Implementing Emergency Alternate Routes: Wisconsin Experience

Andrew Mielke
SRF Consulting Group, Inc.
One Carlson Parkway North, Suite 150
Minneapolis, MN 55447
amielke@srfconsulting.com

ABSTRACT

Each year, incidents such as crashes or spilled loads cause major backups on interstates in urban and rural areas. This results in traffic randomly detouring from the freeway and choking local roads and streets. In an attempt to improve traffic conditions during these incidents, the Wisconsin DOT developed and implemented an emergency alternate route system in District 1 along Interstates 39, 90, and 94, and in District 4 along Interstate 39/US Highway 51 and State Trunk Highway 29.

The primary purpose in creating emergency alternate routes is threefold: (1) identify, in advance, alternate routes to use along each corridor; (2) establish procedures for when and how to implement alternate routes; and (3) enhance interagency communication during events.

By implementing coordinated, designated alternate routes during incidents and other major traffic delays, the time needed to clear the roadway and return it to free-flow conditions is reduced. Safety is increased as secondary crashes are minimized, agency response time is enhanced with improved communication, and incident duration is reduced.

Key words: alternate routes—incident management—operations guide
INTRODUCTION

Each year, incidents such as crashes or spilled loads cause major backups on interstates in urban and rural areas. This results in traffic randomly detouring from the freeway and choking local roads and streets. In an attempt to improve traffic conditions during these incidents, the Wisconsin DOT (WisDOT) developed and implemented an emergency alternate route system in District 1 along Interstates 39, 90, and 94, and in District 4 along Interstate 39/US Highway 51 and State Trunk Highway 29.

The primary focus of creating emergency alternate routes is threefold:

1. Identify, in advance, alternate routes to use along each corridor
2. Establish procedures for when and how to implement alternate routes
3. Enhance interagency communication during events

By implementing coordinated, designated alternate routes during incidents and other major traffic delays, the time needed to clear the roadway and return it to free-flow conditions is reduced. Safety is increased as secondary crashes are minimized, agency response time is enhanced with improved communication, and incident duration is reduced.

METHODOLOGY

A significant aspect of this effort was collaborating with local municipalities and agencies to discuss and agree on how to divert freeway and expressway volumes onto county and local roads. The agencies included two state transportation departments (WisDOT and the Illinois DOT), 13 counties, public works departments, elected officials, emergency service responders, state patrol officers, and homeland security officials. Actively engaging the appropriate stakeholders was critical to obtaining buy-in and building positive momentum for the project.

Major elements of the planning process included the following:

- Inventorying candidate alternate routes, which included collecting data on crash history, geometric constraints, capacity, bridge height and roadway weight restrictions, local circulation, connectivity, and significant traffic generators
- Developing implementation guidelines to establish clearly the criteria that must be met to employ the alternate routes
- Creating an operations guide that graphically illustrates the alternate route for each freeway segment and lists actions that must be taken to implement the route; these actions include placing portable message signs and assigning personnel to direct traffic at key locations
- Preparing an interactive operations e-guide that enables dispatchers and users in the field to access information from a laptop or mobile data terminal
- Securing approvals from WisDOT and local agencies to formalize their cooperation and alternate route implementation procedures
- Providing guide updates and continual training for local officials and emergency responders

Preliminary Alternate Route Selection

As part of the proposal phase of this project, the team from SRF Consulting Group, Inc., identified roads that could potentially be used as alternate routes within each district. The list included a combination of state trunk highways, county trunk highways, and local streets. These roads were selected as possible alternate routes because of their general location and alignment, shown in Figures 1 and 2.
As illustrated in these figures, many of the routes are located a significant distance from the study corridors. At this point, the roadway characteristics that were needed to handle freeway-type traffic volumes had not been analyzed, and a field survey of roadway characteristics was needed to proceed.

To facilitate completing the field survey, the original list of potential alternate routes was reduced to primary alternate routes by WisDOT staff and the SRF team. Roadways were eliminated based on a variety of factors regarding their feasibility to serve as an alternate route. By using the initial criteria to eliminate several of the original routes, the study progressed more efficiently and was more cost effective.

Figure 1. District 1 preliminary alternate route candidates
Figure 2. District 4 preliminary alternate route candidates
Data Collection Process

Roadway data was collected along the primary alternate routes. Photographs were taken of each route to provide a visual perspective of the roadway, and the following roadway characteristics were recorded:

- Location/termini
- Length
- Speed limit
- Number of lanes
- Traffic controls
- Design type: section type, lane width, shoulder width, shoulder material, etc.
- Geometrics
- Pavement condition
- Capacity constraints
- Access type: classified according to quarter-mile or half-mile spacing
- Summary comments: overall assessment of road as an alternate route

Alternate Route Selection Criteria

Next, the SRF team discussed the criteria that should be used to select the alternate routes. Compatibility with other WisDOT districts and consistency with existing statewide policies and procedures used to select alternate routes was considered essential. In addition, by establishing criteria or rules to use in selecting and eliminating routes, a technical approach and method to quantify which roads should be used as alternative incident management routes was provided.

The following criteria were proposed for selecting alternate routes:

- Use state highways, whenever possible.
- Avoid alternate routes with weight restrictions.
- Minimize the use of alternate routes that have at-grade railroad crossings, especially if a high number of trains use the railroad line.
- Avoid alternate routes with height restrictions because of underpasses or low bridge clearance.
- Use alternate routes that continue to carry traffic in the same general direction as the interstate.
- Avoid alternate routes that carry traffic in the opposite direction of intended travel for more than one mile.
- Avoid alternate routes traversing communities with multiple signals (more than four to six).
- Minimize use of alternate routes through residential areas.
- Minimize use of alternate routes that require traffic to make 90-degree turns.
- Consider alternate route options at all interchanges.
- Minimize the length of the alternate route segments.

Two additional factors were considered during this phase:

- Select roadways that WisDOT has established as existing long truck routes. However, because there are few long truck routes in Wisconsin District 4 (I-39/US 51, STH 29, US 10, STH 34, and a portion of STH 66 between Wausau and Stevens Point), this factor was not incorporated for that study area.
- Use state trunk highways. However, due to the lack of state roads that parallel either I-39/US 51 or STH 29, this factor could not be used consistently throughout both districts.

After WisDOT staff reviewed the above criteria, they were subsequently approved by the local agencies involved in the project. The final emergency alternate routes selected are shown in Figures 3, 4, and 5.
Figure 3. District 1 I-39 alternate routes

Figure 4. District 1 I-94 alternate routes
Figure 5. District 4 I-39 alternate routes
COMMUNICATION ISSUES

As a part of the effort to identify alternate routes and create appropriate procedures for their use, an inventory of the emergency response dispatch systems in the study area was also completed. A series of telephone interviews and emails were primarily used to collect data and were supplemented by discussions at a project team meeting. This information was then used to evaluate what communication systems and processes were used in the study areas.

Through this effort, it became apparent that each emergency incident has its own unique characteristics and circumstances, which influence the response procedures. Each responding agency has numerous responsibilities; however, many responsibilities are not known until additional information is gathered when first responders arrive at the scene. Securing answers to a variety of incident issues often takes time, and several immediate questions need to be answered:

- Are hazardous materials present?
- Are there any additional safety risks to the people involved in the incident?
- Are there any safety risks to the people near the incident scene or to the people traveling through the surrounding area?

First responders must answer these questions and many more when they arrive at an incident. During the study, it was determined that a comprehensive method of assessing potential problems and implementing procedures at the scene of an incident would hasten communication and improve coordination between all responding agencies.

Technology plays a large role in the ability of agencies to communicate with each other. While many agencies can communicate between the dispatch center and people at the scene, there is limited communication between the dispatching agencies. Efforts to improve this communication would result in improved service. In addition to high-technology improvements that were not cost-effective to implement, several low-technology ideas were available to enhance communication between agencies that do not use the same communication systems.

Activating, delivering, and deploying necessary equipment to the scenes of incidents can be especially problematic in rural settings, such as the I-39 corridor. Some of the issues that had to be addressed for rural settings included the distances between cities, the number of jurisdictions along the corridor, and the scattered location of and diverse ownership of various management response tools. It can also take several hours to collect and deploy the equipment used to reroute traffic.

In addition to identifying the necessary resources, it was determined that efforts should be taken to communicate details to all agencies that may be affected. Quickly identifying safety needs and potential environmental issues is critical to minimizing impacts.

To address these issues, the operations guide incorporated detailed notifications and actions for all of the involved agencies to follow during incidents.
RESEARCH RESULTS

To date, emergency alternate routes have been implemented in several locations (urban and rural) at different times of the day (peak and off-peak) for a wide range of incidents. Because each incident has unique characteristics that make it difficult to plan for, this system provides a proactive mechanism for emergency responders. Furthermore, the benefits of using alternate routes include the following:

- Reducing secondary crashes
- Keeping people and freight moving
- Improving response time
- Reducing incident duration
- Allocating staff and equipment effectively

With the implementation of the emergency alternate routes, WisDOT is making great strides in improving motorist safety and maintaining system operation and performance.