance rating for the category, as a whole was 4.30 or “Somewhat Important.” This mean is virtually the same as the statewide average.

The third set of activities was labeled “Beautification/Attractiveness” and contained only two activities: (i) “Maintaining wildflowers” and (ii) “Providing satisfactory landscape appearance.” The respondents’ ratings of these two and the mean importance ratings are shown in Exhibits D7-16, D7-17, and D7-18, respectively. These exhibits show that “Providing Satisfactory Landscape Appearance” is somewhat more important than “Maintaining Wildflowers.” Even so, the mean rating for the category is 3.71 or “Somewhat Important” and is slightly higher than the statewide average.

There are eight activities in the Signage/Signals/Markers category:

- Maintaining adequate signage (like speed limit posting, stop sign, work zone);
- Providing adequate number of signs (like speed limit posting, stop signs, work zone);
- Maintaining visibility of pavement markings (like directional arrows, centerline, lane dividers) considering both daytime and nighttime appearance;
- Keeping traffic signals clearly visible;
- Keeping traffic signals working;
• Providing adequate number of traffic lights;
• Maintaining visibility of raised reflective pavement markers; and
• Providing adequate number of raised reflective pavement markers.

The respondents’ importance assessments are shown in Exhibits D7-19 through D7-26. In this category, the evaluations are most tightly clustered on “Very Important” for both “Keeping traffic signals clearly visible” and “Keeping traffic signals working.” Responses for “Maintaining visibility of raised reflective pavement markers” and “Providing adequate number of raised reflective pavement markers” show the most variance in this category.
The mean importance ratings for Signage/Signals/Markers are shown in Exhibit D7-27. Here, one can see that almost all of these activities are above a mean of 4.5, that is, close to “Very Important.” The least important in this category is “Providing adequate number of raised reflective pavement markers.” The mean importance rating for this category is 4.75, and is above the statewide average.

The category “Rest Area/Welcome Center Maintenance” has three activities: (i) Providing satisfactory appearance of rest stops; (ii) Providing clean restroom and picnic facilities; and (iii) Staffing rest areas. The importance ratings are shown in Exhibits D7-28 through D7-30, with Exhibit D7-31 showing the mean importance rating for this category.

From these assessments, it is clear that “Providing clean restroom and picnic facilities” is the most important activity in this category and “Staffing rest areas” is least important. Overall, the importance rating for Rest Area/Welcome Center Maintenance is 4.38, or “Somewhat Important.” As with the previous maintenance category, the district-side mean is above the statewide average.
The last two categories of maintenance activities, “Bridges” and “Residential Driveways,” each have two activities listed. For “Bridges,” the two activities are: (i) Keeping bridges repaired and (ii) Replacing bridges in a timely manner. Though both of these activities are very important to respondents (4.81 for the category overall), the former is more important (Exhibits D7-32, D7-33, and D7-36). The district-wide average is slightly below the statewide average for bridges maintenance activities.

The two activities for “Residential Driveways” are: (i) Keeping driveway aprons repaired up to the property line and (ii) Installing aprons to driveways up to property line. The overall rating for this category is 4.25, or close to “Somewhat Important” (Exhibit D7-36). However, a glance at Exhibits D7-
34 and D7-35 show that the distributions of ratings are virtually identical. Note that the district-wide average for driveway maintenance activities is higher than the statewide average.

To summarize this section (Exhibit D7-37), the maintenance activity category of “Bridges” received the highest importance rating among the seven categories. The lowest importance rating among these categories was given to “Beautification/Attractiveness.” For individual maintenance activities, the highest importance rating was given to “Keeping roads safe to drive on,” followed closely by “Keeping traffic signals working” and “Keeping traffic signals clearly visible,” in that order. The two maintenance activities in the lowest rated category “Beautification/Attractiveness” were rated lowest among the individual maintenance activities.

Section II. In this section, respondents were asked to assign a grade (A, B, C, D, or F) to indicate how good a job the S.C. Department of Transportation does on the specific work activity. (As in the previous section, there was no opportunity for respondents to choose “don’t know” or “not applicable”.) The same categories of activities noted in Section I were used and presented to respondents in the same order as in
Section I. These categories were: Highway Surface Work, Beautification/Attractiveness, Signage/Signals/Markers, Rest Area/Welcome Center Maintenance, Bridges, and Residential Driveways.

Exhibits D7-38 through D7-44 show the distribution of grades assigned for each of the maintenance activities in Highway Surface Work. In most of the activities, the percentage of respondents assigning a B or C grade is almost equal. An A grade is more prominent for “Removing Snow and Ice,” and a B grade is more prominent for “Keeping roads safe to drive on.” The mean grade for Highway Surface
Work considering all the activities together was 3.40, or a C+ (Exhibit D7-45). The mean value is slightly higher than the statewide average.

For the maintenance activities included as Roadside Work, the distribution of grades is shown in Exhibits D7-46 through D7-51. In most of the activities, the percentage of respondents assigning a B or C grade is almost equal or approaching close to equality.


Exhibit D7-52 shows the mean grade respondents assigned to the activities in this category. Here, the highest given is a 3.54, a B. The mean grade overall is 3.31, a C+, for Roadside Work, and is equal to the statewide average.

The mean grades for the “Beautification/Attractiveness maintenance activities is higher than those previously reported (Exhibits D7-53 through D7-55). Specifically, the overall grade is 3.70, a B, and there is little difference in the grade distributions between “Maintaining wildflowers” and “Providing...
satisfactory landscape appearance” (Exhibits D7-53 and D7-54, respectively). District 7’s average grade for beautification/attractiveness is the same as that for the state as a whole.

The exhibits showing the grade distributions for the “Signage/Signals/Markers” maintenance activities are Exhibits D7-56 through D7-63. In almost all of the activities, the percentage of respondents assigning a grade A was higher than those assigning other grades. The percentage of respondents assigning an “A” is most pronounced for “Keeping traffic signals working”.
The mean grades for the Signage/Signals/Markers maintenance activities are shown in Exhibit D7-64. Respondents give an average of a B (4.12) to these activities, with the lowest grade for “Providing adequate number of raised reflective pavement markers” and the highest grade for “Keeping traffic signals working.” The district average is somewhat above the statewide average.
The grades for “Rest Area/Welcome Center” maintenance activities are above 3.5 (somewhat important). Exhibits D7-65 through D7-67 shows the distributions of responses for the individual activities in this category. Overall, the mean grade for all the activities in this category is 3.93, or a B (Exhibit D7-68). This was equal to the statewide mean grade for these activities. Among the activities in this group, the highest grade assigned was for “Providing satisfactory appearances of rest areas.”

Grades B is more prominent for the bridge maintenance activities (Exhibits D7-69, D7-70, and D7-73, next page). A somewhat greater percentage of respondents assigned an “F” to “Replacing bridges in a timely manner”. The mean overall grade was 3.75, or a B (Exhibit D7-73). The district-wide mean for bridges is somewhat higher than the statewide average for the same maintenance category. The mean grade for “Keeping bridges repaired” was higher than that for “Replacing bridges in a timely manner.”
The two maintenance activities in the “Residential Driveways” category received nearly identical grades (Exhibits D7-71, D7-72, and D7-73). The overall mean grade, 3.43 (C+) is slightly below the statewide average.

Exhibit D7-74 shows the summary of grade of all the categories for the District 7. The overall grade was 3.67 “B”. District 7 respondents gave top grades to signage and rest area. Though the lowest grades were C+, the District 7 mean was slightly above the statewide average.
Problem Scores. Developing problem scores is a method for determining the value to the consumer for correcting or fixing a problem. A problem score combines both the consumer’s assessment of the importance of an issue and the consumer’s satisfaction with the same issue. This research in no way identifies the causes for the perceived problems. Nor does the research focus on root causes for problems perceived by the consuming public. In other words, a high “problem score” for patching potholes does not suggest that poor maintenance attention is the cause of potholes needing to be patched. Further, potholes may be a symptom of a deeper, underlying problem associated with the soil under the roadway.

To develop problem scores for this project, the grades and the level of importance were combined. Exhibits D7-75 through D7-80 show the problem scores for each maintenance activity by S.C. Department of Transportation category.

From Exhibit D7-75 on “Highway Surface Work,” the largest problem score is on “Patching potholes in pavement” and “Keeping same conditions statewide.” As will be seen upon review of the remaining exhibits in this group, these maintenance activities have the largest problem scores of all activities studied. In essence, this means that more people in District 7 will receive greater satisfaction if the S.C. Department of Transportation gives more attention to patching potholes and keeping conditions the same statewide. The overall problem score for “Highway Surface Work” is 7.44, which is slightly below the statewide average.

For “Roadside Work” (Exhibit D7-76), “Leveling drop-offs or ruts at edge of pavement and shoulder” has the highest problem score in the category. “Cleaning ditches and gutters” and “Removing litter” follow closely behind. The category of “Roadside Work” has an overall problem score of 7.53, which is somewhat above the statewide average.

In the “Beautification/Attractiveness” category, both maintenance activities have a relatively low problem score (Exhibit D7-77). The
problem score for “Providing satisfactory landscape appearance” is somewhat higher than that for “Maintaining wildflowers.” The “Beautification/Attractiveness” category has an overall problem score of 4.82, which is nearly equivalent to the statewide average.

**Exhibit D7-78** shows the problem scores for the maintenance category of “Signage/Signals/Markers.” Overall the category has a 4.18 problem score, substantially below the statewide average. Within the category, however, “Maintaining visibility of pavement markings” and “Providing an adequate number of pavement markers” have a higher problem scores than other activities listed.

Of the three maintenance activities in the “Rest Area/Welcome Center” category, “Staffing rest areas” has the highest problem score (**Exhibit D7-79**). The overall score for this category is 4.66, about the same as the statewide average.

“Replacing bridges in a timely manner” has the highest problem score within the “Bridges” category (**Exhibit D7-80**). “Bridges” overall have a 6.01 problem score, which is well below the statewide average.

In contrast, the overall score for driveways of 6.68 is well above the statewide average. There is little difference in problem scores between the two maintenance activities included in the “Residential Driveways” category (**Exhibit D7-80**).

**Exhibit D7-81** summarizes the Problem Scores by maintenance category. For District 7 respondents, the average problem scores for roadside work and driveways are above the averages for the state in these categories. So, while the results suggest that maintenance action in the areas of “Highway Surface,” “Roadside,” “Bridges,” and “Driveways” are likely to generate greater satisfaction among the state’s residents, maintenance action which focuses on roadside work and driveways will be even better perceived by residents in District 7.
Section III. The third section of the questionnaire asked respondents to consider how they would allocate dollars among eight categories if all there was to spend was $100. The results are shown in Exhibit D7-82. Though the categories are not perfectly consistent with the categories we have discussed previously, the results are consistent with the earlier findings. In particular, the categories that respondents would put the most dollars on are pavement patching, pavement resurfacing, and bridge maintenance.

Section IV. The fourth and final section of the survey addresses demographic information about the respondent.

The largest county in District 7 when population sample is considered is Orangeburg. (Exhibit D7-83), followed by Clarendon, then Barnwell.

Exhibit D7-84 shows the proportions of respondents exhibiting specific characteristics. The difference between 100 and the proportion shown is the proportion composing the characteristic not shown. So, nearly 65 percent of respondents are married (with 35 percent being unmarried). About one-fourth are retired, and nearly 55 percent are male. Close to 70 percent of respondents are employed, with more than 80 percent of these being employed full time. About 15 percent of respondents report they live in an urban community (as opposed to a rural community). This is a drastic difference from the other districts.

Exhibits D7-85 and D7-86 show size of household, respondent age, and household income. As is clear, the average household size is 2.71 persons. The largest proportion of respondents are between 35 and 49 years, and about 20 percent are 65 years and older. The largest percentage of respondents live in households with annual incomes of $25,000 or less—almost 32 percent. This is also dramatically different from the distribution in other districts.
Conclusions

The objective of this project was to develop opinions and attitudes of the South Carolina public concerning SCDOT’s highway maintenance programs. In this regard, the results section of this report describes in some detail the findings of the survey as they pertain to respondents from SCDOT service District 7.

Recalling the overall importance scores, the top three categories in terms of importance to respondents are: (i) Highway Surface Work; (ii) Signage; and (iii) Residential driveways. Within the “Highway Surface Work” category, “Patching potholes” and “Keeping roads safe” are most important. In the “Signage” category, “Maintaining working signals” is most important. In “Bridges” category, “Repairing bridges” is the most important maintenance activity.

The tallest bars in Exhibit D7-81 show where the S.C. Department of Transportation should put its emphasis. In other words, the public will more positively perceive greater attention to maintenance of the activities within the tallest bar maintenance activity categories. Specifically, these are: (i) Highway Surface Work; (ii) Roadside Work; (iii) Bridges; and (iv) Residential Driveways. Even within the categories, greater maintenance action in certain individual areas will have a more positive effect on the public.