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16. Abstract This task examined using the Texas Department of Transportation's (TxDOT) dynamic message signs (DMS) to provide motorists information about the status of the different responders during incident conditions. The types of status information that were examined included messages such as "Police En Route," "Police On Scene," and "Police Notified." These status messages would be used in place of the typical "Expect Delays" message currently used by TxDOT in any locations in Texas. Limited surveys of both TxDOT traffic management center (TMC) operators and motorists were used to examine user acceptability and response to the messages. The TxDOT districts surveyed indicated that they would not favor replacing "Expect Delays" messages with status information about the incident response, citing concerns about increases in operator workload, legal issues, and message formatting problems as reasons for not wanting to display the messages. The survey of motorists found that only 28 percent of the motorists thought status information about the responders was useful. Therefore, it is recommended at this time that TxDOT continue to display "Expect Delays" messages on their DMSs and to not display information about the status of the incident response.					
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DISPLAYING RESPONSE STATUS MESSAGES TO MOTORISTS DURING INCIDENT CONDITIONS

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The objective of Research Project 7-4907 *Functional Process Specifications for Improving Incident Response* was to examine how the Texas Department of Transportation (TxDOT) responded to incidents and to investigate methods and technology that TxDOT could use to enhance the incident response process. As part of the research effort, the Texas Transportation Institute (TTI) conducted site visits and measured incident response times in several cities in Texas. The literature was used to then identify methods and technologies that could reduce the response times for certain tasks in the response process.

In addition to assessing the different technologies available for improving incident response, the researchers also worked to identify motorist information needs under incident conditions. The focus of this task was to determine how TxDOT could use information already coming into the control centers from various sources (i.e., police, detectors, surveillance cameras) to generate messages for dynamic message signs (DMS) for the given incident.

This task was approached using two different avenues. The first was to contact several TxDOT districts currently using DMSs to get feedback on using specific incident events as part of DMS messages. The second approach was to go to the public and conduct a limited user acceptance study to get the opinion of motorists as to how helpful they felt different types of information would be during an incident.

TxDOT District Reactions to Incident Messages

Several TxDOT districts were contacted during this effort and asked to give their reactions to different incident messages for use on DMSs. These messages contained real-time information that would be available to the control center in order to keep the motorists informed as to the status of the incident. The messages that the districts were asked to comment on were as follows:

Same Roadway:

- 1) ACCIDENT AT MAIN
LEFT LANE BLOCKED
POLICE ENROUTE
- 2) MAJOR ACCIDENT | 2 LEFT LANES CLOSED
AT CHIMNEY ROCK | EMER VEH ON SITE
- 3) ACCIDENT AHEAD
AT WOODWAY
CLEARED TO SHOULDER
- 4) ACCIDENT AT MAIN
CLEARED AT 8:10

Different Roadway:

- 1) ACCIDENT ON I-10 EB
AT LITTLE YORK
POLICE ENROUTE
- 2) ACCIDENT ON I-10 WB | RIGHT LANE CLOSED
AT SILBER | EMER VEH ON SITE
- 3) I-10 EB FREEWAY CLOSED
AT SILBER
CLEARING DEBRIS
- 4) ACCIDENT ON I-10 WB
AT SILBER
CLEARED TO SHOULDER
- 5) I-10 WB ACCIDENT
AT SILBER
CLEARED AT 8:10

Upon reviewing these messages, the districts were asked to give their reactions regarding the feasibility for the use of a real-time information message set and to address other operational issues related to these messages. The initial questions posed to the districts can be found in the Appendix.

The TxDOT districts that responded with comments were the Austin, Dallas, and San Antonio districts. Within these districts, there were some varying opinions as to why this information would or would not be useful to a motorist. However, the overall feeling of the districts was that

incident response information given over DMSs would not be possible at the current time. It was indicated that in order for this type of incident information display to be feasible, the districts would have to have robust integration with other area agencies as well as the ability to visually verify the status of incidents. Also, it was the overall feeling of the districts that this type of a message series during an incident would create a work overload for the TxDOT operators. One solution to this problem that was mentioned was the use of an automated process to generate messages, thereby significantly reducing the operator workload and making the use of a message series more feasible. The following sections outline further opinions of each of the districts.

Austin

The Austin District felt that, although this information would be useful to the motorist, the information capacity of DMSs is too limited to accommodate this information in most incident situations. District representatives indicated that since this information is relevant to the driver, a better platform to present the information is desired, such as directing the motorist to listen to highway advisory radio (HAR). The issues of operator workload and the need for an automated process are still concerns when using HAR. Finally, the Austin District had some concerns regarding legal issues that may be raised through the use of real-time incident status information. It was felt that the time/date stamps that accompany the message records could cause some problems for outside agencies regarding incident response times.

Dallas

The opinion of the Dallas office with respect to presenting real-time status information on DMSs was that this is more information than the public needs regarding an incident and “ACCIDENT AHEAD” is sufficient warning as to the circumstances. Although representatives did not believe that this type of information would be useful to the driver, the Dallas office did offer comments as to the use of these messages. For this district, there would be a need for greater field surveillance prior to this type of message being feasible. Currently, the district relies primarily on coordination with field personnel for incident information. A further concern voiced by the Dallas District concerned the logistics of when each message would be used since oftentimes the events overlap (i.e., police are on site while ambulance is en route).

San Antonio

Representatives from the San Antonio District felt that the use of these messages would not help to serve its primary goal in DMS use, which is safety. In the opinion of these representatives, these messages were more to satisfy motorist curiosity and did not provide useful information to the driver as to driving decisions or actions. These representatives felt it may be helpful in reducing the number of 911 calls regarding a single accident, thereby clearing these lines for further emergencies. One point to note about San Antonio’s current DMS operations is that personnel do use messages which indicate debris in the road and give information as to the specific type of debris. Also, they are using congestion messages that give point-to-point limits for the congestion area and use this information, when possible, for incident situations.

User Acceptance Study

In order to estimate public opinion of different types of information being provided using DMSs, a limited survey was conducted in Houston, Texas. This survey was done on a one-to-one basis at the Department of Public Safety Drivers Licensing Office. In this effort, interviewers collected data from a total of 51 subjects. Although specific demographics requirements were not established for this survey, [Tables 1](#) and [2](#) represent the age and education demographics of the study participants. Gender was accounted for in collecting the data, and the participants were split evenly between male and female.

Table 1. Age Demographics of Respondents to User Acceptance Survey of Alternative Incident Messages.

Age Group	Number of Participants
<25	15 (29%)
25-39	24 (47%)
40-54	9 (18%)
55-64	3 (6%)
65+	0 (0%)

Table 2. Education Demographics of Respondents to User Acceptance Survey of Alternative Incident Messages.

Education Level	Number of Participants
No High School Diploma	5 (10%)
High School Diploma	10 (20%)
Some College	19 (37%)
College Degree	17 (33%)

The protocol for conducting this survey had the participants look at a card containing the four messages in question while the researchers recorded their responses to each question. The four messages that were provided to the study participants were:

ACCIDENT
AT WOODWAY
2 LEFT LANES CLOSED

ACCIDENT AT MAIN
RIGHT LANE BLOCKED
POLICE ENROUTE

ACCIDENT AT SILBER
RIGHT LANE BLOCKED
EXPECT DELAY

ACCIDENT AT KIRBY
LEFT LANE CLOSED
EMER VEH ON SITE

This survey asked the participants questions regarding their opinions about what information different messages were providing to the driver and to determine which of these messages they felt was the most helpful in making driving decisions. A copy of the survey form can be found in the Appendix.

The participant responses to the question, “What information does this message provide to the driver?” for each of the messages indicated a general understanding of the messages by the study participants, and it allowed them an opportunity to focus on each message prior to further questions. Once these questions were completed, the participants were asked, “Of the four messages that you saw, which do you feel provided you with the most helpful information to make driving decisions?” [Table 3](#) contains the participant responses.

Table 3. Number of Participants Selecting a Given Message as Most Helpful.

Message	Number of Participants (%)
1. ACCIDENT AT WOODWAY 2 LEFT LANES CLOSED	18 (35%)
2. ACCIDENT AT MAIN RIGHT LANE BLOCKED POLICE ENROUTE	8 (16%)
3. ACCIDENT AT SILBER RIGHT LANE BLOCKED EXPECT DELAY	15 (29%)
4. ACCIDENT AT KIRBY LEFT LANE CLOSED EMER VEH ON SITE	6 (12%)
1 and 3	1 (2%)
2 and 4	1 (2%)
Other (all the same, 1 & 4)	2 (4%)

The opinions of motorists were split as to which message was most helpful to them in making driving decisions. The highest percentage of responses was for message one (35 percent), which gave only the basic incident information. This was followed closely by the incident status messages at 30 percent, when the responses for messages two and four were combined, and 29 percent for message three which contained the phrase “expect delay.” For testing purposes, messages two and four contain the same type of information, both giving real-time status reports for the incident, and the participant responses are therefore combined during the data analysis.

The reasons given by the motorists for selecting message one as most helpful was that it provided clear and concise information regarding the accident. Some of the respondents also indicated that further information given by the other messages tested was a matter of common sense and only complicated the messages.

In contrast, participants who selected either message two or four as the most helpful preferred the information given regarding the emergency response. To them, these messages indicated that they should use extra caution due to the presence of emergency vehicles as well as giving them information that a response action is already in progress. Finally, the participants who selected message three as the most helpful in making driving decisions did so because they felt that the phrase “expect delay” gave a time frame for the incident and resulting delay. They also felt that this statement created a definite sense of what the motorist should expect as far as traffic conditions.

In examining the participant responses, there is no clear indication that one type of message was better received than the other messages. The split of responses (approximately one-third of the participants for each type of message) indicates that there are strong reasons for using any of the above formats. Further investigation of public opinion should be done to determine if there is a definite preference in the type of information presented on a DMS.

A final question was presented to the study participants that asked, “Would you like to be informed on emergency response actions?” It was the feeling of 73 percent of the participants that they would like to have this type of information. Of the participants who answered yes to this question, 76 percent felt information regarding emergency response actions was very important in making driving decisions. This indicates that although messages containing incident status information were not always selected as the most helpful in the previous questions, the overall feeling of motorists is that this information is important to them and would be well received in the appropriate application.

Conclusions and Recommendations

In this study, the researchers examined several alternative message types that could be used to display to motorists during incident conditions. The alternative messages were intended to replace messages such as “EXPECT DELAYS” on a typical DMS sign. The researchers believed that providing information about the status of the response (e.g., “POLICE ENROUTE,” “EMS ENROUTE,” “POLICE ON SCENE,” etc.) would provide motorists with more useful information than the typical “EXPECT DELAYS” message. The researchers surveyed both TxDOT operations personnel and motorists to determine whether or not this hypothesis was true.

The general consensus of the TxDOT districts surveyed about replacing the “EXPECT DELAYS” message with the incident response information was that incident response information should not be provided on the DMSs for the following reasons:

- Due to the constant changes that occur at many incident scenes, modifying the messages every time the incident response changed at the incident sites would place a strain on an operator’s workload.

- Because the message content is limited, DMSs are probably not the best format for providing this information. This information is better suited for a motorist information system that is not limited in the amount of information that can be provided (e.g., an HAR system).
- There may be some legal issues that have to be resolved before the messages can be implemented.
- The data that are needed to constantly update incident response messages about incident response are difficult to obtain and labor intensive.
- Information about the status of the incident response is not very useful to motorists.

A limited user survey was performed using motorists in Houston. From this user survey, researchers found that most users felt that incident response data were of only limited value. Only 28 percent of the motorist surveyed indicated that they thought it was useful information. For the most part, motorists liked the “EXPECT DELAY” message.

Therefore, it is our recommendation that TxDOT continue to use the “EXPECT DELAY” message as part of their normal DMS messaging for incident response and **not** use the DMS signs to provide incident response status information.

APPENDIX
USER ACCEPTANCE SURVEY FORM

- Do you feel it is feasible to use this type of message set? (approx. three or four messages for an incident)
 - How do you feel about the amount of operator workload when using these messages in series?
 - Are there any of these messages that you think are inappropriate or unrealistic for general use?
 - Would you use this type of message?
-

Possible Incident Events:

- Incident is verified by operator
- Police en route (also ambulance, emergency vehicle, or response)
- Police on site (also ambulance, emergency vehicle, or response)
- Incident cleared
- Given with a time of day
- On shoulder
- Wrecker on site
- Medical helicopters
- Fire
- TxDOT maintenance on site
- Debris in road

Project # 449070
Incident Messages for Dynamic Message Signs

Demographic Questions (for statistical purposes only):

Age: <25 25-39 40-54 55-64 65+

Education: No High School Diploma High School Diploma
 Some College College Degree

Gender: Male Female

Study Questions:

Instructions: Read the message provided in the box and answer the questions related to that message.

Message 1:

ACCIDENT
AT WOODWAY
2 LEFT LANES CLOSED

What information does this message provide to the driver?

Message 2:

ACCIDENT AT MAIN
RIGHT LANE BLOCKED
POLICE ENROUTE

What information does this message provide to the driver?

Message 3:

ACCIDENT AT SILBER
RIGHT LANE BLOCKED
EXPECT DELAY

What information does this message provide to the driver?

Message 4:

ACCIDENT AT KIRBY
LEFT LANE CLOSED
EMER VEH ON SITE

What information does this message provide to the driver?

Of the four messages that you saw, which do you feel provided you with the most helpful information to make driving decisions? _____

Why? _____

Would you like to be informed on emergency response actions (i.e., police/ambulance en route)?

Yes No Other _____

If Yes, how important is this information to you in making your driving decisions?

Very Important Somewhat Important Not Important