

*Motorists' Attitudes to Using ATIS  
at Highway-Rail Intersections*

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## **ABSTRACT**

Highway-Rail Intersections (HRIs) confront urban areas with several safety and congestion problems. The Fargo-Moorhead area for instance, is divided by a major rail line which experiences approximately 70 trains a day. Delays at HRIs of up to 10 minutes can cause traffic problems for many people who either utilize services or work in the downtown area. In addition, the blockage of a rail crossing when a train is present may hinder the effective movement of emergency vehicles. High-cost solutions to separate rail lines from surface roads are infeasible in many areas. However, ITS can offer cost-effective solutions by redirecting traffic away from blocked HRIs. The system would detect a train and estimate approximate delays at affected HRIs. Real-time information may be displayed on electronic signs (such as CMSs). Motorists can then decide whether to continue on their original routes or divert to different routes to avoid the HRIs.

The operational and cost effectiveness of the ITS solution will depend on the extent of motorist participation, i.e., percentage of drivers who would change their route. Therefore, a survey was developed to assess motorist attitudes toward delays at HRIs and their acceptance of the application of ITS to provide information about HRI delays. The survey was conducted as part of a case study in the Fargo-Moorhead area. Over 1,500 surveys were distributed and 535 returned, a 36 percent response rate. The survey was augmented with a focus group to discuss preferences for alternative ATIS methods and information.

The survey results revealed that the majority of the motorists in the study area see significant problems at HRIs in need of solutions. The results also indicated motorists would react favorably to having information provided to them through ATIS.

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## **CHAPTER 1. INTRODUCTION**

The purpose of this study is to determine motorists' preferences and attitudes toward using advanced traveler information systems (ATIS) at highway-rail intersections (HRIs). Intelligent Transportation systems which include real-time information for motorists can provide cost-effective solutions to reducing delay and congestion, as well as improving traffic safety at highway-rail intersections.

### **Background**

Since transportation budgets in many urban areas are very limited, high cost solutions to separate rail lines from surface roads (i.e., building underpasses or overpasses) may be infeasible in many areas. As an alternative, Intelligent Transportation System (ITS) may provide cost-effective solutions to the problems associated with HRIs. The three ITS components include train detection, advanced traveler information systems, and advanced traffic signal systems. Before these new technologies are planned and implemented, it is important to understand user preferences and attitudes toward using these systems and to incorporate these considerations into the system design.

### **Description of the Problem**

HRIs confront urban areas with several challenges, which include safety and congestion. Many small and medium size metropolitan areas, especially in the Midwest region, were established along rail lines. As they grew around these lines, in the absence of proper land use policy, these cities became literally divided across the rail lines. Further, that continued growth has increased traffic levels to overwhelm existing capacity (infrastructure and traffic controls), especially at HRIs. At the same time, there has been more concentration of rail traffic along

fewer lines due to rail abandonments that has further complicated these problems. The railroads' use of unit trains that exceed one mile in length continues to increase which results in delays exceeding 10 minutes in some locations, depending on the operating speeds.

There are several problems associated with HRIs such as delays, congestion, disruption of traffic flow and traffic safety. These problems affect the surface streets leading to and parallel to the rail lines as spill backs could build quickly due to longer trains and high traffic levels. Although crashes at rail-highway crossings may not seem very high, they still receive a strong public and political focus. In addition to auto-train collisions however, unsafe maneuvers by drivers in the HRI area (i.e., making a U-turn, or trying to squeeze into limited space) result in more incidents. Motorists are often frustrated by the lack of information on train lengths and the expected wait time, which often leads to unsafe driving behavior. In addition, the blockage of a rail crossing when a train is present may hinder effective movement of emergency vehicles.

### **Description of the Study Area**

The Fargo-Moorhead Metropolitan area has a population of just under 150,000 and encompasses the cities of Fargo and West Fargo, ND and the cities of Moorhead and Dilworth, MN. There are two major rail lines operated by the Burlington Northern and Santa Fe (BNSF) that basically divide the area in an east-west direction. The major rail line runs parallel to the Main Avenue corridor across several north-south streets. Most of the problems are in the downtown area which additionally experiences inadequate street layout and traffic controls, further aggravating traffic problems.

There are no plans for HRI grade separation for the downtown area in the short to medium-term. As the metropolitan area continues to grow, traffic congestion and delays (especially during peak periods) will only get worse. These problems are increasingly receiving greater attention from motorists and decision makers. As a result, alternative methods to improve traffic conditions around HRIs such as using ITS, may have a high priority on the political agenda.

### **Application of ITS Technologies**

The proposed ITS measures will include a train detection system and an advanced traveler information system (ATIS). Information about the presence, location, and length of a train is conveyed to a processing point that will in turn send out information to motorists with approximate delay times and/or information on alternative routes. In addition, an Advanced Signal Control System would facilitate the movement of diverted motorists to encourage the use of alternative routes by adopting favorable signal timing plans. The ATIS could use changeable message signs (CMSs) to deliver the information to motorists at key locations in the corridor allowing them adequate time to take alternative routes.

Most motorists in the metropolitan area are unfamiliar with ITS technologies. In order for them to support these concepts, they must be introduced to these systems and be involved early on in the process of developing and designing alternative ITS systems. It is important to identify how the motorists would react to this information and the format and methods used in delivering that information.

## **Importance of Research**

Research on understanding users acceptance of ATIS and the underlying factors for forming that acceptance is still in developmental stages given the short experience with ITS. In addition, most of the existing studies were conducted in larger urban areas (e.g., Boston) and dealt with pre-trip travel information services or advisory information. These studies have generally found only a small portion of motorists (15-20%) actually change their travel routes based on advisory information. As a result, there is some reluctance about the use of CMSs as a method of delivering information to motorists en-route.

Theoretically, traffic flow principles support the argument that motorists typically select routes that minimize their travel times (if they are aware of such routes). However, motorists choice of a route is usually based on their ‘perceived’ levels of service (such as travel time) which can vary from the route’s actual levels of service. So it is important to assess motorists attitudes toward delays associated with HRIs and their potential responses to ATIS.

This study is unique in two aspects: 1) it examines a specific application of information, i.e., the presence of a train and expected delays at various locations within a corridor and 2) it is conducted in a relatively small urban area where motorists are familiar with most routes, including alternative routes, so traveler safety is not a major concern.

## **Format and Objectives of the Study**

The survey was conducted as part of a case study in the Fargo-Moorhead metropolitan area. The purpose of the survey was to determine the driving public’s attitudes on two main issues: 1) their perception of the problem with delays at rail crossings and 2) how valuable ITS

technologies will be to them in addressing these problems. In order to collect this information from the users, a survey tool was developed which was augmented with a focus group.

A mail-back questionnaire was developed to determine the user's perception of the problem and to provide an assessment of the potential benefits of an ITS solution. A mail-back format was chosen because it allowed information to be collected from a wide cross section of the affected driving public. In addition, this format was chosen because the questions could be fairly straightforward as they relate primarily to the drivers' experiences and attitudes toward rail crossings. In order to get an assessment of their attitudes toward ITS solutions in general, one example of an ITS solution using a CMS was presented as part of the survey. Subsequently, questions were asked about the potential usefulness of this example ATIS solution.

The purpose of the focus group was to gather additional insights on possible design alternatives for the ATIS solutions. Many drivers are not familiar with this technology and thus need to be educated on the applicable options. Therefore, a focus group format was used to inform the drivers of the alternative methods of ATIS as well as determine which factors affect the usefulness of various information delivery systems.

### **Organization**

This thesis will begin with a review and discussion of previous related studies which is provided Chapter 2. Chapter 3 will discuss the methodology used for the mail-back survey. Chapter 4 will provide the methodology used for the focus groups. The results of the mail-back survey and focus group will then be presented separately in Chapters 5 and 6 respectively. The conclusions and recommendations for both the mail-back survey and the focus group will be presented in Chapter 7.

## **CHAPTER 2. LITERATURE REVIEW**

One of the key components to the intelligent transportation infrastructure for this study is the advanced traveler information systems (ATIS). ATIS can provide real-time information to motorists that will allow them to respond to the existence of a train at the HRI. It is difficult to know how the motorists will respond or react to this information. Several studies have been performed in order to understand the effects that ATIS can have on travel behavior. However, most of these existing studies were conducted in larger urban areas where ATIS was used to inform motorists of recurrent congestion or traffic accidents. Thus, this is one of the first studies performed to understand the users' attitudes and benefits from ATIS in a relatively small urban area for a specific application. The following sections provide a brief description of several studies reviewed to understand the effects ATIS could have on predicted or actual travel response.

### **Assessing Consumer Response to ATIS**

In March 1997 a symposium was held to assess ATIS effects on travel behavior, travel patterns and transportation system performance. This symposium involved reports by representatives of five major ATIS projects on the observed and anticipated effects of their travel behavior and the transportation network. The results of these studies showed the following(1):

- In a survey of 2,000 users of Boston's SmarTraveler system, 14 percent of respondents reported changing the time of departure and 12 percent reported changing their route.
- In a survey of commuters in the Seattle area, 29 to 36 percent of respondents indicated that traffic messages frequently influence their commute choice.

- A survey conducted in the Orlando area as part of an ITS deployment planning study showed that 20 percent of the respondents would divert from their regular route if a delay of more than 15 minutes was expected.

These and other surveys and focus group research suggest that many commuters are unable or unwilling to modify their regular commute habits. In some metropolitan areas, geographic and topographic features limit the choice of commute routes. In other urban areas, commuters are reluctant to divert from their customary commute route because they fear getting lost or feel insecure in unfamiliar territory. Many symposium participants agreed that although some commuters do act upon the information they receive, there does not appear to be enough of them to affect the overall network performance.

### **California Bay Area Commuters**

This study investigated the potential en-route traveler response to ATISs by using a detailed survey of San Francisco Bay area commuters in the Golden Gate Bridge corridor. In February of 1993, a total of 1,492 individuals were asked about a hypothetical situation of having an in-vehicle ATIS device giving accurate delay information on the same trip. Twenty-seven percent of travelers said they would switch to an alternative route when qualitative information is provided to them. This number increases to 52 percent when quantitative real-time information for the usual route is provided; 55 percent when predictive information for the usual route is provided; 58 percent when delay information on the usual route and travel time on the best alternative route is available; and 61 percent when prescriptive information to take the alternative route is provided. (2)

The responses were based on what the travelers think about having an in-vehicle device on their last experience with unexpected congestion on their usual route. The actual length of delay for the majority of these respondents was over 15 minutes. Note that because of the size of the community and the length of the typical delay, it is difficult to compare these results to a smaller community where delays are shorter. In addition, the respondents in a smaller community are much more familiar with the network and thus, much less worried about getting lost.

### **Washington D.C. Area Motorists**

A survey of more than 500 motorists in the Washington D.C. area was carried out to assess motorists' attitudes toward CMSs and in particular, toward possible new kinds of information that they might display. The study also evaluated if demographic variables have any effect on motorists' attitudes. This study asked motorists about their experiences with CMSs that describe traffic conditions on the freeway. When asked how often the motorists are influenced by CMSs, half of the survey respondents said often, 38 percent said occasionally and 13 percent said not at all.(3) Respondents were found to be positively disposed to CMS messages that are simple, reliable and useful. This study also found that demographic variables appear to have very little influence on motorist attitudes toward CMSs. Key findings about the content of variable message signs were as follows:(3)

- The primary concern of motorists is that the traffic information on CMSs be timely and accurate.

- There is support for displaying alternative travel routes in the case of heavy congestion, but motorists would be reluctant to use such routes for fear of getting lost or encountering heavy congestion on the alternate route.
- Most motorists wanted to be informed of the delay time caused by congestion, but opinions differed widely about the form of such estimates.

### **User Acceptance of ATIS Products and Services**

A report prepared by Charles River Associates Incorporated summarizes information from twelve focus groups that were used to appraise the potential customer acceptance for key ITS products and services directed at individual consumers. One of the products discussed, in-vehicle dynamic navigation system, provides some guidance to user preferences about traffic delays. The study found that real time information about traffic delays – particularly those of a non-recurrent nature – do have additional value to travelers.(4) However, the existing methods used to relay this information, such as radio traffic reports, have inherent deficiencies in terms of timeliness, specificity, and geographical coverage. Focus group participants acknowledged they were more excited about enhanced up-to-the-minute delay information than they were about route guidance information. This finding reflected the user's confidence in their own local knowledge and abilities to navigate around hold-ups if they have accurate information about the nature and extent of the problem.

### **Presenting Descriptive Information in Variable Message Signing**

This study in the Netherlands evaluated the effects of presenting descriptive types of information on variable message signs on route choice and driving behavior. Using driving simulators, 36 male drivers had to choose between a normal route to a fixed destination, which

could have congestion of varying levels, and an alternative route. Information was presented on:

a) length of congestion, b) delays relative to normal travel times, and c) travel times. The

following conclusions were reached (5):

- Providing descriptive information on CMSs results in diversion rates that increase sharply with levels of congestion, so that they offer a high potential for optimizing traffic streams to capacities on the intended and alternate routes.
- Reliability of information is much more important when information is provided in terms of congested miles rather than in delay or travel time estimates. In other words, when information is given in travel times or delays, divergence is much less affected by the reliability of the information.
- Driving speed is increased slightly when the CMS indicates congestion on the normal route.

## CHAPTER 3. MAIL-BACK SURVEY METHODOLOGY

### Objectives of the Mail-Back Survey

The first purpose of the mail-back survey was to determine how significant the problem of waiting for trains is for area motorists. Several objectives were set to determine the drivers' current experiences with waiting for or avoiding trains as well as their attitudes toward waiting.

These objectives included determining the following:

- how often the drivers were stopped during a typical week
- how long they typically wait for a train to pass
- what are the traffic conditions most often like in the HRI area
- how often does the driver avoid being stopped by a train, either by planning to use alternative routes with grade-separated crossings or by turning when they are en-route and realize an at-grade crossing is blocked.
- how frustrated is the driver with waiting
- does the driver feel the problem is serious enough that some type of improvements should be made.

The second purpose of the mail-back survey was to determine if drivers felt they would benefit from information provided to them by the ATIS. Many drivers in the Fargo-Moorhead area are not familiar with ATIS solutions. Therefore, one proposed ATIS solution using a changeable message sign was presented to obtain a general idea if ATIS would be valuable to them. Drivers could benefit from train information in two ways: 1) avoid blocked HRIs to reduce their travel times and delays, and 2) reduce their frustrations by informing them of expected delays (peace of mind). The decision to take action and turn in order to divert to an

alternative route is based on many factors but mostly the length of delay. Therefore, the objective was to determine how likely the drivers were to take action based on various wait time intervals. This objective has important implications in assessing the benefits of the ITS system.

In addition to the two purposes described above, several questions were used to determine driver and delayed trip characteristics which included: age, gender, employment status, miles driven per day, trips through downtown per week, and delayed trip purpose. These characteristics were obtained to see if there is a relationship between the driver's characteristics and the driver's attitudes or the usefulness of the proposed ITS solution.

### **Mail-Back Survey Design and Format**

The mail-back questionnaire was used to collect information from a wide cross-section of affected motorists. The questionnaire was designed with sixteen closed ended questions and one open-ended question to allow people to provide input of additional issues that were important to them. All 17 questions were placed double sided on one 17" by 11" size sheet and then folded into a book format so that all four pages of the questionnaire were contained on one sheet of paper. The questionnaire consisted of:

- Cover letter: brief description of the study, introduction to HRIs delays/safety concerns, graphical description of ITS application, and contact for further information.
- Driver/trip characteristics: employment, type of vehicle, average miles driven per week, age, gender, and willingness to participate in a focus group.
- Driver experience with HRIs: weekly frequency driving in the HRI area, weekly frequency of stopping at HRI, average wait when stopped at HRI, traffic

conditions at HRI while waiting, the type of trip when stopped at HRI, frequency of avoiding HRIs, and turning away once a train is in sight.

- Driver attitude toward waiting: frustration with waiting at HRI and whether something should be done to alleviate traffic problems at HRIs.
- Potential value of ITS solutions: how helpful is the information about HRI blockage.
- Willingness to turn given information on expected delays (1-3 minutes, 4-6 minutes, 7-9 minutes, and over 10 minutes)

A Likert scale was used for many of the questions regarding attitudes and perceived benefits of the ITS technologies. The Likert scale is a widely used rating scale that requires the respondents to indicate a degree of agreement or disagreement with each of a series of statements about the stimulus objects (6). Typically, each question has five response categories, ranging from “strongly agree” to “strongly disagree”.

Prior to mailing the survey, the questionnaire was pretested to identify any problems in the questions, clarity of responses, and time requirements to fill out the survey. Three classes at the College of Business at North Dakota State University (NDSU) were used for pretesting. The students were also instructed to mark any questions that were not clear to them. In addition, transportation professionals from the F-M metropolitan area and NDSU faculty in marketing reviewed the survey and provided valuable comments. As a result, several questions and response categories were revised.

## **Targeted Motorist Sample**

The target population for this study consisted of drivers who utilized the downtown Fargo-Moorhead area. Nonprobability sampling of the target population was used to determine the proportion of the sample that gives various responses or expresses various attitudes to waiting for trains to pass at HRIs. Two distinct categories of drivers were surveyed 1) personal vehicle drivers who utilize their vehicle to get to or from work, and or for social, recreational and personal business, and 2) drivers who use their vehicle for business related reasons such as fire, police, ambulance drivers, UPS and mail delivery personnel, and utility service personnel. The personal vehicle driver's group consisted of three subcategories: downtown area employers, the general public using the downtown area and drivers held waiting at the HRIs. During December 1997 and January 1998, about 1500 questionnaires were distributed to personal vehicle drivers and business-related drivers who drove in downtown Fargo-Moorhead .

The most effective method for distributing questionnaires was through the downtown Fargo and Moorhead employers, relying heavily on personal contact between the study team and the employer and between the employer and the employees. Many employers seemed very interested in helping because of their familiarity with HRI problems. A total of 47 business assisted in the distribution of surveys. Personal vehicle driver surveys were distributed to 19 business in Fargo and 13 businesses in Moorhead. In addition, 15 businesses agreed to distribute surveys to business related drivers in both Fargo and Moorhead. Appendix B shows a list of the individual businesses that were contacted.

Although most of the personal vehicle drivers' surveys were distributed through their employers, some surveys were also distributed to the general public in the downtown area.

Copies of the survey were placed at the front desk of the Fargo Public Library so that interested people could take one. Additionally, surveys were distributed on two separate occasions to shoppers at the Moorhead Center Mall. A limited number of surveys were also distributed at the railroad crossing to vehicles held waiting for the train. However, this method was least practical due to weather restrictions, the irregularity of train intervals, and the labor intensity required to distribute surveys to a large number of vehicles in a short time period. In addition, surveys were also distributed to transportation professionals and public officials at several meetings where transportation topics were discussed.

In order to further people's awareness of the project, the news media was contacted and informed about the potential benefits of implementing new technologies to reduce driver frustration and delay at the at-grade HRIs. An article appeared in the local Fargo-Moorhead newspaper just prior to the distribution of the survey discussing HRI problems. This article, and a TV news story which ran several months before the survey, helped inform the public about the project. This advance knowledge about the project assisted in making people more interested in completing the questionnaire and probably contributed to higher response rates.

## **CHAPTER 4. FOCUS GROUP METHODOLOGY**

### **Objectives of the Focus Groups**

The purpose of the focus group was to gather more in-depth information from the users about the types of information that they are most interested in receiving, methods of delivery, and other details related to the ATIS system design. This information can be used in developing more effective ATIS solutions for the community

The first objective of the focus group was to inform participants about how the ITS technologies will be used in order to provide information about the trains to the drivers. Also, the participants needed to be informed of the various ATIS technology options that can be used to provide information to the motorists. Many people are not familiar with these technologies, and it is therefore difficult to obtain the information from them without first educating them. It was also important to establish a common knowledge base among all participants.

The second objective was to determine if the focus group participants would validate the key findings of the mail-back survey. Therefore, it was important to understand how and why this is a significant issue for the participants. In addition, it was important to determine if these participants felt they would benefit from ATIS after they were more informed about the proposed ITS system.

The third objective was to determine the participants' preferences for types of delivery methods as well as their reasons for choosing these methods. Some examples of types of ATIS methods include CMS, permanent train warning signs with a flashing light, or in-vehicle navigation devices.

The last objective was to determine the types of information that would be most useful, such as warning of an oncoming train, approximate length of delay, or an alternative grade-separated route. It was also important to determine the factors which impact the usefulness of the information such as wait time, traffic conditions on intended route, trip purpose, familiarity with the routes, length of trip, etc.

### **Identifying Participants**

The mail-back surveys contained a question asking for volunteers who would be willing to participate in focus groups in the second stage of the study. Over 100 personal and business related drivers provided their names and phone numbers. After, determining a date and time that would work best for people and providing a light dinner as incentive, twelve of the volunteers agreed to participate in the focus group meeting.

A majority of the volunteers' addresses were found in the local phone directory. The remaining addresses were obtained by calling the participants. Approximately 20 of these volunteers were called to determine if a daytime or evening meeting would be more convenient for them. In addition, a focus group expert was consulted on days of the week and times of the day they have found to attract the most participants. It was decided that the meeting would be held on a Tuesday evening between 6:00 and 8:00 p.m.

Typically focus group participants are provided a monetary incentive to participate. For this focus group meeting, it was decided to provide a light dinner (sandwiches and salads) rather than a monetary incentive. Therefore it was determined that invitations needed to be given to all volunteers in order to have enough people for discussion groups of 8 to 12 people. An invitation letter, an RSVP form and a return envelope were sent to all volunteers.

## Focus Groups Format

The focus group meeting was held at NDSU's campus because it is located close to downtown Fargo-Moorhead and most people in the area are familiar with this facility. The meeting began with an introduction of the study research team and the participants. Each participant was asked to provide reasons why the blocked HRIs are a problem for them.

Participants were then informed about problems and potential ATIS solutions at HRIs through:

- A video presentation demonstrating traffic flow and safety problems at a downtown Fargo HRI.
- A description of how ITS technologies can be used to detect the train, coordinate traffic signals and provide information to drivers.
- A demonstration of the projected improved traffic conditions when ATIS is implemented using animated traffic simulation model results (TRAF-CORSIM) (7). This simulation model clearly showed current traffic flow conditions, as well as the projected traffic flow after ITS improvements are made.
- Various examples of electronic signs with alternative types of information through a slide presentation. Information was also provided on the various types of ATIS technology delivery methods that could be used, such as CMS, in-vehicle navigation, or warning signals to provide information to the drivers.

Participants were then involved in a discussion about possible ATIS solutions through:

- A discussion on their preferences for types of ATIS delivery methods (warning sign with flashing light, flashing beacon with train icon, variable message signs, in-vehicle device).

- Discussion on their preferences for types of information (train at rail crossing, length of delay, closest alternative route).
- Discussion on the placement of signs in the system.

At the completion of the focus group meeting, participants were asked to fill out a questionnaire about their preferences for alternative ATIS methods and information.

## **CHAPTER 5. RESULTS OF THE MAIL-BACK SURVEY**

Out of the 1502 surveys distributed, a total of 535 questionnaires were returned, which represents a 36 percent response rate. It is important to add that a lower response rate was obtained from the largest employer in Moorhead which was provided with 300 surveys. Therefore, if the surveys for this employer were eliminated from the total, the overall response rate would be 46 percent. Typically mail-back surveys produce response rates between 10 and 20 percent. This higher than normal response rate for a mail-back survey might indicate that people in the Fargo-Moorhead area have a significant interest in this issue. Out of the 535 questionnaires, 392 were from personal vehicle drivers and 143 were from business related drivers.

Results of the survey were analyzed using Excel spreadsheets and a statistical computer program, SAS. The analysis examined the results of the personal vehicle drivers and the business related drivers. A few of the questions regarding driver characteristics were different for these two groups; therefore, the analysis was kept separate. In almost all cases, the subgroups were kept separate for surveys distributed in Fargo versus those distributed in Moorhead, except for business related drivers that served both areas. Appendix A contains a summary frequency distribution of the personal and business driver's questionnaire.

### **Drivers**

About 86 percent of the personal vehicle drivers work full time. Of the total returns, 73 percent of the personal vehicle drivers are delayed at the rail crossing during their trip to or from work in the downtown area. The three largest categories of delayed trips for business related

drivers are: emergency services (40%), providing transportation for customers (24%), and providing service for customers such as realtors (18%). About 55 percent of the personal vehicle returns and 80 percent of the business related drivers consisted of male drivers. The driver age ranged from less than 20 to over 60 years old, with a mean age of approximately 39 years old.

### **Significance of Delay**

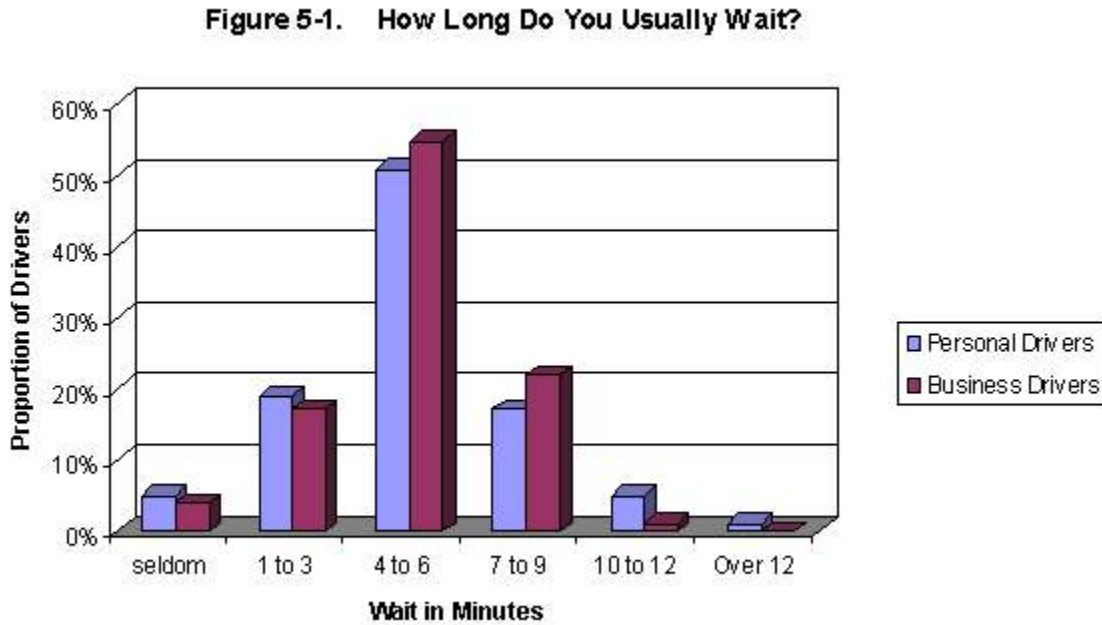
Survey responses indicated HRI problems were viewed as a significant issue for drivers in the downtown area. Numerous written comments were provided by the respondents which reinforced the impression that reducing delay at the HRIs was important for them.

The first factor used in determining the significance of this issue for the driving public was the driver's experiences with rail crossing delays. The drivers' current experiences were primarily measured by the frequency of rail crossing delays, typical length of wait, and their propensity to avoid routes with rail crossing delays.

The largest percentage of personal vehicle drivers, 56 percent, are typically delayed between 1 and 4 times per week. The second and third largest groups include personal vehicle drivers that wait between 5 and 9 times per week (20%), and those that are seldom stopped (15%). Business related drivers tend to drive through the downtown area more often and thus, tend to be delayed more often than personal vehicle drivers (38 percent are also typically delayed between 1 and 4 times; 20 percent are delayed between 5 and 9 times; and 22 percent are delayed between 10 and 19 times per week).

The distribution for typical length of wait at the rail crossings is shown in Figure 5-1.

The majority, 51 percent of personal vehicle drivers and 55 percent of business drivers, perceive their wait to be between 4 and 6 minutes. About 17 percent of personal drivers and 22 percent of business drivers, perceive their wait to be between 7 and 9 minutes. About 17 percent of personal drivers and 22 percent of business drivers, perceive their wait to be between 7 and 9 minutes.



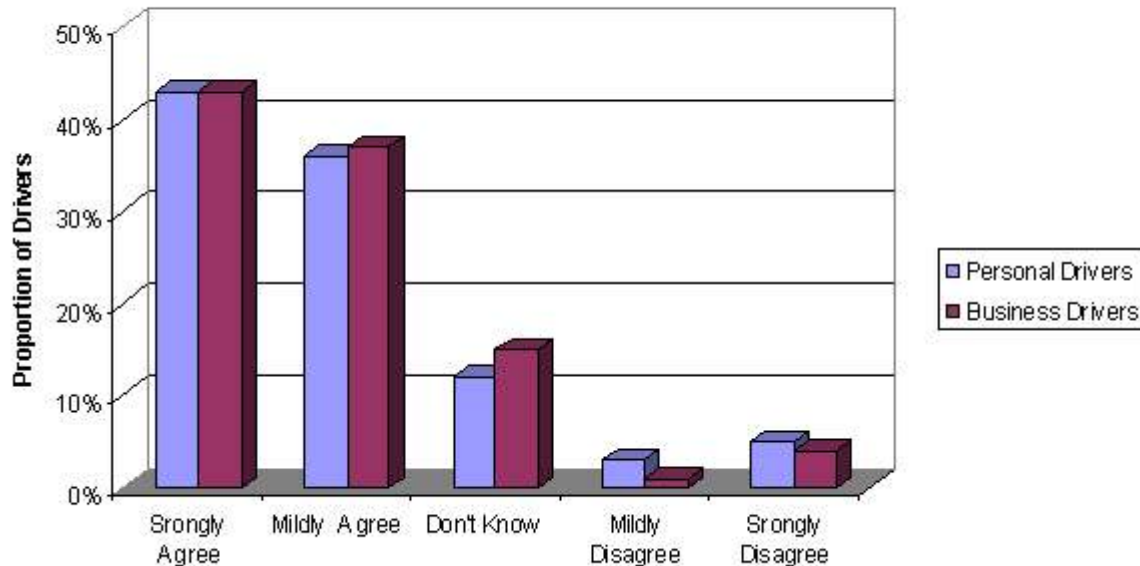
When drivers were asked if they avoid certain routes with at-grade HRIs because there is a chance that they may be stopped by a train, 37 percent of personal and 47 percent of business drivers said they would often avoid certain routes with HRIs. In addition, many drivers are turning when they get close to the HRI and can either see or hear the train. Table 5-1 shows how drivers typically avoid routes with rail crossings or maneuver around blocked HRIs.

**Table 5-1. Drivers Avoid HRIs**

Question	Response	Personal Drivers	Business Drivers
Do you avoid certain routes because there might be a chance you will be stopped by a train?	never avoid	5%	3%
	rarely avoid	12%	7%
	sometimes avoid	38%	30%
	often avoid	37%	47%
	always avoid	8%	13%
How often do you turn when you are on a route with a rail crossing and can see the train?	never turn	3%	0%
	rarely turn	10%	4%
	sometimes turn	33%	22%
	often turn	42%	53%
	always turn	12%	21%

The second factor used in determining the significance of delays at the rail crossings, is the driver's attitude toward delay. The majority of the people expressed some degree of frustration with delays at HRIs, with 34 percent slightly frustrated and 37 percent moderately frustrated. Figure 5-2 shows how drivers felt about the need to do something about the problems with HRIs. Of all personal and business respondents, 43 percent strongly agreed and 37 percent mildly agree that something should be done. Therefore, a very high percentage of drivers, 80 percent, strongly or mildly agrees that something should be done to reduce delay, congestion and frustration for motorists at the HRIs.

**Figure 5-2. Should Something Be Done?**



The third factor used in determining the significance of this issue was the written comments. Survey respondents were asked to comment on the rail crossing issues or on any traffic issues in general in the Fargo - Moorhead area. A significant amount, 179 or 33% of the total respondents provided comments. This high percentage, as well as the content of the comments, indicate that delay and traffic problems at railroad crossings are an important issue for many people in this area. The individual personal vehicle and business related drivers' comments are shown in Appendix C. Here are a few examples of motorists' comments relating to the importance of this issue:

- “The trains are a real issue with our decision to push the relocation of our downtown Fargo business.”
- “I believe signs would definitely help with the traffic downtown and would help to choose alternative routes.”

- “I’m glad someone is working to solve this problem. I am sometimes late for work because of trains – a major annoyance.”
- “I am glad to see a study being done to try and fix or help this situation. I think it has been a problem for a very long time.”
- “Fire and medical emergencies do not allow us to wait for trains if at all possible!”

The respondents’ comments provided very valuable insight into specific rail crossing issues as well as general traffic issues. The many comments were categorized into groups by looking for recurring themes. In addition to the comments themselves, this categorization provides some insight into the significance of the issues being raised in the individual comments. For example, 12 people provided comments about traffic conditions and signal coordination issues at the rail crossings. Even though coordination of signals was not addressed in the survey, many people would like to see improvements in this area. The categories and the number of comments are shown in Table 5-2.

**Table 5-2. Categorization of Written Comments**

	<b>Personal Business</b>
<b>Rail Crossing Issues/Concerns</b>	
1. Railroad crossing needs to be addressed/Message sign is a good idea	44
2. Trains are especially a problem during peak times	14
3. Traffic problem issues at railroad crossings	12
4. Concerns about alternative routes	29
5. Railroad tracks should be relocated	5
6. Train horns are a problem	8
7. Other railroad comments	38
8. Rail crossings are not a concern/Message sign will not help	19
<b>Other Traffic Related Issues In The Fargo-Moorhead Area</b>	
1. Improvements to signals or turning lanes	14
2. Specific corridor problems	12
3. Maintenance and other issues	<u>15</u>
<b>Total</b>	<b>210</b>

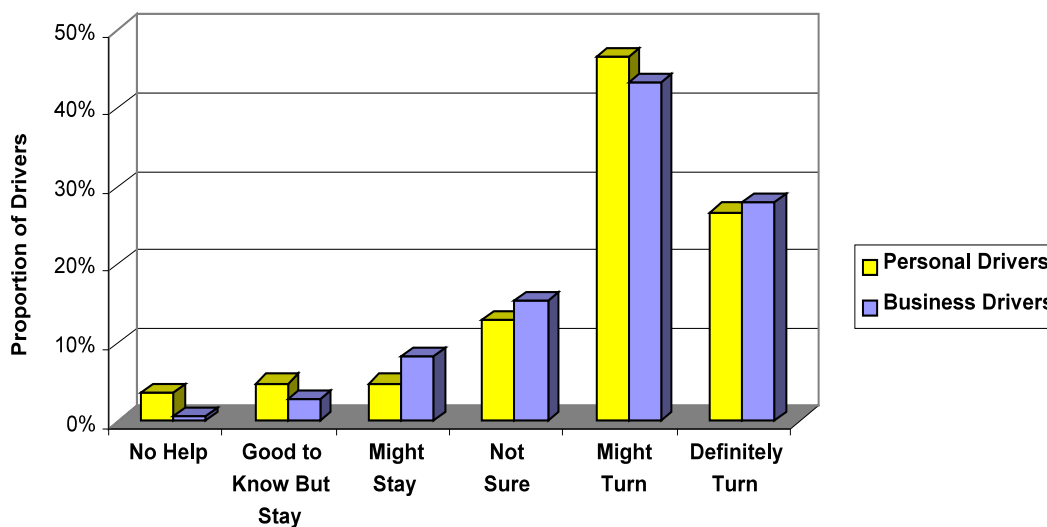
\*Note that several people provided comments on more than one category, therefore, the total is slightly higher than the total number of people providing comments.

## Benefits of ATIS

The second main purpose of the mail-back survey was to determine if drivers felt that they would benefit from having information about the closed crossing. Two main questions were asked using an example blocked HRI, in which motorists would be informed about the length of delay through a CMS. Responses for these two questions were very similar for personal and business drivers.

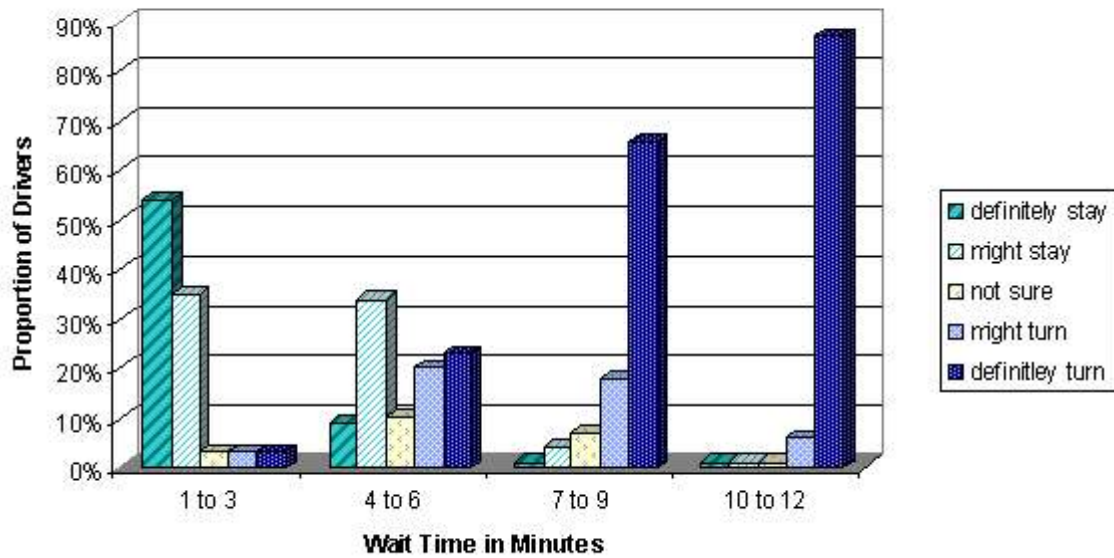
The first question was designed to first see if people would benefit by either simply having information about the train delay or by taking action and turning in order to divert to an alternative route. Figure 5-3 shows that 97 percent of the personal and business respondents feel they would benefit in some way from ITS improvements. Four percent of the drivers felt they would benefit from knowing the train was present, but would probably not take action. However, 46 and 27 percent of respondents might or definitely would divert to an alternative route (a total of 73 percent).

Figure 5-3. How Would The Message Sign Help You?



When asked more specifically if drivers would benefit by taking action and diverting to an alternative route, for various delay time intervals, both personal and business drivers had very similar responses. Figure 5-4 shows that for a 4 to 6 minute wait, 43 percent of all drivers might or definitely would stay and 43 percent might or definitely would turn. For wait times over 6 minutes, the majority of drivers feel they would turn. In the 7 to 9 minute wait category, 84 percent either might or definitely would turn, and in the 10 to 12 minute category, 93 percent either might or definitely would turn.

**Figure 5-4. Would You Turn Given The Following Wait Times?**



### Association Between Drivers' Experiences, Attitudes and Benefits

Several associations were found between those drivers who are willing to turn in the 4 to 6 minute category and their experiences and attitudes. Stronger associations were probably found in the 4 to 6 minute range because such a large percentage of drivers are either not willing to turn in the 1 to 3 minute category or are willing to turn in the 7 to 9 and 10 to 12 minute categories. In addition, the 4 to 6 minute range is a primary concern because it was considered the typical wait time.

A chi square test was performed to determine the statistical relationship between frequencies of responses to questions. The chi square value was calculated using equation 5-1 (Elzey, 1971). The chi square value is compared to the critical chi square for degrees of freedom of (number of rows - 1)(number of columns - 1), and  $P = .01$ . If the chi square value is greater than the critical chi square, the null hypothesis is rejected, and the association between frequencies of responses to questions is significant.

$$\chi^2 = \sum \frac{(O - E)^2}{E} \quad \text{Equation (5-1)}$$

where

O = observed frequency

E = expected frequency determined by  $\frac{(N_{row})(N_{col})}{N_{total}}$

Several hypotheses were made at the outset of the study to examine conditions between drivers experiences and attitudes and how they would benefit from the ITS solution. Table 5-3 shows the questions that were tested for a positive relationship to the driver’s willingness to turn in the 4 to 6 minute interval. The resulting chi square and associated probabilities between responses are also shown.

**Table 5-3. Relationship Between Drivers Willingness To Turn And Questions On Attitudes And Experiences**

Question	Association to: Given a 4 - 6 minute wait, do you think you would stay on your intended route or turn and take an alternative route?			
	Personal Drivers		Business Drivers	
	Chi Square	P	Chi Square	P
How many times do you stop at HRIs?	24.33	.08	15.74	.47
How many minutes do you usually wait?	22.24	.14	24.14	.09
How heavy is the traffic as you approach the HRI?	22.39	.13	18.58	.29
What is your attitude toward waiting?	62.25	.00	24.19	.08
Do you avoid routes with HRIs?	48.05	.00	33.07	.01
Do you currently turn when you can see the HRI is blocked?	97.87	.00	48.38	.00
Do you think something should be done to improve conditions at HRIs?	8.50	.39	22.89	.12
Critical Chi Square	37.57	.01	37.57	.01

\*Shaded areas indicate significant relationships between the driver’s willingness to turn in the 4 to 6 minute interval and the stated question.

After inspecting the data a positive association was found between the personal driver’s frustration and willingness to turn given a 4 to 6 minute wait. This is evidenced by a chi square of 62.25 which is significantly higher than the critical chi square of 37.57. This substantiates that

these two variables are highly related for the personal drivers. For example, Table 5-4 indicates that of the personal drivers that are not at all frustrated with waiting, 26 percent might or definitely would turn given a 4 to 6 minute wait. Meanwhile, of the personal drivers that are extremely frustrated with waiting, 62 percent might or definitely would turn given a 4 to 6 minute wait. However, the chi square test did not support similar relationships for the business drivers.

It was expected that there would also be a positive association between people who think something should be done to improve conditions and people who are more likely to benefit from ATIS by turning in the 4 to 6 minute category. However, the chi square test did not show these two variables to be highly related. This may be because such a significant number of drivers believe something should be done, even among drivers that are less likely to turn in the 4 to 6 minute interval.

**Table 5-4. Correlation Between Drivers' Attitudes and Drivers That Turn**

Attitude Questions	Proportion of drivers that might or definitely would turn for 4 to 6 minute wait		
	Response	Personal Drivers	Business Drivers
What is your attitude towards waiting for trains to pass at railroad crossings?	not at all frustrated	26%	33%
	slightly frustrated	28%	60%
	moderately frustrated	46%	51%
	very frustrated	47%	57%
	extremely frustrated	62%	88%
Do you avoid routes with HRIs?	never avoid	25%	50%
	rarely avoid	25%	50%
	sometimes avoid	30%	42%
	often avoid	49%	61%
	always avoid	61%	68%
How often do you currently turn?	never turn	0%	0%
	rarely turn	16%	0%
	sometimes turn	28%	35%
	often turn	50%	55%
	always turn	56%	90%

The chi square test also showed that personal and business drivers who avoid routes with HRIs are more likely to benefit from a changeable message sign. For example, of personal drivers that always avoid routes with at-grade HRIs, 61% feel they might or definitely would turn. In contrast, of personal drivers that rarely avoid routes with at-grade crossings, only 24% feel they might or definitely would turn given a 4 to 6 minute wait. As expected there is a very strong relationship between drivers that currently turn and drivers that are willing to turn when information is provided to them through ATIS.

It is interesting to note that no significant association was found between the frequency or length of typical wait and the likelihood that the drivers will turn and take an alternative route.

### **Male Versus Female Drivers**

A few differences were found in the responses between the male and female personal vehicle drivers. Differences in responses by gender for the personal vehicle drivers are only included in the following discussion because business related drivers were predominately male (80%). Male drivers tend to feel they experience train delays more often. For example, 23 percent of males versus 18 percent of females wait between 5 and 9 times per week and 8 percent of males versus 3 percent of females wait between 10 and 14 times per week.

Male drivers also responded that they would turn and take an alternative route more often than females. This can be shown by the amount of drivers that would turn given information about a 4 to 6 minute wait (43 percent of male drivers versus 34 percent of female drivers believe they might or definitely would turn in this category). It is interesting that although more male drivers are willing to take action, a higher percentage of female drivers (82 %) than male drivers (78%) believe that something should be done to improve conditions at the HRIs.

## Fargo Versus Moorhead Drivers

There are a few differences between the experiences and attitudes of the Moorhead drivers and the Fargo drivers. Moorhead drivers tend to stop slightly more often, believe the traffic is heavier, and feel more strongly about the need to improve conditions at the HRI. In addition, drivers in Moorhead tend to turn slightly more often when they encounter a blocked HRI. The shaded areas in Tables 5-5 and 5-6 show where the experiences are more frequent and the attitudes are stronger about HRIs, for Moorhead drivers. This finding makes sense because the city of Moorhead has fewer grade-separated routes than the city of Fargo.

It is interesting to note that while there were some differences in the attitudes and experiences between Moorhead and Fargo drivers, the percent of drivers that will benefit from the ATIS are almost the same. The following responses were found to the question asking drivers if they would benefit from ATIS, given a 4 to 6 minute wait.

- 21 percent of Fargo drivers and 19 percent of Moorhead personal drivers might turn.
- 18 percent of Fargo drivers and 16 percent of Moorhead personal drivers would definitely turn.
- 29 percent of Fargo drivers and 20 percent of Moorhead business drivers might turn.
- 31 percent of Fargo drivers and 37 percent of Moorhead business drivers would definitely turn.

**Table 5-5. Differences Between Fargo And Moorhead Personal Drivers.**

Question	Percent Frequency		
	Fargo	Moorhead	Difference
<b>How many times do you stop at an HRI?</b>			
seldom	15	14	1
1 to 4 times per week	62	44	18
5 to 9 times per week	16	28	-12
10 to 14 times per week	6	11	-5
15 to 20 times per week	2	3	-1
over 20 times per week	0	0	0
<b>How heavy is the traffic when you approach an HRI?</b>			
not heavy at all	7	4	3
slightly heavy	30	19	11
moderately heavy	47	56	-9
very heavy	13	18	-5
extremely heavy	0	2	-2
<b>Do you think something should be done to reduce delay and frustration at the HRIs?</b>			
strongly agree	38	55	-17
mildly agree	40	30	10
neither agree nor disagree	13	9	4
mildly disagree	4	3	1
strongly disagree	5	3	2
<b>When you are on a route with a blocked HRI, how often do you turn?</b>			
never	3	3	0
rarely	12	1	11
sometimes	31	39	-8
often	40	46	-6
always	13	11	2

**Table 5-6. Differences Between Fargo And Moorhead Business Drivers.**

Question	Percent Frequency		
	Fargo	Moorhead	Difference
<b>How many times do you stop at an HRI?</b>			
seldom	10	3	7
1 to 4 times per week	43	20	23
5 to 9 times per week	24	23	1
10 to 19 times per week	19	31	-12
20 to 29 times per week	2	17	-15
30 to 40 times per week	2	3	-1
over 40	0	3	-3
<b>How heavy is the traffic when you approach an HRI?</b>			
not heavy at all	5	0	5
slightly heavy	31	20	11
moderately heavy	64	66	-2
very heavy	0	14	-14
extremely heavy	0	0	0
<b>Do you think something should be done to reduce delay and frustration at the HRIs?</b>			
strongly agree	40	51	-11
mildly agree	33	37	-4
neither agree nor disagree	21	3	18
mildly disagree	2	0	2
strongly disagree	2	9	-7
<b>When you are on a route with a blocked HRI, how often do you turn?</b>			
never	0	0	0
rarely	5	3	2
sometimes	24	17	7
often	50	60	-10
always	21	20	1

## **CHAPTER 6. FOCUS GROUP RESULTS**

A focus group was conducted with 12 participants to discuss ATIS delivery methods and types of information that would be most useful. Approximately half of the participants were business drivers and half were personal vehicle drivers. The drivers ages ranged from 20 to over 60. All but one driver was male. The participants were extremely ready to talk and give their opinion on the ATIS methods that were presented to them.

### **Follow-Up to Mail Back Survey**

The drivers were shown a traffic simulation model which demonstrated the traffic conditions at the railroad crossing before and after ITS improvements were made. The simulation was shown for a total of five minutes. After the simulation, the participants were asked to fill out a questionnaire asking how likely they would be to turn given the fact they would be provided with the information on the five minute train delay. This question was asked to see how differently they answered when comparing it to a similar question on the mail-back survey. The question on the mail-back survey asked about the likelihood of turning assuming a changeable message sign shows a 4 to 6 minute wait. Table 6-1 shows how the same 12 participants answered the duplicate questions. In the mail-back survey, 34 percent of the participants felt they might or definitely would turn. Whereas, after watching the simulation, 84 percent of the participants felt they might or definitely would turn. These results show that people felt they were much more likely to turn after they watched the simulation. This could be due to the fact that 5 minutes feels much longer when you actually experience it versus simply reading the interval on a questionnaire.

**Table 6-1. How Likely Are Focus Group Participants To Turn**

How likely are you to turn?	Mail-Back Survey	Focus Group
	4 to 6 minute wait	5 minute simulation
Definitely Stay	17%	0%
Might Stay	33%	17%
Not Sure	17%	0%
Might Turn	17%	42%
Definitely Turn	17%	42%

### **Importance of Improvements**

The participants stressed the importance of improving conditions at the rail crossings especially for those who work in the downtown area. The main reasons stated for wanting improvements included delays, traffic problems, and safety. The participants were especially cognizant of the cost of building additional underpasses and felt that providing a lower cost alternative such as ITS was much more preferable in most cases.

The participants have developed their own methods to avoid having to sit and wait for the trains. Some of these methods include: knowing the approximate schedules during the work day so they can plan their day around the trains; watching the speed of the trains in order to determine about how long the delay will be; watching or listening for the trains as they get close to the crossings and then trying to turn; and taking alternative routes to avoid the chance of being stopped altogether.

## Types of ATIS Methods and Information That Would be Useful

The participants were shown various examples of types of ATIS methods and information that could be provided to them. The most preferred ATIS delivery method and type of information discussed by the group was a changeable message sign that would display the length of delay in a simple format. Figure 6-1 shows the example shown to the participants that displays the delay information. The participants felt that information on length of delay would help: drivers make smarter decisions in taking alternative routes, reduce driver frustration, reduce unsafe maneuvers and accidents, and reduce travel time which would increase productivity.

**Figure 6-1. Changeable Message Sign With Length Of Delay.**



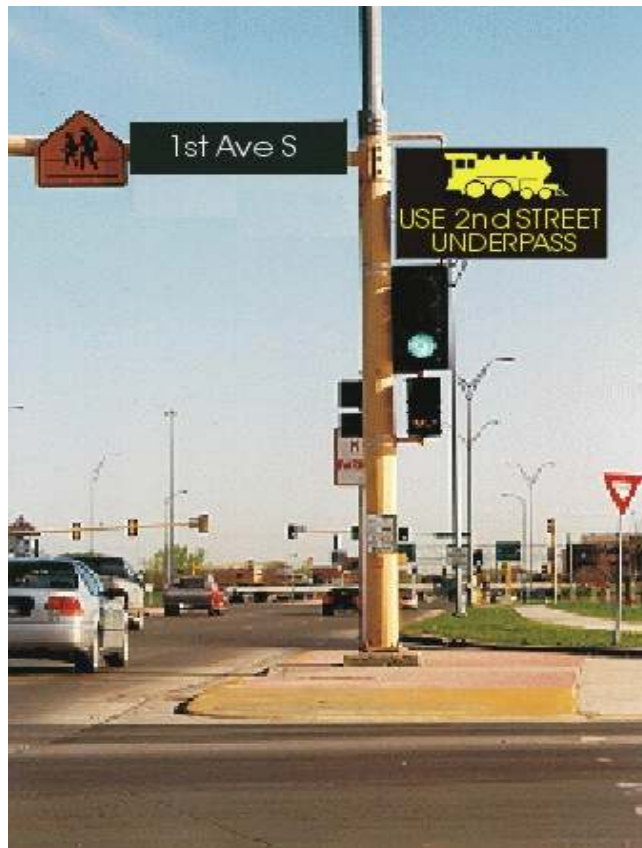
The participants discussed two other methods that they felt would also be somewhat helpful. One method could consist of a flashing light attached to a permanent train warning sign. This method would simply inform drivers that a train is passing through and the crossing is currently blocked. The flashing light had some appeal because it is simple and is a lower cost alternative to the changeable message sign. This method would be helpful for drivers who travel through downtown frequently and could then consider rerouting their trip. Figure 6-2 shows the example shown to the participants that uses the flashing light on a permanent train warning sign.

**Figure 6-2. Train Warning Sign With Flashing Lights**



A changeable message sign with information on alternative routes was also found to have some merit. Fargo-Moorhead is an area with significant growth and has many visitors from surrounding communities. Thus, it would be good to provide these people who are not as familiar with the area with information on alternative routes. However, providing information on alternative routes would require additional changeable and fixed signs in order to effectively guide visitors. Therefore, the participants felt this may not be the most efficient use of resources due to the additional cost of providing this information. In addition, in order to improve traffic conditions, not all drivers will need to turn and take an alternative route. Figure 6-3 shows the example shown to the participants that displays information on alternative routes.

**Figure 6-3. Changeable Message Sign With Alternative Route.**



The participants were somewhat less interested in having the information provided to them through an in-vehicle device. Perhaps this was because they would need to pay for the device and they are even less familiar with in-vehicle technology. Figure 6-4 shows the example on an in-vehicle device shown to the participants. This device does not specifically show information on a train, however, it was explained to the participants that this type of information could be presented in a number of ways in the vehicle.

**Figure 6-4. In-Vehicle Device.**



### **Placement of Signs in the Network**

Participants felt the signs should be placed in the busiest traffic corridors. The number of signs will depend on the cost efficiency and thus, it is probably not cost effective to place them in all corridors. The participants indicated that signs should be placed several blocks away from the crossing to allow motorists enough time to turn and take an alternative route. It would not be helpful to place the sign where the driver can already see the train. All participants felt the signs should be connected to the traffic signal because they would be easier to notice.

## CHAPTER 7. CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The results of this survey process indicate that waiting for trains at HRIs is a serious concern for most drivers in the downtown areas. These findings further demonstrate that motorists in this medium sized community will clearly benefit from having information provided to them through some type of ATIS. The first indicator of the driver's concern was the interest the study team received from the downtown employers in assisting with the survey as well as the higher than normal response rate for the mail-back survey. People seemed genuinely interested in participating in a study which could help make some improvements to this problem.

The mail-back survey showed that the average driver is stopped at least once per week, and waits between four and six minutes for a train to pass. Drivers seem to be so frustrated with waiting for trains that they are willing to use various methods to avoid being stopped. The mail-back survey indicates that 74 percent of the business-related drivers either often or always try to turn when they get close to the crossing and can see the train coming through. Emergency personnel stated that they are concerned about the number of unsafe maneuvers that they see at the crossings. Drivers have indicated that they are generally frustrated with waiting, and in fact, 80 percent of all drivers either mildly or strongly agree that something should be done to reduce delay, congestion and frustration for motorists at the HRIs.

A significant number of drivers believe they would benefit in some way from having information provided to them about the presence or length of a train delay. Results from the mail-back survey indicate that in general, 97 percent of the people would either benefit by simply having their expectations managed or by actually taking action and turning to take an alternate

route. The results further indicate that enough people are willing to turn in the 4 to 6 minute interval which could impact the overall system performance. Once delays become longer than 6 minutes, almost all drivers are willing to take alternative routes to avoid the wait at HRIs.

The focus group participants indicated that receiving information about the length of the train delay is as important as knowing the train is present. This information would help them make smarter decisions about taking alternative routes, reduce their frustration while waiting, and help reduce unsafe maneuvers and accidents. This information will also help reduce their travel time which is especially important for the many people who are driving either to or from work or who are traveling for business related purposes.

### **Recommendations**

The findings of this study can be used to support the implementation of an ITS system. The information can be used by the decision makers of the City of Moorhead ITS project in determining if and what kind of information about the trains should be provided to the motorists. This information can also be utilized for future cost benefit studies in order to help justify the costs of implementation. Benefits can be quantified from the predicted travel time savings from those drivers that feel they are willing to take an alternative route. In addition, operating cost savings will be realized by those drivers. One benefit that is difficult to quantify, but should not be overlooked, is the ability of ATIS to manage the drivers expectations.

Once the ATIS is implemented in the Fargo-Moorhead area, another survey similar to this study should be performed to determine how drivers would actually respond to the system once it is complete. This information can then be used to determine the actual benefits that are realized by the motorists and whether the system is meeting the user needs.

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**APPENDIX A**

**Mail-back Questionnaire Frequency Distribution**

<b>Mail-Back Questionnaire: Personal Vehicle Driver Responses</b>					
		Percent Frequency			
				Officials	Total
	Response			and	Personal
Question	Choices	Fargo	Moorhead	Tranps.	Drivers
1. During an average week, about how often do you drive through downtown Fargo or Moorhead	seldom	1	1	0	1
	1 to 4	9	10	0	8
	5 to 9	8	15	12	10
	10 to 14	38	25	30	34
	15 to 20	29	27	33	29
	over 20	16	22	24	18
2. During an average week, about how many times do you have to stop and wait for a train?	seldom stopped	15	14	12	15
	1 to 4	62	44	48	56
	5 to 9	16	28	36	20
	10 to 14	6	11	0	7
	15 to 20	2	3	3	2
	over 20	0	0	0	0
3. About how many minutes do you usually wait at a rail crossing?	seldom stopped	6	2	9	5
	1 to 3	21	12	27	19
	4 to 6	51	56	42	51
	7 to 9	17	18	15	17
	10 to 12	3	11	6	5
	over 12	2	0	0	1
4. How heavy is the traffic on the streets when you typically approach a rail crossing?	not heavy at all	7	4	12	7
	slightly heavy	30	19	27	27
	moderately heavy	47	56	45	49
	very heavy	13	18	15	14
	extrememly heavy	0	2	0	1
5. What type of trip are you most often making when you are stopped for a train at a rail crossing?	work	76	66	70	73
	shopping	6	8	9	7
	school	1	1	6	1
	social/recreation	5	10	3	6
	personal business	7	11	6	8
	other	0	2	3	1
6. Which of the following best describes your attitude towards waiting for trains to pass at rail crossings?	seldom stopped	4	1	0	3
	not frustrated	12	10	3	11
	slightly frustrated	33	32	36	33
	moderately frustrated	35	31	33	34
	very frustrated	13	17	21	15
7. Do you avoid certain routes because there might be a chance you will be stopped by a train?	extrememly frustrated	6	9	6	7
	never	7	2	0	5
	rarely	14	8	9	12
	sometimes	35	49	27	38
	often	36	33	52	37
8. When you are on route with a rail crossing and can see a train passing through, how often to you turn and take an alternate route?	always	8	8	12	8
	never	3	3	0	3
	rarely	12	1	12	10
	sometimes	31	39	33	33
	often	40	46	45	42
	always	13	11	9	12

9. In general, do you think something should be done to reduce driver delay and to reduce driver frustration at rail crossings?	strongly agree	38	55	52	<b>43</b>
	mildly agree	40	30	24	<b>36</b>
	neither agree nor disagree	13	9	18	<b>12</b>
	mildly disagree	4	3	0	<b>3</b>
	strongly disagree	5	3	6	<b>5</b>
10. How do you think the message sign would help you?	not help	3	5	0	<b>4</b>
	good to know but stay	5	4	9	<b>5</b>
	might stay	5	5	3	<b>5</b>
	not sure	13	13	15	<b>13</b>
	might turn	47	49	39	<b>47</b>
	definitely turn	27	23	33	<b>27</b>
11a. Given a 1 - 3 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	58	65	58	<b>59</b>
	might stay	33	23	33	<b>30</b>
	not sure	2	4	0	<b>2</b>
	might turn	4	1	6	<b>3</b>
	definitely turn	1	3	3	<b>2</b>
11b. Given a 4 - 6 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	11	13	6	<b>11</b>
	might stay	35	39	45	<b>36</b>
	not sure	12	8	9	<b>11</b>
	might turn	21	19	6	<b>20</b>
	definitely turn	18	16	33	<b>19</b>
11c. Given a 7 - 9 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	2	1	0	<b>2</b>
	might stay	2	9	0	<b>4</b>
	not sure	5	10	18	<b>7</b>
	might turn	21	15	15	<b>19</b>
	definitely turn	67	57	67	<b>65</b>
11d. Given a 10 - 12 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	1	1	0	<b>1</b>
	might stay	2	1	0	<b>1</b>
	not sure	0	2	3	<b>1</b>
	might turn	5	8	9	<b>6</b>
	definitely turn	88	82	88	<b>87</b>
12. What is your age?	Less than 20	0	0	0	<b>0</b>
	20 - 29	21	15	15	<b>19</b>
	30 - 39	27	28	18	<b>27</b>
	40 - 49	28	28	45	<b>29</b>
	50 - 59	17	18	9	<b>17</b>
	over 60	5	10	12	<b>7</b>
13. What is your gender?	Male	51	61	64	<b>55</b>
	Female	49	38	36	<b>45</b>
14. Which of the following categories best describes your employment status?	employed full time	88	78	91	<b>86</b>
	employed part time	7	9	3	<b>7</b>
	working at home for pay	0	1	0	<b>1</b>
	looking for work	0	0	0	<b>0</b>
	homemaker	1	1	0	<b>1</b>
	student	1	2	3	<b>2</b>
	retired	2	8	3	<b>3</b>
	other	0	0	0	<b>0</b>

15. On an average weekday about how far do you drive?	1 - 4 miles per day	12	8	9	<b>10</b>
	5 - 9 miles per day	31	29	21	<b>30</b>
	10 - 14 miles per day	24	13	18	<b>21</b>
	15 - 19 miles per day	11	12	21	<b>12</b>
	20 - 24 miles per day	7	10	15	<b>8</b>
	over 25 miles per day	14	28	15	<b>18</b>
16. Would you be willing to participate in an hour-long session to discuss the types of improvements that could be made?	unable to participate	77	70	61	<b>74</b>
	able to participate	14	26	24	<b>18</b>
<hr/>					
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Number of respondents in subgroups		266	93	33	<b>392</b>

<b>Mail-Back Questionnaire: Business Related Driver Responses</b>					
		Percent Frequency			
		Both			<b>Total</b>
	Response	Fargo &			<b>Business</b>
Question	Choices	Moorhead	Fargo	Moorhead	<b>Drivers</b>
1. During an average week, about how often do you drive through downtown Fargo or Moorhead	seldom	0	2	0	<b>1</b>
	1 to 4	8	7	0	<b>6</b>
	5 to 9	6	10	6	<b>7</b>
	10 to 19	29	17	17	<b>22</b>
	20 to 29	9	29	11	<b>15</b>
	30 to 40	5	12	17	<b>10</b>
	over 40	44	24	49	<b>39</b>
2. During an average week, about how many times do you have to stop and wait for a train?	seldom stopped	11	10	3	<b>8</b>
	1 to 4	44	43	20	<b>38</b>
	5 to 9	15	24	23	<b>20</b>
	10 to 19	18	19	31	<b>22</b>
	20 to 29	8	2	17	<b>8</b>
	30 to 40	2	2	3	<b>2</b>
	over 40	3	0	3	<b>2</b>
3. About how many minutes do you usually wait at a rail crossing?	seldom stopped	5	2	3	<b>4</b>
	1 to 3	14	26	14	<b>17</b>
	4 to 6	59	50	54	<b>55</b>
	7 to 9	21	21	26	<b>22</b>
	10 to 12	2	0	3	<b>1</b>
	over 12	0	0	0	<b>0</b>
4. How heavy is the traffic on the streets when you typically approach a rail crossing?	not heavy at all	9	5	0	<b>6</b>
	slightly heavy	20	31	20	<b>23</b>
	moderately heavy	56	64	66	<b>61</b>
	very heavy	11	0	14	<b>8</b>
	extremely heavy	3	0	0	<b>1</b>
5. What type of trip are you most often making when you are stopped for a train at a rail crossing?	product deliveries	0	2	0	<b>1</b>
	mail deliveries	2	2	0	<b>1</b>
	service for customers	26	10	14	<b>18</b>
	providing transportation	44	5	9	<b>24</b>
	repair/maintenance	0	2	9	<b>3</b>
	emergency services	23	55	54	<b>40</b>
	other	5	19	14	<b>11</b>
	seldom stopped	2	2	0	<b>1</b>
6. Which of the following best describes your attitude towards waiting for trains to pass at rail crossings?	not frustrated	9	5	3	<b>6</b>
	slightly frustrated	35	48	17	<b>34</b>
	moderately frustrated	42	36	57	<b>44</b>
	very frustrated	9	5	17	<b>10</b>
	extremely frustrated	5	7	6	<b>6</b>
7. Do you avoid certain routes because there might be a chance you will be stopped by a train?	never	3	5	0	<b>3</b>
	rarely	8	10	3	<b>7</b>
	sometimes	26	26	43	<b>30</b>
	often	47	50	43	<b>47</b>
	always	17	10	11	<b>13</b>
8. When you are on route with a rail crossing and can see a train passing through, how often to you turn and take an alternate route?	never	0	0	0	<b>0</b>
	rarely	5	5	3	<b>4</b>
	sometimes	23	24	17	<b>22</b>
	often	52	50	60	<b>53</b>
	always	21	21	20	<b>21</b>

9. In general, do you think something should be done to reduce driver delay and to reduce driver frustration at rail crossings?	strongly agree	39	40	51	<b>43</b>
	mildly agree	39	33	37	<b>37</b>
	neither agree nor disagree	17	21	3	<b>15</b>
	mildly disagree	2	2	0	<b>1</b>
	strongly disagree	3	2	9	<b>4</b>
10. How do you think the message sign would help you?	not help	0	2	0	<b>1</b>
	good to know but stay	3	2	3	<b>3</b>
	might stay	9	7	9	<b>8</b>
	not sure	21	14	6	<b>15</b>
	might turn	45	36	49	<b>43</b>
	definitely turn	18	38	34	<b>28</b>
11a. Given a 1 - 3 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	44	36	34	<b>39</b>
	might stay	41	52	49	<b>46</b>
	not sure	6	0	3	<b>4</b>
	might turn	5	2	3	<b>4</b>
	definitely turn	3	10	9	<b>6</b>
11b. Given a 4 - 6 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	5	2	6	<b>4</b>
	might stay	30	26	26	<b>28</b>
	not sure	5	10	11	<b>8</b>
	might turn	20	29	20	<b>22</b>
	definitely turn	33	31	37	<b>34</b>
11c. Given a 7 - 9 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	2	0	0	<b>1</b>
	might stay	3	5	3	<b>4</b>
	not sure	8	2	6	<b>6</b>
	might turn	15	17	17	<b>16</b>
	definitely turn	65	74	74	<b>70</b>
11d. Given a 10 - 12 minute wait, do you think you would stay on your intended route or turn and take an alternate route?	definitely stay	0	0	0	<b>0</b>
	might stay	5	0	0	<b>2</b>
	not sure	0	0	0	<b>0</b>
	might turn	3	10	6	<b>6</b>
	definitely turn	86	88	94	<b>89</b>
12. What type of business do you work for?	Hospital/Medical office	8	2	0	<b>4</b>
	Community (fire, police)	18	74	89	<b>52</b>
	Manuf./Construction	0	0	0	<b>0</b>
	Public Utility	0	2	6	<b>2</b>
	Transportation provider	44	0	0	<b>20</b>
	Real Estate/Finance	20	5	0	<b>10</b>
	Mail or Product Delivery	0	0	0	<b>0</b>
	Other	11	17	6	<b>11</b>
13. What type of vehicle do you use for business related trips?	Passenger Car	32	62	71	<b>50</b>
	Van	15	2	0	<b>8</b>
	Bus	23	0	0	<b>10</b>
	Light Truck	23	7	9	<b>15</b>
	Heavy Truck	8	29	20	<b>17</b>
14. On an average weekday about how far do you drive for business?	1 - 4 miles per day	2	5	6	<b>4</b>
	5 - 9 miles per day	5	10	11	<b>8</b>
	10 to 14 miles per day	5	10	3	<b>6</b>
	15 to 19 miles per day	5	7	6	<b>6</b>
	20 to 24 miles per day	9	7	6	<b>8</b>
	over 25 miles per day	76	62	69	<b>70</b>

15. What is your age?	less than 20	0	0	0	<b>0</b>
	20 to 29	32	19	34	<b>29</b>
	30 to 39	29	55	40	<b>39</b>
	40 to 49	18	17	23	<b>19</b>
	50 to 59	17	10	3	<b>11</b>
	over 60	3	0	0	<b>1</b>
16. What is your gender?	male	67	86	97	<b>80</b>
	female	32	14	3	<b>20</b>
17. Would you be willing to participate in an hour long session to discuss the types of improvements that could be made?	yes	67	81	80	<b>74</b>
	no	32	19	20	<b>25</b>
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Number of respondents in subgroups		66	42	35	<b>143</b>

## **APPENDIX B**

### **Survey Distribution and Response Rates**

**Personal Vehicle Driver's Survey Distribution and Response Rate**

Name		Address	Surveys Distributed	Surveys Returned	Response Rate
<b>I. Fargo Personal Vehicle Drivers</b>					
<b>Employers</b>					
1	hearland trust company	120 8th st S			
2	united way/community resources	219 7st S			
3	neuropsychiatric research institute	700 1st ave S			
4	precision marketing	15 8th st S			
5	mexican village restaurant	814 main ave			
6	fargo park district	701 main ave			
7	northwest bank	406 main			
8	mid american steel	92 NP avenue			
9	gate city federal	500 2nd ave N			
10	the forum	101 5th st N			
11	prairie public television	207 5th st N			
12	professional management associates	109 1/2 broadway			
13	dain bosworth inc	74 broadway			
14	state bank of fargo	51 broadway			
15	merrill lynch	51 broadway			
16	smith barney	23 broadway			
17	northern school supply	np ave and 8th st			
18	dawson insurance	721 1st ave			
19	ITS meeting (NavTech employees)				
			449		
<b>General Public/ Other</b>					
20	fargo public library	102 3rd st N			
21	4th ave railcrossing	4th ave			
			<u>130</u>		
<b>Total Fargo Personal Vehicle Drivers</b>			579	266	46%
<b>II. Moorhead Personal Vehicle Drivers</b>					
<b>Employers</b>					
1	city of moorhead	500 center ave			
2	moorhead insurance	501 main			
3	state farm insurance	725 center avenue			
4	viking bank	1001 center ave			
5	moorhead chamber of commerce	725 center avenue			
6	farmer's insurance group	19 4st S			
7	american federal bank	602 center ave			
8	bluecross blue shield	813 center ave			
9	minnesota technology	725 center avenue			
10	first bank	403 center ave			
11	edward jones	725 center avenue			
12	norwest bank	730 center ave			
13	american crystal sugar co.	2500 11st N			
<b>General Public/ Other</b>					
14	moorhead center mall	500 center ave			
15	moorhead city council	500 center ave			
16	technical transportation committee				
			<u>110</u>		
<b>Total Moorhead Personal Vehicle Drivers</b>			494	126	26%
<b>Total Personal Vehicle Drivers</b>			<b>1073</b>	<b>392</b>	<b>37%</b>

**Business Related Driver's Survey Distribution and Response Rate**

	Name	Address	Surveys Distributed	Surveys Returned	Response Rate
<b>I. Fargo and Moorhead Business Related Drivers</b>					
1	fire department - fargo	637 northern pacific ave			
2	fire department - moorhead	1120 1st ave N			
3	police department - fargo	222 4th st N			
4	police department - moorhead	915 9th ave N			
5	post office - fargo	657 2nd ave N			
6	post office - moorhead	119 5th st S			
7	fargo-moorhead ambulance	1101 1st ave S			
8	ups	3901 12th ave N			
9	corporate courier dispatch group	1130 40th st NW			
10	doyle's yellow checker cab				
11	all occasion limo				
12	nsp	2302 great northern drive			
13	metro area transit	502 northern pacific ave			
14	city of moorhead transit drivers				
15	park co. realtors	28 10th st N			
<b>Total Business Related Drivers</b>			<b>429</b>	<b>143</b>	<b>33%</b>

<b>Total Personal and Business Drivers</b>	<b>1502</b>	<b>535</b>	<b>36%</b>
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**APPENDIX C**

**Mail-Back Survey Comments**

## Personal Vehicle Drivers' Comments (Manila Survey)

#	Code	Grp	
<b>A. Rail Crossing Issues/Concerns</b>			
<b>1. Railroad crossing needs to be addressed/Message sign idea is good.</b>			
2	E	1	Message board is good idea. When riding my bicycle, I have an alternate underpass route to use when I hear or see a train approaching my at-grade crossing. Question #15- only drive on weekends (use alternate transportation during week)
18	E	1	The trains are a real issue with our decision to push the relocation of our downtown Fargo business location at 23 Broadway.
20	E	1	Thank you - This is an important issue and needs to be addressed.
38	E	1	Question #10: It would be good to know how long I would wait, I might take an alternate route.
56		1	No comments- just frustrated!
75	E	1	Yes keep up the efficiency of Traffic Circulation esp at the RR tracks- signs of anticipated delay make big sense vx. an overpass etc. !
96	TS	1	I would rather see money spent on manage ctr. rather than underpass.
100	E	1	This is an area that needs to be addressed! Thanks for looking into it!
107	E	1	I have learned to avoid using any roads that have train crossing- so while I travel though downtown- I use 2nd street, 10th, and University a great deal.
117	E	1	Please move ahead on some of the above improvements.
118	E	1	Glad this is being addressed. Very frustrating.
128	Q	1	It's really annoying to wait for a train to get out of Village Green, and then wait for the same train a 2nd time to get to work uptown Mhd!!
133	E	1	Fargo is better than Moorhead- more alternate routes but still can be frustrating.
141	E	1	I feel something needs to be done here in Fargo/Moorhead to reduce the train problem.
154	E	1	Good luck! I hope your work will help to make improvements. They are needed!
166	F	1	It is noticeably getting worse.
179	F	1	Question #6- Depends on situation/timing of trip..... If there were a device showing the approximate time remaining to wait, I would be encouraged not to turn and go another route - would definitely wait if under 5 minutes.
207	E	1	I am sorry that I am unable to attend, but I feel that the message signs are an excellent idea and would greatly improve the downtown area.
241	E	1	Yes because I work right by railroad tracks and I've been late for work because of train and my lunch time has been more then once delayed for at least 10 min. and only have half hour lunch.
259	Y	1	I get frustrated with trains, however, if my wait is 2-5 min., I can deal with it. I once had to wait 16 min. I could not turn around. This problem needs to be addressed.
275	G	1	This is a good idea- a step in the right direction.
288	E	1	I'll give you credit for trying.
302	G	1	I like the idea about information signs because there is enough under passes to take alternate routes.
308	E	1	I believe the signs would definitely help with the traffic downtown and would help to choose alternative routes.
323	E	1	Yes, I am a school bus driver for the Moorhead Public School Dist. This will mean I have undoubtedly skewed your results. I appreciate the questionnaire.
334	E	1	I'm glad someone is working to solve this problem. I am sometimes late for work because of trains- a major annoyance.
347	F1	1	I am very glad to see a study being done to try and fix or help this situation. I think it has been a problem for a very long time.
364	F1	1	I don't drive up-town that often but when I do 9 out of 10 times I wait for a train. Very Frustrating!!!
380	F1	1	There definitely needs to be something done to alleviate some of the congestion at crossings in FM Area. There are getting to be too many trains at too many different times.
381	F1	1	I think your ideas are great and hopefully your ideas will make a lot of sense to other people.
389	F1	1	No. But it is about time that these things are brought to attention.
121A	E	1	I think addressing train delays like this is great!
12C	E	1	I like the idea of having signs to show amount of minutes your wait will be.
93A	E	1	I believe trains should be the number 1 transportation concern for Fargo Moorhead due to traffic and safety issues.
<b>Subtotal</b>		<b>34</b>	

**2. Trains are especially a problem during peak times.**

37	E	2	Trains should not go through town between 7:00 am and 8:00 am and 4:30 pm - 5:30 pm. They always go through during the middle of rush hour.
55	Q	2	Try going through town at hours other than 7:30-8:00, noon hour, and 4:30-5:00.
62	B	2	Traffic from South Fargo (32nd St.S., University Drive) to the Downtown area is very heavy and slow going to work at 7:40 am and home at 5:00 pm.
72	E	2	8:00 am and 12:00 pm seem to be when I most often get caught by a train.
92	E	2	Should be run only at night.
109	E	2	I often have to wait for trains going to or from work at 8 am and 5 pm. Maybe consider rescheduling trains to run at off-peak hours? (even just a few minutes difference would help a lot of people).
122	E	2	Is there any reason why the train schedules can't be changed or adjusted to avoid peak traffic times. It seems that the trains are always blocking traffic during peak times like 8 am, 12 noon, 5 pm. I am an impatient person who hates to wait for trains.
132	E	2	Questions #3- In most cases, I'll take another route so I don't have to wait. Question #6- Depends on the time of day. I'm extremely frustrated if I must wait around 8:00 am or 5:00 pm.
183	F	2	Just a thought about train traffic and their routes, It seems as though trains typically pass through downtown during morning, noon, and evening rush hours. Could train schedules be altered to avoid these times?
222	E	2	The trains could cooperate and stay out of downtown during morning and aft. rush hour and from 12:00 - 1:00 noon weekdays. 7 am to 8 am, 4:30 to 5:30 pm
296	E	2	Is there any way to change the schedule of the trains so they don't come through at 5 pm? Rush hour traffic.
12B		2	It is very important for me to be at work at 7 am. Sometimes I am stopped by a train just off of Main Ave and I don't reach my destination until 7:10-7:15, after I wait for a train.
354A	E	2	It seems as the Fargo- Moorhead is right in the middle of the coal train schedule.
354B	E	2	The grains going east that are full and the trains that are empty going west seem to pass thru F-M at the noon hour which is the time of day when I do most of my running around.
354C	E	2	It seems that this schedule could be altered slightly so these long trains could pass thru F-M at a different time, because F-M is the biggest metro area along their route.
<b>Subtotal</b>		<b>13</b>	

**3. Traffic problem issues at railroad crossings**

33	E	3	Put notice to drivers before turn proceeds into street blocked by existing train. Diagram: More notice or sign to intersection before being "locked" into "dead end street" so choice could be made before turning into blocked street.
149	E	3	Please also consider safety issues. There are certain RR x'ings that can be a dangerous traffic situation. The road just doesn't allow enough room for the traffic that is waiting to cross
168	F	3	In downtown due to short road segments traffic can get backed up in several directions and affect cars that do not need to cross the railroad to get to their destination.
244	E	3	Stop signs (near train crossings) are very frustrating when they prevent you from leaving the corner but let parallel traffic through.
250	E	3	The present system not allowing you to cross Main Avenue when a train is running is ridiculous. Some people from 1st or 2nd Ave So heading North want to get on Main Avenue to go West but the light stays red until the train is gone.
282	Y	3	Another problem are cars that want to turn at RR crossings tend to backup traffic when a train is passing thru. turning lanes would help on those roads to keep traffic following without delays.
285	E	3	Stop lights are set poorly. If you are making a left turn on Main heading North, you are stuck until the train is gone because the lights never change. Flashing Red or 3 minute maximum would be better.
12A	E	3	Turning onto Broadway from Main Ave is difficult as a train is passing through town. Too many cars attempt to turn and some are left out in the middle of Main Ave. Also the turning lanes on Main Ave have become congested.
176A	F	3	I think one of the dangerous aspects is when traffic backs up along main routes and blocks cross traffic. Also when cars are parked on RR tracks during a red light.
370A	F1	3	An issue not listed here is when traffic stops at a stop light for a train that is on tracks across from the stoplight - the autos sit thru green lights because of the train and approach to the rails across the intersection is full of other autos.
370B	F1	3	People cannot turn right or left as they cannot get to the intersection. SEE DRAWING.
390A	E	3	By the time a train has passed, traffic congestion around the RR crossing area is highly unmanageable and disorderly.
390B	E	3	Having a white signal lamp on the traffic control lights is helpful but does not prevent me from being stuck at a red light which denies me access to an alternate route to avoid the train.
390D	E	3	Question #4- Extremely heavy when a train is passing. Crossing areas become very congested and unmanageable. Cars behave unpredictably as they seek last minute escapes from the delay caused by passing trains.
390E	E	3	Traffic is often backed up by passing trains. Traffic is often backed up so much it impedes driveways and other intersections.

**Subtotal 11**

**4. Concerns about alternative routes**

- 13 E 4 What "alternate route" and how long will that take?!
- 43 E 4 Question #5- Driving daughter to activities/classes. I am a Moorhead resident- and train delays in Moorhead are particularly troublesome since there are few alternate routes from South to North.
- 59 E 4 See Back page- There are many points where it would be 8-10 blks out of the way to avoid trains if you don't initially take underpass. Hard at some points to go around without going completely off route.
- 64 E 4 There are not enough alternate routes to take when a train is going through town unless you want to drive a mile or two out of the way.
- 93 E 4 Another issue- if you suggest alternate routes with a sign- won't the alternate routes become congested and cause delay?
- 120 4 I would like to see another underpass in Moorhead.
- 136 E 4 It would be especially helpful to something downtown where everything is close-in and crowded. When a train goes through, it becomes heavily congested and causes delays on the alternate routes also!
- 172 F 4 Instead of signs, money might be better spent for another railroad underpass - I don't think a sign will change my attitude about waiting for trains.
- 177 F 4 Often in Moorhead there are no reasonable alternate routes, reducing the effectiveness of such a informational signage system
- 178 F 4 The idea of an "alternate route" is a good one; however, there are only two alternate routes in Moorhead (under the Red River Bridge and 21st Street) and those are sometimes not an option due to spring flooding or more trains at Main Ave.
- 182 F 4 Biggest problems (from what I hear) are in Moorhead with the lack of over/under passes.
- 237 E 4 Question #10- I would be thinking- If everyone turns to take the alternate route than it might take as long as just waiting.
- 286 E 4 Its only getting worse. Question #7- cannot avoid easily Question #8- no good alternate route. Question #11- Where are these alternate routes you are fixated on?
- 290 E 4 More over/underpasses would be preferred to the signs realizing however that these would be vastly more costly.
- 387 E 4 Even if I chose to take an alternate route there are few options, this makes me concerned about safety vehicles (ambulance, police, fire) being able to get through in an emergency.
- 391 E 4 Yes, there are too many train delays. (Too many trains) where as there should be at least 1 more underpass in Moorhead and 2 more in Fargo.
- 174A F 4 I believe one additional underpass (within the City of Moorhead) ( grade separation) needs to be in place - located in the 8th Street to 11th street area in order for this type of electronic signal system to be effective.
- 284A E 4 We need one good underpass going North and South downtown.
- 284B E 4 Question #8- This question is not pertinent because there is little to choose from for alternate routes. Question #11- Downtown alternate routes aren't available except for 1 which is out of the way and time consuming. Poor alternative.
- 298A G 4 1. I think we need more over/under passes.
- Subtotal 20**

**5. Railroad tracks should be relocated**

- 85 Q 5 A. Move/relocate downtown Moorhead; or B. Relocate at least one set of RR tracks.
- 242 E 5 Road repair, underpass or overpass on 7th Ave NW Great Northern Drive Underground railroads as in SUBWAY- PLEASE- PLEASE- PLEASE
- 382 F1 5 Is it possible to reroute tracks around town. This would be GREAT. Moorhead is terrible.
- 189A F 5 Question #6- However, understanding that most of what passes through here is inroute from Asia to Europe, passing through the US by way of rail, I feel the trains should be re-routed around the city and stop wasting our communities' time.
- 328A E 5 Reroute rails out of the city. There is no justification at this time why rails have to be in the city. These rails were set up for an earlier time.
- 328B E 5 Consideration must be also be taken in evaluation the consequences of traffic accidents due to hazardous material being hauled by trains. Those passengers taking AMTRAK could just as well take buses or taxis out of the city if depot is relocated-
- 328C E 5 case in point - airport is out of city- why not rail.
- Subtotal 4**

## 6. Train horns are a problem

34	E	6	Another issue is the train horn. Is it necessary to be so loud and to blow so frequently.
41	E	6	The train horns have affected my hearing.
257	Y	6	For me..... more initiating than crossing delays is! loud train whistles- noise could be reduced by muting the whistle or limit to one per crossing.....
320	E	6	Would do most anything to cut down of the noise pollution resulting from excessive load and to frequent use of air horn, whistle etc. and they go thru the cities.
342	F1	6	Do they have to blast their air horn at every intersection.
353	F1	6	I don't like the "bumpy" RR crossings and I am extremely annoyed by the shrill - ear shattering train whistles!
390C	E	6	The train horns are painfully loud. I am sure they are sometimes harmfully loud. I am not alone in objecting strongly to this. Question #4- most of the time. Then crossing, even empty, does slow normal traffic somewhat.
89A	Q	6	Stopping time/waiting for trains is secondary- the primary problem associated with trains, especially in Moorhead, is the NOISE POLLUTION! If you can eliminate the need for trains to blow whistle at every intersection, then you've improved our community
<b>Subtotal</b>		<b>8</b>	

## 7. Other railroad crossing or survey comments

1	E	7	I will wait for a train when I don't have anything going on. However, if I am in a hurry I probably spend more time trying to avoid a train than actually waiting
14	E	7	Question #7- Sometimes it is not possible or feasible.
45	E	7	Not as bad as Dilworth!
48	E	7	Question #2- usually take underpass routes
51	E	7	Question #6- depends on my schedule
58	E	7	Mostly depends on how rushed you are.
81	Q	7	My frustration comes from when the train is stopped blocking the intersection. There has to be other places for this.
124	Q	7	If possible; trains should not stop across major intersection within city limits.
143	E	7	I think at all railroad crossings should have a crossing bar that goes down when train is coming!
159	E	7	These questions about the sign don't address how long it will take to get back to another route.....
163	F	7	I realize the trains are here to stay, But the length of train should be addressed.
170	F	7	Question #10- I would need to know what direction the train was heading.
200	E	7	Underpasses for railroad they flood out during rain storm and winter become icy hazards
229	E	7	I usually choose my routes to use underpasses.
240	Y	7	Have felt cost prohibits changing train problems, so we just have to always use alternate routes if we are on a time schedule.
274	Y	7	Some trains are pretty slow- more speed would be acceptable.
278	Y	7	The trains are too long.
309	G	7	I don't travel through downtown often enough to fee qualified to give my opinion.
326	E	7	The BN line is worse for blocking.
330	E	7	I usually seek a route that includes an underpass to avoid waiting.
337	G	7	My answers are relative to how late I am in getting somewhere.
344	F1	7	railroad crossing on Clay county 26 & 18 needs lights
373	F1	7	It's really bad when you have to wait for 3 trains at 1 stop. I have had this happen to me a couple of times in Mhd.
378	F1	7	I work at American Crystal Sugar. I live near Barnesville and I have 58 miles round trip. I use the Moorhead 21st St underpass or it would be nightmare. I don't use the other crossings unless its necessary.
379	F1	7	Question #4 is foolish- If a train is passing at 3:00 pm- Traffic is usually heavy (weekdays with Friday the worst) I work a rotating shift schedule so I see the 12:50 am trains when traffic is not heavy.
383	F1	7	Question 10 was difficult to answer. If a train was coming and everyone tried to advance, we would end up with the same net result at one end or the other.
386	E	7	This is the 1st survey I've seen and underpasses in Fargo to avoid delays have been taken.
174B	F	7	Question #2- I plan my route- use existing underpasses.
189C	F	7	Question #10- Moorhead intersections are too close it simply wouldn't matter. Maybe which way the train is going.
<b>Subtotal</b>		<b>29</b>	

**8. Railroad crossings are NOT a concern/Message sign will NOT help**

90	Q	8	People who become frustrated with the trains, should realize the benefits that the railroad brings to a community.
105	E	8	I wait longer and become more frustrated waiting for trains in Moorhead. Railroads are a very important part of our economy. As long as they don't stop or are slowing down in front of me- I'm okay with them.
147	E	8	Trains are essential and they have been here a long time. If you don't have the patience to wait for a train- go a couple of blocks out of your way to an underpass
214	Y	8	I do use underpasses frequently to avoid possible trains and the possibilities of trains dictates my routes. I have lived in the F-M area for 35 yrs so it has become a habit to avoid trains.
263	E	8	Question #10 I think a message sign would only produce congestion on side streets. Also: Fargo built up around the railroads; perhaps people should think of that before they get upset that the railroad runs right through the middle of town.
317	E	8	I love living in a town with trains. They are the commerce of our country!
345	F1	8	I believe there is more whining in Moorhead than actual problem. Cross the tracks when there is no train. (Plan ahead)
357	F1	8	The traffic flows well. The underpass on each end of Moorhead keeps the traffic moving.
360	G	8	The railroad was here before the cities!
15B	E	8	The roads & signage around town (Fgo-Mhd) are pretty good and I much prefer Fargo-Mhd traffic to Minneapolis, etc.
189B	F	8	Diagram- This will not take care of the problem. This example is a 'cough drop remedy' makes you feel good but you're still sick. The problem is too many trains in and through our area not completing or taking on our area's business.
189D	F	8	Question #11- If it is the path I need to take, it is the path I need to take. Driving all around the city will take full waiting time or more. Taking alternate routes is not the answer in Moorhead. (Maybe in Minneapolis.)
289A	E	8	Trains are important part of our transportation system especially in rural communities. If we are going to keep trains in ND we need to be more patient and supportive of the great role they take in providing transportation for ag products, etc.
289B	E	8	We should be thankful every time we see a train. They represent a good economy and progress. They should always have the right of way
319A	E	8	Be patient as you would at any red/green lighted intersection. The people who cross the rail- tracks should realize it is the same as most intersections of crosstraffic!!! Most importantly, the railroads were here FIRST!!!
319B	E	8	P.S. I have no connection nor business monetary interest in the railroads- other than paying taxes.
332A	E	8	A sign would be ugly and expensive (like previous page- yuk!) and if in a hurry folks turn around. Trains are no big deal- adult and mature drivers can't wait- then they shouldn't drive. It's a privilege not a right.
332B	E	8	We go to damn fast in this very short life. Let's stop Drunk Driving Huh!
89B	Q	8	In my opinion, "waiting signs" are a waste of time and money.
94A	E	8	1. The rails should become our dominant means of transportation- They are the most energy efficient. 2. Auto Speed Limits in Fargo are too variable and subjective. 3. Traffic law enforcement needs to be improved.
94B	E	8	4. Rails are not a traffic or noise problem- the 4 wheel drive utility auto is worse.
<b>Subtotal</b>		<b>16</b>	

## B. Other Traffic-Related Problems in the Fargo-Moorhead Area

### 1. Improvements to signals or turning lanes

5	E	9	Traffic Signal Synchronization
6	E	9	Traffic turn and time sensitive lights should be re-assessed.
54	E	9	I think we need more traffic lights.
63	E	9	Downtown traffic is absurd! There should be some way to make traffic smoother- especially with turning lanes and increased time amounts for lights.
77	E	9	Lines need to be put on streets in early Spring- not in Fall or late Summer. More planning for turning lanes and lights. Such as 45 Street South of 94, do it right the first time- 2 lanes with a turning lane down it - all the way
82	Q	9	Mhd needs to time and synchronize stop lights.
260	E	9	Left turn and straight lanes combined delay traffic. These lanes should be changed so that left turns will be separate from traffic going straight or turning right.
299	G	9	Turning lanes need to be marked more clearly (IE: by water treatment plant- L) turning lane). Need more green arrows for L) turns, esp. on University Ave by DHHS and Nativity. Question #4- depends on time of day after work, much heavier traffic
339	F1	9	Between not enough left turn lanes and signals, plus trains, driving downtown is very poor!
351	F1	9	Mhd lights need to be synchronized like Fargo
367	F1	9	Moorhead's traffic lights are starting to get better as far as timing. But they still need a lot of work.
176B	F	9	To me trains are not as frustrating as the lack of left turn arrows at major intersections.
<b>Subtotal</b>		<b>12</b>	

### 2. Specific corridor problems

22	E	10	Look for ways to improve the back-up of west-bound traffic from 4:30-6:00 weekdays on Main Ave from 25th Street to the I-29 exit.
68	E	10	Parking downtown, overall traffic conditions downtown.
76	E	10	We need more crossings of I-29 going between Fargo to West Fargo or vice versa.
111	E	10	Something needs to be done with the congestion on Main thorough ways (Main/ University).
114	E	10	I travel 45 St S as will be very glad when the 45 St and Main Crossing is complete.
129	E	10	I believe there are too many stop lights on the Main North-South routes (University, 10th, Broadway, and 4th St). If these are our main traffic zones, there should be less restrictions to travel flow.
228	E	10	The amount of places to cross from Main to North Side of Rail Road track from I-29 to 8th St there is only one place.
248	E	10	Not only do the in town rail crossings get backed up. The crossing for County road 11 is always backed up because of the switching of rails, or engineers, or whatever it may be. I see that this to could use improvement.
333	E	10	Need better traffic flow at peak hours 7:00-7:00 am and 4-5 pm West Acres 13th ave a major problem area
121B	E	10	Similar issues of jams on 13th Ave., etc. need to be addressed. Also, Downtown Fargo DESPERATELY needs parking RAMPS!!
<b>Subtotal</b>		<b>10</b>	

**3. Maintenance and other issues**

31	E	11	I feel when streets downtown are under construction; they are often unclearly marked and difficult to navigate. At night this becomes especially dangerous; motorists often can't tell where to go.
83	E	11	All intersections to be marked- so people don't have to guess who has the right of way- seems everyone thinks they have the right of way.
97	TS	11	Could you please pass the information to regulatory agencies/ planning bodies that the road conditions in F-M are TERRIBLE! Are there any funds for maintenance of these routes?
194	E	11	Yes, - Downtown turn lanes need to be repainted to indicate the arrow for turning, most street lanes could use new paint as well.
246	Y	11	Tougher law enforcement directed at speeders and running traffic lights. We are too lax on this area in Fargo. Can't address Moorhead on this subject.
255	E	11	Street repair
376	G	11	People drive way to fast in Fargo, even on icy conditions. The Police department should be more strict on speed violators.
176C	F	11	In residential Fargo I believe parking should only be allowed on one side of the street during winter months to avoid dodging parked cars and close calls with on-coming traffic.
298B	G	11	2. Almost all of the streets are in terrible cond.
84	E	11	FARGO has adequate alternatives for drivers when delayed by a train- Moorhead is terrible. Downtown improvement in both Fgo and Mhd should coordinate more than traffic concerns- GREEN SPACES and AESTHETICS.
203	TS	11	We need more long range planning. We need to plan for increased traffic flow for future.
15A	E	<u>11</u>	Some people are not as patient as others. Too many motorists travel too fast. I see far too many children (no seat belts) standing while cars are traveling too fast.
<b>Subtotal</b>		<b>12</b>	
<b>Total</b>		<b>169</b>	

## Business Related Drivers' Comments (Green Survey)

#	Code	Grp	
<b>A. Rail Crossing Issues/Concerns</b>			
<b>1. Railroad crossing needs to be addressed/Message sign idea is good.</b>			
1018		1	The area where I have the most difficulty with RR crossings is downtown Moorhead.
1022		1	Nice to know someone is checking into the problems. Also, the downtown railroad crossings are far too rough.
1025		1	Fargo isn't too bad, however it would be nice to know wait time. Moorhead is impossible. You must either take the 3rd St underpass, or drive 1 1/2 to 2 miles to where 1st Ave N meets Hwy 10. With the meter running (in Taxi) this can cause problems
1027		1	Some sort of sign or flashing light- like the one at Broadway and Main in Fargo would be nice to tell if a train is coming- especially for emergency response times.
1028		1	I drive cab and depending on the amount of time and traffic at the train crossing, is what I base my decision on, whether to turn onto a different route or not. The signs would greatly help.
1043		1	What a good idea.
1065		1	I think you have good ideas. I don't want to see the train industry hurt in all this. They provide a good means of transportation of people's good, & people have fought hard to keep them in service. You have a good alternative.
1085	A	1	On Main Ave, at signal lights for East/West traffic, when a train is coming, a bright white light flashes. This tells me a train is coming, I adjust my route. It would help with a time frame as to how long to wait.
1091	B	1	Fire and medical emergencies do not allow us to wait for trains if at all possible!
1104	A	<u>1</u>	In my line of work, a sign that tells the amount of time before the crossing is blocked would be more helpful.
<b>Subtotal</b>		<b>10</b>	
<b>2. Trains are especially a problem during peak times.</b>			
1052		<u>2</u>	Too many trains at 5:00 pm and there is already enough traffic.
<b>Subtotal</b>		<b>1</b>	
<b>3. Traffic problem and safety issues at railroad crossings</b>			
1142A	A	3	I am concerned about the safety aspect of people taking alternate routes and driving in an unsafe manner at the crossing to get to that route.
1142B	A	<u>3</u>	i.e. u-turns, wrong lane usage, shortcuts through parking lots, backing up in their lane, using rail frontage roads. (I've seen them all!)
<b>Subtotal</b>		<b>1</b>	
<b>4. Concerns about alternative routes</b>			
1021		4	There should be another underpass in Moorhead. If we have a call N & E of the tracks between Center and Main Aves, we have to go all the way to 3 St to get under the train, then backtrack up to 13 blocks to continue on our call.
1023		4	Fargo is not as bad as Moorhead for rail traffic. Only access in Moorhead are on opposite sides of town.
1024		4	Anything other than rerouting of trains or street traffic will be a patch at best. Sooner or later these by-passes will have to be made. I see no reason to use a band-aid now and waste that much money. I would go ahead and plan over/under passes.
1046		4	How can you take an alternate route when there is not one for a mile away out of your way.
1081	A	4	Too long of stretch from Univ. Drive to 25th for a cross over or cross under.
1116	B	4	An underpass is needed somewhere in the middle of Moorhead.
1117	B	4	I feel a underpass at 11th St is essential. Often time police, fire, or ambulance is delayed because of the distance and time to reach 4th St or 21st St when a train is blocking south access from Moorhead fire and P.D.
1122	B	4	I like the idea of the signs, that is if they are working. It would be nice if there was another overpass in Moorhead for emergency situations.
1132	B	<u>4</u>	It would be helpful to have more underpasses at busy crossings.
<b>Subtotal</b>		<b>9</b>	
<b>5. Railroad tracks should be relocated</b>			
1100	B	<u>5</u>	Its long overdue that the trains are diverted around the city limits. Snow buildup on crossing is dangerous, and causes damage to vehicles.
<b>Subtotal</b>		<b>1</b>	

**7. Other railroad crossing or survey comments**

1001		7	If the trains weren't quite so long or had to switch in congested areas everything would be o.k.
1015		7	If the train would all travel about 30 miles an hour, this would really help. Some travel very slow which really holds us up a long time.
1021		7	The train tracks downtown are very rough.
1032		7	Fix it now and do it right- delay will just end up costing more \$
1080	A	7	Better planning to avoid a wait of 7-10 mins for an eastbound train- only to have to wait 5-10 mins on over for a westbound!
1082	A	7	Moorhead has a bigger problem with delays than Fargo.
1099	B	7	Why do trains only go slow when we really have to get to the other side in a hurry?
1102A	B	7	Snow and ice build up at RR crossings is very bad and unacceptable 14th street is the worst. I have seen car parts which have been ripped off vehicles at these crossings. Usually impossible to travel 10 mph over crossing in the winter.
1102B	B	7	Requests by law enforcement to have crossing plowed seem to be ignored.
1130	A	<u>7</u>	Sometimes I wish I had a L.A.W. rocket M72 when waiting on trains.
<b>Subtotal</b>		<b>9</b>	

**8. Railroad crossings are NOT a concern/Message sign will NOT help**

1039		8	I do not see the need nor justification to spend a lot of dollars to build bridges over the tracks. Trains are running routine business as are the rest of us.
1055		8	BNSF won't do anything.
1077	A	<u>8</u>	The waits I have encountered in downtown Fargo and Moorhead because of train traffic have been minimal and I don't not see it being a big problem.
<b>Subtotal</b>		<b>3</b>	

**B. Other Traffic-Related Problems in the Fargo-Moorhead Area**

**1. Improvements to signals or turning lanes**

1126	A	9	Traffic could be improved more by having smart stop lights and/or better timed lights.
1035		<u>9</u>	Make the traffic lights in city standard left turn on arrow protected on some goes to green and slows turn when traffic permits on some turn on arrow only on some no green on some.
<b>Subtotal</b>		<b>2</b>	

**2. Specific corridor problems**

1059		10	27th St should be a one way heading south from Main due to the danger of cars trying to sneak across Main to 27St N.
1109	A	<u>10</u>	Please, widen 13th ave S (from 25th ST to 45th ST SW and add frontage roads like South University).
<b>Subtotal</b>		<b>2</b>	

**3. Maintenance and other issues**

1021		11	Resurface 7 Ave N between 25 St and 10 St.
1062		11	Fix the bumpy streets
1075	A	<u>11</u>	I feel alternate routes are already available- 2nd St- University, 10th St. However I strongly feel alternates are needed for pedestrians- especially downtown elderly folks in winter season.
<b>Subtotal</b>		<b>3</b>	

**Total 41**

## Railroad Crossing Survey Subgroup Codes

### Personal Vehicle Drivers

Employees  
American Crystal Sugar Employees  
Public Officials  
Transportation Professionals  
General Public at Rail Crossing  
General Public Other

### Fargo Moorhead

E F  
F1  
P Q  
T S  
G H  
X Y

### Business Related Drivers

Serve mostly one area  
Service is provided for both areas

A B  
no codes used