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Transportation Research Center: Public Perception  
of Midwest Pavements

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# Public Perceptions of the Midwest's Pavements - Minnesota - Phase III (Targeted Survey Report)

University of Wisconsin - Extension, Wisconsin Survey Research Laboratory

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*Public Perceptions of the Midwest's Pavements - Minnesota - Phase III (Targeted Survey Report),  
Madison, WI (2001).*

This Phase I study (Minnesota) is part of a larger study. See links below for reports on Phase I, Phase II and the executive summary of this study:

[Phase I - Focus Group Study](#)

[Phase I - Winter Ride Study](#)

[Phase II - State-Wide Survey Report](#)

[Executive Summary \(Minnesota\)](#)

# Public Perceptions of Midwest Pavements

Focus Group Content Analysis - Minnesota

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## INTRODUCTION

### **Purpose of the Study**

This research is being conducted as part of a larger study of the public's perceptions of state-maintained rural highway pavements in Wisconsin, Minnesota, and Iowa. Later stages of this project will involve interviewing residents of the three states by telephone to gather information about people's concerns about the pavements in general and specific stretches of highways in particular. Information from this effort is expected to aid the states' Departments of Transportation refine the standards used to set pavement reconstruction priorities to better meet the needs of residents.

### **Purpose of the Groups**

In order to better understand the general concerns of residents and the terms people use when talking about those concerns, a series of focus groups was conducted in each of the participant states. Each group followed a standard protocol which consisted of a general discussion of pavement features participants liked or dislike, a series of questions which asked participants to choose between difficult options, and a ranking exercise in which participants decided which factors should be considered when prioritizing road repairs. Based on experiences with groups conducted in Wisconsin, some minor modifications were made to the standard protocol including the addition of a section that directly explored the terms participants use in describing different road features. In addition, participants were asked to complete a basic demographic sheet which included questions about driving habits (see Appendix B for a more detailed description of the demographic characteristics of the groups). Moderators were instructed to pay particular attention to differences in terminology used by participants and to explore these differences when they occurred. Similarly, moderators were watchful for any regional differences apparent in the groups.

## Purpose of the Analysis

This paper reports the findings of a content analysis conducted on the focus group transcripts. Content analysis is a useful tool for searching for common patterns in ways of talking about issues as well as for identifying significant differences. It is particularly helpful, as in the current situation, when researchers are interested in gathering more information to use in designing an effective survey instrument. This analysis will focus on several separate issues. First, it will look at the terminology used by participants in order to design questions that will be understandable to and elicit relevant information from respondents. Second, the analysis will examine the ways in which people talked about pavement conditions. The discussions that occurred during these focus groups can sensitize researchers to the kinds of information respondents may have available and the areas that are either difficult for respondents to articulate or that are outside of their experience. Third, this report will explore the substantive position of participants. Obviously, this analysis can not make claims of conclusive or representative findings, but can indicate whether there is reason to believe that a high degree of consensus exists in the general public and what issues are likely to have large variability.

## **DESCRIPTION OF THE GROUPS**

The series comprised six groups in each of the three states for a total of 18 groups. The Minnesota groups were conducted in six separate communities selected by the Department of Transportation to provide a variety of perspectives from different regions of the state. Five groups in Minnesota were entirely composed of people randomly selected from the community who regularly drove rural highways (see Appendix A for a more detailed description of the sampling procedure). One group included a mix of participants who were selected because they held commercial drivers' licenses as well as randomly selected individuals. A total of 58 people participated in the six focus groups conducted in Minnesota including 32 men and 26 women. Participants were

paid \$35 as compensation for their time. Unlike the groups in Iowa and Wisconsin, no participants were specifically asked to drive a stretch of rural highway before coming to the meeting but were asked to identify the stretch of road they were describing’.

### **St. Cloud**

The first Minnesota group was conducted in St. Cloud, in central Minnesota, on October 7, 1996. There were seven participants in the group including five men and two women. The group was comprised of both people selected at random from the community and a number of participants who were invited because they held commercial drivers’ licenses. The group included four motorcycle owners. The special concerns of motorcycle riders rarely entered the conversation.

### **Detroit Lakes**

The second Minnesota group was conducted in Detroit Lakes, in northwestern Minnesota on October, 8, 1996. There were eight participants including four men and four woman. Participants in the Detroit Lakes group were randomly selected from the community. The group include two people who owned recreational vehicles such as motor homes or travel trailers.

### **Grand Rapids**

The third Minnesota group was conducted in Grand Rapids, in the arrowhead of Minnesota, on October 9, 1996. There were ten participants including five women and five men. Participants were selected from the community at random. The group included two recreational vehicle owners and two motorcycle owners. The concerns of

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<sup>1</sup> The conversations in a few groups indicated that participants were professional drivers or drove extensively for their jobs. Unfortunately, we have no specific information about the number of CDL or professional drivers in the groups.

these drivers sometimes entered the conversation. The group also included at least one commercial driver, which was mentioned at times in the discussion.

### Rochester

The fourth Minnesota group was conducted in Rochester, in southeastern Minnesota near both the Iowa and Wisconsin borders, on October 14, 1996. There were nine participants including six men and three women. Participants were selected from the community at random. The group included two people who owned recreational vehicles and one person who owned motorcycles.

### Shakopee

The fifth Minnesota group was conducted in Shakopee, located south of Minneapolis and St. Paul, on October 15, 1996. There were 11 participants including six women and five men. Participants were selected from the community at random. The group included one motorcycle owner and two people who owned recreational vehicles.

### Marshall

The sixth Minnesota group was conducted in Marshall, in southwestern Minnesota, on October 16, 1996. There were 13 participants including seven men and six women. The group was comprised of people selected at random from the community. The group included two people who owned motorcycles and four people who owned motor homes or travel trailers.

## **PHRASING ISSUES**

The focus groups serve an important function by providing background information for researchers to use when designing an effective telephone questionnaire or quantitative survey. Several related themes that emerged in the discussions of the focus

groups directly relate to this process. First, it is important to understand how participants, and eventually respondents, think of or identify particular stretches of highway. Second, focus group discussions should be analyzed to catalog the terms used by participants for various features of the road surface. Third, the experience of the focus group can provide researchers with important insights into the specific problem of verbalizing the non-verbal expressions commonly used in the context of discussions about road conditions.

### **Road Segment Identification**

Because researchers are eventually interested in comparing the findings of a telephone survey with actual pavement conditions, it is imperative to find a reliable way to have respondents identify specific stretches of highway. In order to do this, we must first understand how participants define a stretch of road and then how they identify those stretches. The reliability of such identification will depend on and be limited by the answers to the first question. If people conceive of “stretches” as relatively long, poorly defined distances, any information about smaller, more specific pieces of the road will be highly unreliable.

By far, most references to a stretch of road indicated a specific highway (by number) between two towns or in relation to one town. For example, a person might talk about “from here [St. Cloud] to Glenwood, from St. Cloud to Foley, from St. Cloud down to St. Michael” or they may talk about highway “15, north and south [of St. Cloud].” Occasionally, when participants defined a stretch they would refer to a significant intersection with another highway. In such cases, the intersection was usually one where the roads divided or where the participant usually turned off or on the highway. Participants also noted significant changes in the nature of the road, such as changing from two to four lanes. In some groups, it was common for people to note county lines as the demarcation of stretches, usually in connection with noted differences in the quality of the pavement that began at the county line. Similarly, some in-



dividuals noted important landmarks along the road, such as a store or restaurant. Junctions with county roads were rarely noted.

It is possible to detect a similar feature in all of the more common means of identifying beginning and end points. Drivers note changes in the road that they must respond to as drivers. All of the features included above cause the driver to respond, either by slowing to enter a village, city, or dangerous intersection, remembering to turn, or suddenly needing to pay more attention to a poor road surface. Participants' understanding of the roads on which they travel, then, is intimately connected to the way they travel the road. These findings suggest that the degree to which a particular landmark, intersection, or other point along the highway requires drivers to respond will correspond to the pervasiveness of respondents identification of that specific point. Somewhat ironically, this means that the more a person travels a particular stretch of road, the less able they will be to explicitly name it.

## **Terms**

A second issue of special interest to survey designers are the terms used and understood by participants. It is important to note that these are two distinct issues. The first is the language participants, and eventually respondents, choose to use when discussion certain pavements features. The second is the related issue of what participants understand when someone else, a telephone interviewer for example, uses a specific word. Problems in the latter may pose a significant threat to the effective design of a survey instrument. Luckily, there is greater variation in the former than the latter.

The problem of language comprehension is notable in the context of a survey about highway pavements chiefly because there seems to be little readily accessible vocabulary for participants to call on in discussion. In general, a wide variety of terms were used by individuals, within groups, and among the different groups. This was especially true in Minnesota. Frequently, the same word was used (sometimes with and sometimes without modifier) to indicate separate features or characteristics. In all three

states, including Minnesota, participants often resorted to longer descriptions of features rather than use a single word. All of these things indicate that no commonly agreed upon vocabulary exists in the everyday language of participants. This situation can lead to the development of regional differences and idio-cultural responses.

In order to better understand the terms used by participants, the focus groups in Minnesota began by asking participants what they would call certain road features described by the moderators. In this exercise, there was little evidence of failed communication and a great deal of agreement over terms. However, later in the discussion, this agreement proved to be elusive as participants used a wider variety of new terms to describe road features.

Though this lack of vocabulary caused participants to work harder in order to express themselves, it did not appear to be a major impediment to communication. Moderators noted no instances of failed communication and the transcripts do not provide any internal indication of participant frustration. It would seem that people have a common experience which they can recognize in the speech of others, despite not sharing a single common way of referring to it. Therefore, researchers should be aware that several possible problems could develop, but should not be overly concerned that communication will be seriously threatened. Specifically, two possible situations may occur. First, the potential exists that there are regional variations in terms that were not detected in the focus groups. Second, researchers should not rely on a specific term to describe road features, unless that term is clearly described or defined in the course of the survey.

In addition to these general findings, content analysis also revealed variations surrounding several terms that may be of special interest.

### ***Rutting***

By *rutting*, we mean the indentations along the tire tracks that form on the road surface as a result of compression caused by heavy trucks or traffic. This phenomena

was noted in every group conducted but was frequently referred to be different names. Participants sometimes called these features *wallering out*, *grooves*, the worn *area*, or *tracks*. Participants used several different characteristics to identify this feature including: its causes (trucks or traffic), its location (in the tire tracks), and the fact that it was not an intentional part of the road design but occurred due to wear.

### *Grooves*

By grooves, we mean a pattern of narrow channels purposefully cut into a road surface, either parallel or perpendicular to the road lines, intended to increase surface friction and therefore provide safer driving conditions. Participants were fairly aware of this feature, though not as explicitly aware as they were of rutting. Most respondents indicated that they became aware of grooves as a result of the distinctive noise they causes. Most participants lacked any handy term to use for this feature and instead attempted to describe them, especially in relation to the noises they made (which was most often referred to as *whining*) and recognized their intentional design as an identifying characteristic.

In addition to the fact that most participants lacked a specific term for grooves, there is indication that participants failed to immediately understand what moderators were referring to when using the word “grooves”. In part, this may be due to the fact that many participants considered grooves to be what we are calling ruts. Another problem is the confusion of certain road repair practices with grooving. Specifically, in several areas in the region grinding is used to level the road surface if ruts or frost heaves have created unevenness. Sometimes, this is done to prepare the road for resurfacing while other times it is left as a final end-state. This practice leaves deep grooves which have several characteristics in common with grooves: they are intentional, create a distinctive noise, and can affect driving by “taking” or “grabbing” the car tires. Whatever the cause, discussion about grooves frequently involved an initial debate among

the participants to firmly establish what feature was being discussed and it is unclear whether all participants were in fact discussing the same condition.

Another road feature that may sound somewhat similar to grooving are rumble strips. Focus group moderators specifically asked about these features and found that the most common term was rumble strips. The common identification of rumble strips indicates that any confusion respondents might have between grooving and rumble strips can be quickly and easily eliminated by informing them that we are not speaking of the latter.

### ***Pavement Rehabilitation Strategies***

A third set of terms of obvious importance to this research refer to road reconstruction. Participants made several distinctions in the level of road repair. The first level could be called *patching* and involves simply patching holes in the pavement, sealing cracks, or other similar repairs to specific pavement defects. People also referred to this as *repatching*, *fixing*, and so on. The second level could be termed *resurfacing*, which involves applying a new running surface over the existing surface with only minor repairs to the foundation. This was also called *overlaying* and may include *milling* (or grinding down) the original surface. The third level could be called *reconstruction* and involves substantially rebuilding the underlying structure of the road or rebuilding the road in its entirety. Participants might refer to *regrading* or *grading*, *rebuilding* the road, and so on.

The key to participants' understanding lies in the feature that is being repaired. That is repairing the defects, repairing the surface in its entirety, and repairing the foundation each represent distinct activities. Though these differences obviously connect to the cost and effort involved in repairs, participants did not generally understand these distinctions in terms of major or minor repairs. Again, it is reasonable to assume that major and minor refer to the interruption experienced by a driver, not to

the project that is causing the interruption. In other words, it doesn't matter to the driver if the road is closed to be rebuilt or resurfaced. It only matters that it is closed.

It appears from the focus group discussions that this understanding of levels of road repair is generally pervasive. However, this does not mean that participants would automatically understand terms such as reconstruction without at least a brief explanation. Participants' understandings of these alternatives appear to depend on the object of repair. That is, patching (and related terms) refers to specific problems (potholes, cracks, etc.), resurfacing refers to the entire running surface, and reconstruction refers to the foundation.

### ***Shoulders***

This term is only important for one reason: it demonstrates what participants think of when they think of the road surface. In every group, discussion turned at one point to the shoulder. The shoulder exists as an integral part of the road surface, even though it lies outside of the white lines. There are two reasons for this. First, people recognized the structural significance of the shoulder. Should the shoulder be damaged or absent, the foundation of the road may be compromised. Second, the shoulder is important to people's driving strategies. They view the shoulder as a means of getting around turning cars and an escape route in case of trouble on the road. As such, drivers are constantly aware of the shoulder as intimately related to their driving and therefore to the road surface.

### ***Frost heaves***

***Frost heaves*** describe a wide range of phenomena including individual dips or rises in the road, or a more general undulation of the road surface caused by freezing. Most participants had a specific term for these features, though these terms varied somewhat including ***frost heaves*** or ***boils; wavy, rolly,*** or ***buckling roads; dips, washboard,*** and so on. Several of these terms are more vague and may describe a number of fea-

tures. For example, *washboard* may also describe a stretch of road that has been frequently patched. Most important for the purpose of instrument construction, participants seem to understand most of the terms used by moderators or other participants, especially the more common *frost heaves* or *boils*.

### ***Potholes and Cracks***

A similar statement could be made for holes and cracks in the road surface. Terms for holes included potholes, holes, chuck holes, bumps, and an amazing variety of sound effects. Terms for cracked pavements included a number of verbal descriptions such as *spider web*, or *breakage*. Participants also had a variety of terms that seemed to indicate the relative condition of the cracking and holes ranging from worn, and uneven, through broken up, and crumbling. Again, though, participants understood any terms used by moderators or other participants.

### Sounds

Though not specifically terminology, a common pattern is apparent in the focus group discussions that may enlighten attempts to construct meaningful telephone questionnaires. Specifically, four different classes of sounds were identified by participants, each relating to a different road features. For simplicity, we can refer to these as *whine*, *roar*, the sound of *bad or flat tires*, and *chatter*. The first three of these classes were fairly consistently described, while the fourth is more pervasive, yet less concise. Whining is caused by tining or grooves and is similar to the sound caused by going over certain open-grate bridges. It is identified by its high pitch. Roads roar when the aggregate surface is rough or after the roads have been ground before resurfacing or to eliminate unevenness. This sound is identified by its deep pitch and sounds similar to driving with studded tires<sup>2</sup>. People believe that they have bad or flat tires when driving

<sup>2</sup> References to bridges and studded tires were common and sometimes interchanged.

over a concrete surface that has ridges at the expansion joints or sometimes when traveling on a surface where cracks have been sealed with a asphaltic compound. One person also described this as sounding like a running washing machine to convey the rhythmic nature of the sound. The fourth class is far more general and refers to the noise caused by potholes, cracks, or any number of other road defects. People use a wide variety of terms to describe this such as chatter, vibrations, or generalized noise. Understanding when and how people use these descriptions may assist telephone interviewers and survey designers in creating a more reliable instrument.

### Non-verbal indicators

Finally, the pervasive use of non-verbal indicators in all of the focus groups should be noted again. One of the most remarkable features of these groups was the constant use of pantomime and sound effects. Participants mimicked struggling to control a steering wheel, acted out being jostled by a series of bumps, recreated the sound of going over a rhythmic series of bumps as might be caused by concrete joints, and sculpted the air to indicate the shape of the crown of the road, the undulations caused by freezing, and any number of other characteristics of either the ride or road surface. All of these indicate the difficulty many people have verbalizing their experience of driving. This is most likely the result of these experiences being largely tactile and rarely discussed in detail (or at least, rarely discussed in a context which requires one to avoid non-verbal gestures).

### **SUBSTANTIVE ISSUES**

Participants in the focus groups were initially asked to talk about the features of rural, two-lane, state-maintained highways which they liked and disliked. Participants were asked to focus solely on aspects of the pavement surface, however this proved to be a very difficult task for many people. As a result, the discussions addressed both features of the pavement and some other features of highways more broadly. The follow-

ing discussion, like that of the participants, attempts to focus primarily on pavement features but also includes aspects of highways more generally to the degree that they might inform further research.

## Likes

Participants were directly asked what they like about the roads they drive. The most remarkable result of this question was the relative lack of substantive responses. As a general rule, participants gave vague responses or noted the absence of features that they disliked. For example, people would say that they liked smooth, quiet surfaces, or newly resurfaced or rebuilt roads. They also commonly noted liking the absence of bumps, cracks, dangerous intersections, steep hills, slippery surfaces, and so on. The list of specific features participants actively desired was shorter and less frequently mentioned. It included adequate drainage (i.e. a gentle crown to the road), wide shoulders, clearly painted lines, and various pavement surfaces<sup>3</sup>.

The more general theme that can be extracted from these specific concerns and desires is an expectation that the road surface should not distract from the driver's experience. In other words, drivers negatively evaluate a road surface to the degree that they notice it, and vice versa. For most people, driving is a nearly automatic activity. The other activities people carry on while driving, such as conversations or listening to the radio, occupy a more central attentional position. Any road condition that disrupts this state of affairs, that is, that demands attention from the driver, is negative. Therefore, drivers' positive experiences of road surfaces are largely unavailable to the driver. The only exception occurs when drivers suddenly notice the aversive condition ending. This may happen, for example when one crosses out of one maintenance district with

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<sup>3</sup> A number of people expressed a preference for blacktop because of its smoothness, some for concrete for its durability, and some for a combination of concrete foundation with a blacktopped running surface. Most participants did not indicate a strong preference in any direction.



poorly repaired roads into another with freshly resurfaced ones. In this instance, a positive evaluation may be noted. Otherwise, such evaluations will be difficult. This leads drivers to either report vague likes or construct a negative deficit model of the positive, i.e. the positive is that state which does not include any negatives.

## Dislikes

On the converse, participants are sure and conversant about the features that they dislike. The following is a list of the features that participants most commonly mentioned as dislikes and a brief summary of their reasons.

### ***Rutting***

This was possibly the most common concern among participants. People gave several reasons for their concern. First, deep ruts could make it difficult to control the vehicle. Participants frequently pantomimed struggling with the steering wheel when confronting ruts. This was especially true for smaller cars that have a narrower wheel base than the road ruts. Second, people were concerned about the increased risk of hydroplaning when ruts filled with water, and similarly in the winter, the increased risk of ice forming in the troughs.

### ***Patching***

Dislike of excessive road patching was also common. Participants obviously did not want the Department of Transportation to ignore holes or leave them unattended. Instead, they were concerned when the percentage of patches (compared to original road surface) increased to an unacceptable level or when patches were used to repair previous patches that had deteriorated. There were three reasons for this concern. First, excessive patching was seen as a safety issue. Swerving or slowing to avoid patches could lead to accidents. Likewise, one could lose control as a result of hitting bumps associated with patches. Second, excessive patching is connected with extremely

bumpy rides. Third, excessive patching is seen as an indication that the road is not properly maintained or valued. People felt that patching was frequently ineffective, that patches would deteriorate quickly leaving conditions worse than they were originally, and that resurfacing would be more cost effective in the long run.

### ***Bumps***

There was nearly universal dislike of bumps or potholes. Reasons for the dislike fell into one of three categories: ride, safety, and car damage. For most participants, the obvious discomfort caused by driving over bumps and potholes was obvious and required little conversation. However, discussion frequently went beyond the mere discomfort caused by the problem and linked it to safety concerns. Potholes could be a safety hazard because they could “throw” the car into another lane, required more effort on the part of the driver to maintain control of the vehicle, were distracting, and could cause people to swerve or slow in order to avoid them. Many participants also discussed the car damage that they felt potholes could cause. However, it should be noted that people’s understanding of the damage bumps produce is subjective. That is, people believe that certain conditions are more likely to cause damage than others. Some were concerned that the vibrations caused by a series of little bumps was the primary cause of damage while others believed that the heavy impact of a few large holes was more of a concern.

### ***Shoulder***

As noted earlier, many participants were concerned by narrow shoulders or shoulder that were in disrepair. Their interest was twofold. First, they disliked shoulders that were not wide enough to be used by drivers in the case of emergency or to avoid cars that had slowed or stopped to turn off the road. Second, they worried that shoulders that were in disrepair could lead to other structural problems on or under the running surface of the road. Participants also noted a third shoulder condition that

they disliked: height differences between road and shoulder surface. Several people noted that such differences could catch the tires of a car, causing it to suddenly swerve off the road if it ventured too near the edge.

### ***Uneven repairs***

Several participants expressed dissatisfaction with uneven road conditions on successive stretches of highway. People frequently noticed when the condition of the road would suddenly change, as might happen at a county line or when a limited stretch of road is significantly rebuilt or resurfaced. Several people explained that this situation caused the driver to frequently readjust to changing conditions. As explained earlier, because of the desire for driving to be a largely inattentive activity, this inevitably leads to a negative evaluation of the condition.

### ***Looks and noise***

Focus group participants were specifically asked about the impact of road noise and the look of a road on their general evaluations of the ride. Outside of this direct question, very few participants volunteered that either road noise or the look of the road bothered them in some way. As noted earlier, references to noise were frequently to the distinctive kind of noise caused by grooves and sometimes also about the general road noise caused by bumps or a deteriorating road surface. Very few participants discussed the look of the road without being specifically asked. When it occurred, it was seen as an indication of the general disrepair of the road. Overall, participants explained that road noise and unsightliness were annoyances that they prefer to do without, but were not an overriding concern.

### ***Other dislikes***

There were a number of other disliked conditions mentioned less often by participants. These include an undulating road surface which may occur as the result of freezing, excessive crowns, and the rhythmic bumping caused by concrete joints.

#### Indications of needed repair

After the discussion of liked and disliked highways features, participants were asked to discuss when they feel conditions have gotten so bad that repairs are indicated. As may be expected, most of the discussion centered around the dislikes identifies above. Much of the discussion focused on anticipatory repairs. That is, most participants felt that the roads should be maintained so that problems such as potholes and ruts would not have an opportunity to develop. Barring that, however, participants felt that roads should be repaired when the acceptable level of undesirable features reaches a critical limit. Unfortunately, describing these limits proved to be an extremely difficult task for most participants. For example, there was broad agreement that excessive patching indicates the need for more extensive road repair. However, it was nearly impossible for participants to define excessive patching. Comments such as “when there are more patches than road” may indicate some general sense of the criteria, but certainly do not indicate a numerical percentage, i.e. when over 50 percent of the road surface is made up of patches. Focus group participants, like most drivers, were not civil engineers and therefore did not have the expertise required to provide any definitive criteria.

Participants did, however, identify a different form of criteria that may provide useful insights into participants’ thinking about road repair. Several people indicated that they felt the road required repairs when they were forced to pay attention to the road surface rather than to driving in general or the other activities that they were engaged in while driving. To drivers, this situation signals that problems with the road surface are so severe that they represent a safety concern.

## **Other considerations**

After discussing condition thresholds used by participants to decide whether a road was in need of repair, they were asked to consider other factors outside of the actual condition of the road that they felt should be considered when setting priorities.

### ***Traffic***

Traffic was the most consistently important factor people identified that should be considered when setting priorities. Participants frequently discussed at least two kinds of traffic: truck and cars. Occasionally, people would also mention a concern about pedestrian, bicycle, RV, or some other form of less common traffic. Generally, people felt that highly traveled roads should be given higher priority when scheduling repairs. Most people gave a number of intersecting reasons for this belief. First, higher volume would cause more damage and so high volume roads would probably also be the ones in most disrepair. Second, the potential danger of disrepair would be greater on highly traveled roads. Third, repairs made on highly traveled roads would benefit the largest number of people. Some people were concerned that using traffic counts may place certain parts of the state, namely the more rural areas, at a disadvantage. In general, though, traffic counts were seen as a fair way of determining repair priorities.

The discussion surrounding truck traffic was varied. In some groups, participants talked about the need for trucks to be able to deliver important goods in and around the region. In others, people discussed the disproportionate damage caused to the roads by truck traffic. In most groups, there was at least some recognition that both of these can be true at the same time. As a result, it would be difficult or even misleading, to say that a clear consensus developed. In general, most people felt that highways used heavily by trucks should receive higher priorities.

### ***Importance***

Participants were asked if the importance of the highway, e.g. if it connected important locations, public services, or to the Interstate system, should affect how quickly repairs are made. This issue rarely arose unless directly asked. Most people felt that important roads should receive more attention, but also felt that traffic volume would probably be highly correlated with importance. Some discussions reminiscent of the truck traffic debate occurred in this context as well. That is, some people were concerned that roads servicing important businesses were receiving a disproportionate share of repairs. Again, though, these concerns were relatively isolated and uncommon.

### ***Cost***

Most participants explicitly rejected the idea that the cost of repairs should influence priority settings. For nearly all participants, road repairs were a public safety concern and a matter of life and death. Issues of such importance should not be decided on based on cost.

However, participants also recognized that some road repair decisions may be a matter of convenience and therefore open to economic consideration. Similarly, participants felt that road repairs should be strategically planned to both account for future traffic volumes and ensure the most cost-effective use of tax dollars. They also understood that repairs would have to be paid for and were concerned that projects be realistic and efficient.

### **Trade-offs**

Participants were also asked to choose between a series of difficult forced-choice options to better understand how they thought different factors should be weighed when setting construction priorities. The first question addressed convenience. The second concerned investing in longer lasting road construction and the various ways

available to finance such improvements. The third and fourth questions focused on road noise and appearance.

***One summer every 20 or one month every five***

Participants were asked to choose between making major repairs every 20 years which would last an entire summer or making repairs that last less than one month every five years assuming the costs were the same. This question was intended to address convenience issues, however, it uncovered a different set of concerns. Most participants who accepted that these two scenarios would cost the same and believed that repairs could in fact last 20 years chose the 20 year option. Nevertheless, many participants would not accept some of the assumptions of the question. Specifically, many people in Minnesota, as well as those in Iowa and Wisconsin, did not believe that repairs could last 20 years. Other people also questioned the ability of the Department of Transportation to know what demands might be placed on roads so far in the future. These participants frequently opted for the five year scenario.

When focus groups actually considered the relative convenience of the two options, a number of concerns were raised including: whether there were alternative routes available (if so, one summer was not a problem), whether the construction would disrupt important businesses or public service, and how repairs on different highways in an area might be scheduled to avoid repeated disruptions to local transportation.

***Initially spend more to make roads last longer***

The focus groups were also asked to discuss whether they would prefer spending more money up front to build highways that would last longer. Again, the issue for most participants was not whether to build longer lasting roads, but whether the basic assumptions of the question could be accepted. For participants who accepted the assumptions (a majority of participants), the answer was clear: build roads to last longer.

In fact, many participants had suggested similar approaches earlier in the meeting. However, many people could not believe that roads could actually be designed to last that much longer or were skeptical that the improvements would actually be made. People were concerned both that designers could not accurately predict the traffic demands so far into the future. In fact, some participants suggested that we may actually be flying from place to place at that point in the future. Others worried that the additional money supposedly paying for improved road design would actually be wasted through governmental inefficiency or worse.

If people agreed to build longer lasting roads, they were asked to choose between raising revenues or delaying repairs on other roads. Most participants preferred raising revenues. Many people felt that adequate roads were a high priority and deserved the additional money. Understandably, though, people who were skeptical about the governments efficiency were most likely to opt for delaying road repairs. Conversely, though, many participants were concerned that if repairs were delayed, it would disproportionately affect rural areas.

### ***Road noise and looks***

People were asked to discuss whether they would prefer a road that had a rougher texture (grooves) and was safer or one that was smoother, quieter, and potentially more slippery. There was nearly universal and immediate agreement that safety would be selected over road noise. The only exceptions were comments made by people who were concerned about excessive noise. This would include road noise that made conversation or listening to the radio difficult.

People were also asked whether they would choose to repave a road that had been patched but rides well or wait until the ride was noticeably rough and uncomfortable. In the discussions surrounding this question, it was clear that many participants found it impossible to imagine a road that was patched but still rode well.



However, most people felt that resurfacing should only occur when the ride is noticeably uncomfortable.

### Prioritizing exercise: Safety

During the course of the discussion, a list of important considerations identified in the discussion was constructed. As a final exercise, people in the focus groups were asked to prioritize the factors. They were given a number of stickers and an opportunity to “vote” for the factors that they thought should be most heavily weighted in setting priorities. (See Appendix C for a more detailed description of the list in each group and the number of “votes” it received.) Through the experiences of focus groups in Wisconsin and Minnesota, researchers discovered that safety was the overwhelming concern of participants. As a result, assistant moderators began to purposely exclude safety as a choice on the list of features for consideration. Therefore, some of the earlier Minnesota lists include safety, while the later ones do not.

When safety was included on the lists, it was consistently received the most votes. Even when safety as an explicit category was removed from factor lists, its pre-eminence was evident in the discussions that followed the prioritizing exercise. Participants were asked why they had voted the way they did. In every group and for nearly every participant, the major criteria for voting for any factor was safety. That is, even if a participant voted for “potholes”, their vote was motivated by a belief that potholes were a safety concern. As a result, it would be safe to interpret the number of votes for many of the listed factors as an indication of the general importance each has to creating or preventing a safe situation. It is true that a few participants indicated that their choice for some factors was motivated by non-safety concerns (such as convenience), but even these concerns were eventually related to safety and represent an extremely rare occurrence anyway.

## **DIFFERENCES**

In general, these groups were remarkable in their similarity rather than their differences. It is true that certain groups tended to focus on different issues to different degrees, but none of the issues brought up in any group contradicted issues brought up in the others. For example, one group spoke extensively about the dangers of narrow or deteriorating shoulders. Though this concern was not as central in other groups, it was usually noted as a concern. Even conscious manipulations to increase differences were unsuccessful. For example, several groups included professional drivers or people who drove extensively for work, nullifying any significant difference between the group of invited CDL drivers and the rest.

### **Internal tensions**

There were, however, several areas of discussion that indicate unresolved or ambiguous issues for participants. These included the impact of truck traffic on roads, the cost of repairs, and convenience issues.

#### ***Truck traffic***

Participants in the groups recognized simultaneously that trucks were important to the local economy and that they caused a great deal of damage to the roads. This tension was evident in most of the discussions and leads to mixed feelings regarding setting priorities and making repairs.

#### ***Costs***

Similarly, participants wanted the highest quality roads but didn't want increased costs. Discussions around raising revenues focused on several concerns: **1)** efficiency, **2)** equity, and **3)** trade-offs. Discussions of efficiency focused both on whether money was being wasted through mismanagement and on how money could be strate-

gically spent to save “in the long run”. Many participants in Minnesota felt that they DOT did a fairly good job. In general, they were satisfied with the condition of the roads and felt that the DOT carefully planned for future improvements and traffic conditions. However, equity discussions focused on whether state funds were being fairly distributed in different regions (see northern and rural conditions) and how expenses in Minnesota compared to other states both in the region and in other parts of the country. Many people felt that Minnesota’s costs were high, but also recognized that the unique weather conditions in the state significantly added to those costs. Trade-off discussions considered the relative impact of increased road costs (taxes, registration fees, etc.), and potential benefits (decreased car repairs, increased business, etc.). Many people felt that increased spending on roads was matched in fewer repairs to cars and new businesses. In general, people felt that good roads should be a high priority and were willing to pay for their repair and improvement provided that funds were efficiently and equitably used.

### ***Convenience***

Participants were similarly concerned about convenience. In general, detours per se did not appear to be a major concern to participants, but were concerned that the surrounding roads were adequate to deal with the increased demand and did not require excessive rerouting. During focus group discussions, participants recognized that many factors needed to be weighed when setting repair priorities, including their convenience, and took a fairly dispassionate and balanced view. However, these same participants may not take such a broad view when actually confronted with a bumpy stretch of road or detour. The conflict between wanting any road one drives to be freshly resurfaced and considering the realities of road maintenance appeared occasionally in the discussion of the participants, and might appear more often in a different setting.

## Northern and rural conditions

Minnesota is a state of varied regions that differ in the density of the population, weather conditions, important industries, and number of tourists. It also includes the Minneapolis - St. Paul metropolitan area. These conditions combined to create a situation where most groups expressed some dissatisfaction with the distribution of services in the state. Those in the north, felt that southern parts of the state had better roads and received more attention from the Minnesota DOT. Those in southern parts of the state felt that the more urban areas received undue attention. In short, it appears that many of the groups were similar in feeling that they did not receive the kind of attention that they perceive other parts of the state getting.

## Individual differences

Even though the groups were remarkable in their similarity, there were important differences on an individual level. Specifically, a number of participants seemed to pay particular attention to road conditions. Often, this was linked to professional concerns, either as a professional driver or a person associated with road maintenance<sup>4</sup>. These individuals showed greater knowledge of roads in the area, could identify stretches more specifically, and had a more precise and larger (though still not standardized) vocabulary of road terms. Participants who rode motorcycles or drove motor homes also expressed different concerns. In general, their concerns were not qualitatively different, but expressed an intensified dislike of unpopular road defects.

<sup>4</sup> Although households were screened to eliminate those involved in road construction and repair, several participants were retired from the industry or closely associated with those in the industry.

## CONCLUSIONS

The information from these focus groups provides several important pieces of information relevant to constructing effective survey instruments for further research. These include a better understanding of how participants identify road segments and the terms they have available to describe and identify road features. In general, people's understanding of the road on which they drive is based on the amount of attention it demands. Problems exist to the extent that features require the attention of the driver. Similarly, road segments are defined practically by drivers as the distance between points that require attention, such as major intersections or turn-offs. People's vocabulary for road features is limited, relative, and makes use of a great deal of non-verbal language. People's overwhelming concern is safety and features that contribute to or subtract from safety. Interest in strategic planning and convenience is secondary. In general, people in Minnesota seemed satisfied with the condition of roads in the state and with the quality of service provided by the Minnesota DOT.

These findings translate into several guidelines for questionnaire construction.

- 1) Designers should assume that people's ability to identify specific stretches of road will be limited by their driving patterns. If specificity is desired, a special protocol should be developed.
- 2) Questions should be descriptive and not rely on any specific terminology unless those terms are clearly defined in the course of the interview.
- 3) Questions should focus on when features become apparent or distracting. Attempts to describe the quantity or degree of a problem will place an extreme burden on respondents and produce unreliable data.
- 4) The importance of safety may be assumed. Researchers should focus on establishing the relative importance of the features that contribute to safety and possibly weigh the relative importance of other factors controlling for safety. That is, people are willing to weigh the cost of improvements if they feel safety has been assured.

## Appendix A - Sampling

Participants for the focus groups were selected using two separate sampling frames. Participants in all six focus groups were selected using random digit dialing and adjusted to have relatively equal numbers of male and female participants. This selection process worked to create focus groups composed of a mix of individuals from the local communities<sup>5</sup>. Households in the area surrounding the meeting location were contacted and screened to remove people living in household with anyone who is employed by any local, state or federal highway department or involved in any business or trade that either builds or repairs highways. Participants were also screened to ensure that they held a current driver's license and that they regularly (defined as at least once or twice a week) drove rural two-lane state or US highways. Participants in half the groups were also requested to take some time before the meeting to drive a stretch of rural highway paying particular attention to the pavement and the impact it had on their driving.

In one group, additional participants were selected from a list of people in the area of the meeting who held commercial driver's licenses. This group was designed to include relatively equal numbers of commercial drivers and randomly selected participants. In all six groups, recruitment continued until 12 participants confirmed that they would be able to attend the meeting.

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<sup>5</sup> Because of the small number of participants, focus groups can not be considered completely representative samples. The recruitment process is solely intended to create as diverse a mix of participants as possible.

## Appendix B - Demographics

In addition, all focus group participants were asked to complete a personal information sheet which gathered general demographic information and information about their driving habits.

### AGE

Group	Average Age
St. Cloud	48
Detroit Lakes	50
Grand Rapids	53
Rochester	45
Shakopee	41
Marshall	50

### SEX

Group	Male	Female
St. Cloud	5	2
Detroit Lakes	4	4
Grand Rapids	5	5
Rochester	6	3
Shakopee	5	6
Marshall	7	6

### INCOME

Group	< \$20,000	\$20,000 - \$39,999	\$40,000 - \$59,999	> \$60,000	DK/Ref
St. cloud	0	1	2	4	0
Detroit Lakes	1	5	2	0	0
Grand Rapids	2	2	2	3	1
Rochester	0	2	1	6	0
Shakopee	1	4	3	3	0
Marshall	3	4	3	3	0

## CHILDREN UNDER 17

<b>Group</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3 or more</b>
St. cloud	5	1	1	0
Detroit Lakes	5	2	1	0
Grand Rapids	7	0	2	1
Rochester	5	3	1	0
Shakopee	5	2	3	1
Marshall	7	0	3	3

## RACE

With the exception of one participant in Shakopee who identified as “other”, all participants in Minnesota were white.

## EMPLOYMENT STATUS

<b>Group</b>	<b>Full-time</b>	<b>Part-time</b>	<b>Not Employed</b>	<b>Retired</b>
St. Cloud	5	0	2	0
Detroit Lakes	5	0	3	0
Grand Rapids	2	2	3	3
Rochester	8	1	0	0
Shakopee	6	2	3	0
Marshall	9	2	1	1



**EDUCATION**

Groups	Less <b>than</b> High school	High School Diploma or GED	Some College or Technical school	College Graduate or Above
St. cloud	0	1	4	2
Detroit Lakes	0	2	4	2
Grand Rapids	1	3	5	1
Rochester	0	2	1	<b>6</b>
Shakopee	0	0	11	0
Marshall	1	5	<b>6</b>	1

**NUMBER AND TYPE OF VEHICLES**

Groups	Cars, Trucks, Vans, Pick-ups, etc.	Motorcycles	Motor Homes, Recreational Vehicles	Other
St. cloud	22	4	0	1
Detroit Lakes	19*	0	2	0
Grand Rapids	23**	1**	2*	2*
Rochester	28	1	3	0
Shakopee	28	1	2	1
Marshall	24	2	5	2

“one participant did not provide information.

\*\* two participants did not provide information.

AVERAGE MILES PER WEEK DRIVEN

Group	Average Miles Per Week
St. Cloud	286
Detroit Lakes	275
Grand Rapids	325
Rochester	201
Shakopee	285
Marshall	183

## Appendix C - Ranking Exercise

During the discussions, a list of concerns and disliked road features was developed. At the end of the meeting, participants were asked to rank how important each of these features or concerns should be when setting road repair priorities. The following are the results from each group.

<b>ST. CLOUD</b>		<b>DETROIT LAKES</b>	
Cracks/potholes	0	Bumpiness due to frost heaves	17
Ruts	1	Broken pavements	13
Traffic volume/future traffic	9	Ruts	6
Population using the road	15	Appearance	0
Future planning	14	Damage to car	12
Safety	36	Bad patches - repatching	12
Expansion joints	2	Traffic volume	14
		How the road is used	7
		Origin/destination of road	3
		How curvy the road is - rough terrain	4

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**GRAND RAPIDS**

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Need to slow to prevent car damage	20
Yearly repairs, extensive patching	13
Water on the road	4
Potholes, frost boils, cracking	15
Ruts	6
Traffic volume	14
Traffic type	10
Importance of road (tourists, businesses)	11
How curvy the road is, terram	10

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**ROCHESTER**

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Breakage	3
Need to change driving pattern	18
Car damage	7
Safety, high accident rate	32
Cracks	0
Extensive patching	0
Traffic volume	18
Convenience, detours	6
Who will pay costs	13
Traffic type (who uses it)	0

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**SHAKOPEE**

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Wavy roads/frost heaves	16
Bumpy ride	2
Potholes	23
Ruts	8
Broken shoulder	10
Car damage	23
Traffic volume	16
Convenience	3
<b>cost</b>	10
Cracks	7
Whether traffic is diverted	2

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**MARSHALL**

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Potholes	39
Car damage	8
Patches on patches	19
Wavy pavements/frost heaves	21
Broken shoulder	2
Traffic volume	22
Traffic type	17
Economic concerns (importance to businesses)	10

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The results of these individual ranking exercises were combined in several broad categories to indicate the general concerns of participants. It is important to remember that lists were spontaneously generated in each group and so are not completely comparable. Many categories were combined into related areas. It is also important to remember that safety was purposefully excluded from lists in several of the groups.

<b>MINNESOTA - COMBINED</b>	
Safety/Accidents	68
Defect Features (potholes, cracks, deteriorating shoulders, frost heaves, ruts, etc.)	239
cracks and potholes	104
frost heaves	54
extensive patching	44
ruts	25
deteriorating shoulders	12
Traffic (both volume and type)	142
Volume	93
Type	49
Car damage	70
Cost/Economic concerns	33
Attention (watching the road, slowing down, etc.)	18
Strategic Planning/Quality Construction	14
Destinations served/Importance	14
Design features (curvy, rough terrain)	14
Convenience	11
Other	8