

# Assessment of Risk Management Procedures and Objectives in State Departments of Transportation

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State departments of transportation (DOTs) throughout the nation face an increasing problem of compensation for damages caused by inaction or careless or negligent actions by their employees. When a state must compensate for such damages, it is said to be liable in tort. Many states have developed operational procedures to minimize loss due to tort liability; the procedures are generally referred to as risk management programs. The responses to a nationwide survey on risk management for tort liability by state DOTs are presented. The survey was designed first to determine the status of tort liability (i.e., which actions of the state and its employees constitute liability) and secondly the status of the risk management program (i.e., whether the state has established a formal risk management program to avert liability for its actions and those of its employees). If a state had established a tort liability risk management program, the details of the program were investigated to identify the key tasks of the program, including determination of objectives and criteria for measuring the effectiveness of a program, identification of hazardous situations, action taken upon notification of a hazardous situation, prioritization for mitigating hazardous situations, and documentation of notices, situations, and actions taken. A profile of a typical risk management program is provided. The profile can be used as a basis for developing a formal methodology by which DOTs can begin to evaluate existing or proposed risk management programs.

State departments of transportation (DOTs) throughout the nation face an increasing problem of compensation for damages caused by inaction or careless or negligent actions by their employees. When a state must compensate for such damages, it is said to be liable in tort. Until 1946, the doctrine of sovereign immunity protected states and their agencies from liability for death, injury, and property damage resulting from the negligent design, construction, or maintenance of roadways. With the passage of the Federal Tort Claims Act of 1946 and the corresponding erosion of sovereign immunity in many states either by statute or judicial decision, states began to find themselves open to tort liability.

Many states have developed operational procedures to minimize loss due to tort liability; the procedures are generally referred to as risk management programs. Although the number of elements in typical programs may vary, their general purposes are similar. The basic components of a risk management program include identifying risks, measuring the risks (evaluation), determining the method of controlling risks, implementing the method, and monitoring the results.

The purpose of this paper is to describe the status of risk management programs in state DOTs and to indicate appropriate goals, objectives, and criteria for guiding their development. The information provided is intended to aid states that are in the process of establishing or evaluating their organizational structure for risk management. A survey of risk management practices in state DOTs provided most of the data for this study.

## RISK MANAGEMENT SURVEY

In November 1989 a survey of risk management for tort liability was sent to 50 state DOTs and the Department of Transportation of the District of Columbia. Thirty-seven states and the District of Columbia responded to the survey. For the purpose of closure of the study, it was assumed that the non-response states had not established a formal risk management program at the time of the survey or that the survey did not reach an appropriate person. The survey was distributed to CEOs of state DOTs unless an individual responsible for risk management was known to the researchers. The initial distribution resulted in 31 responses. This was followed by a second mailing to the nonrespondents and a follow-up phone call. The final number of questionnaires used in this evaluation was 38.

The following sections describe the answers given by the respondents and provide a picture of how risk management for tort liability is presently addressed by state DOTs throughout the nation. The analysis of the survey is designed to assist the states in establishing or evaluating their organizational structure for risk management.

The questionnaire used for the risk management survey is available in the survey summary report (1). The questionnaire was designed to determine first the status of tort liability (i.e., which actions of the state and its employees constitute liability) and secondly the status of risk management programs (i.e., whether the state had established a formal risk management program to avert liability for its actions and those of its employees).

If a state had established a tort liability risk management program, the details of the program were investigated to identify the key tasks, including determination of objectives and criteria for measuring the effectiveness of a program, identification of hazardous situations, action taken upon notification of a hazardous situation, prioritization for mitigating

hazardous situations, and documentation of notices, situations, and actions taken.

## STATUS OF TORT LIABILITY

It was found that all of the responding states except one had lost full sovereign immunity. To control the influx of claims and lawsuits, states have tried to protect themselves through statutory or judicial means. Some states have reinstated partial immunity such as state immunity, as a result of which the state cannot be held liable for its actions but its employees would be liable for their actions. Some states have employee immunity but not state immunity. Others have design immunity, as a result of which they can only be held liable for construction- or maintenance-related activities.

Another method of controlling tort liability costs has been to establish monetary limits for tort claims. For all the states responding, the limit for an individual does not exceed \$250,000, for all states except New Hampshire, the limit for aggregate claims from an accident does not exceed \$1,000,000. The limit in New Hampshire for aggregate claims is \$2,000,000.

Judicially, the type of negligence law also influences tort liability cost. Negligence laws are either comparative or contributory (see Table 1). Most states indicated that they have a comparative negligence law. The states' answers as to whether having comparative law has helped or hurt the reduction of tort liability varied. The majority believed that having comparative law has increased tort liability. With contributory law, if the plaintiff is at fault, the whole claim is rejected without having to go to court. With comparative law, most of the claims reach court, and then the jury decides the case. In the end, states pay some amount for those cases.

## STATUS OF RISK MANAGEMENT PROGRAMS

Of the 38 responding states (including the District of Columbia), 21 have a risk management program, and 3 are in the process of developing a risk management program. Still, all the states with risk management programs, with the exception of Missouri and Alabama, replied that they did not yet have a procedural manual for incorporating tort liability considerations in the design and maintenance processes. What they have implemented, generally, is a risk or safety management office or engineer to handle the problem. Various responses

to the question, "Who is responsible for risk management in design and maintenance?" are given in Table 2.

## RISK MANAGEMENT PROGRAM TASKS

The ensuing discussion focuses on tasks that are common to the evolving risk management programs. The following tasks were found to be similar in their mission, but, in many cases, different in form in the reported programs: hazardous situation identification, reaction to notification, prioritization, documentation, time limits (response), claims handling, criteria for litigation, and information systems.

### Hazardous Situation Identification

Of 33 responses to this question, 31 states identify hazardous situations in three ways: citizen complaints, accident reports, and routine inspections. Twelve states also use other methods to identify hazardous situations. For example, one uses requests from attorneys and insurance companies, investigations for traffic control plans, and specific incidents as sources of information. Others use observations by their employees or police during routine activities or travel and information from legislators. Another state identifies hazardous situations through litigation trends, traffic engineering experience, and site investigations.

### Reaction to Notification of a Hazardous Situation

Most of the states responded that a notice is either forwarded to the appropriate division for action or is corrected as soon as possible. Three states have procedures that are noteworthy here.

In one case, when notified of a hazardous situation, an accident summary is assembled. Then this summary is analyzed, and a collision diagram is prepared. On the basis of the information obtained, short- and long-term solutions are developed.

In another instance, as soon as notification is received, a "potential" file is created. All related documents are incorporated into this file. An assessment of what must be done to reduce liability is made, and then the names of any employees involved are collected. Also, photographs taken of the scene are added to the file.

TABLE 1 Definitions of Negligence

<b>Contributory Negligence:</b>	The plaintiff is barred from recovering damages for the accident for which he/she also was at fault.
<b>Comparative Negligence:</b>	The driver is not barred from collecting damages, because he/she was also at fault.
<b>Pure Comparative Negligence:</b>	A DOT could be required to pay the full amount of damages even if the plaintiff was 99% at fault and it was only 1% at fault.
<b>Modified Comparative Negligence:</b>	A plaintiff must prove that the DOT is over 50% at fault in order to recover any damages from the state DOT.

TABLE 2 Responsible Persons for Risk Management

State	Person
Alaska	Director of Risk Management
Arizona	Office of Risk Management
Colorado	Division of Risk Management
Hawaii	Assistant Chief of Construction and Maintenance
Idaho	Maintenance Supervisor, Traffic Supervisor, as well as Safety Program Coordinator
Iowa	Safety Review Engineer as well as Litigation Engineer
Louisiana	Department of Transportation and Development
Michigan	Supervisor of Litigation Coordination and Risk Management Section as well as Risk Management Engineer
Minnesota	Tort Claims Engineer
Missouri	Risk Manager
Oklahoma	Division Manager of Operations Review and Evaluation Division
Pennsylvania	Risk Management Engineer
Washington	Office of Risk Management
Wisconsin	Risk Manager

A third state performs an initial review, and the situation is then categorized either as a complex or simple matter. If simple, the following steps are taken:

1. The litigation coordinator/risk manager (LC/RM) coordinates and determines an action plan.
2. A memo is sent to the appropriate person ordering an immediate implementation of the action plan.
3. The LC/RM monitors the status of the action plan.

If complex, steps are more detailed:

1. The LC/RM coordinates risk evaluation.
2. A memo is sent to the appropriate persons asking for more detailed study and an action plan.
3. The LC/RM reviews the action plan devised by the responsible person to determine whether the plan achieves the risk management goals while remaining cost-effective.
4. If approved, the LC/RM sends the plan to upper management for funding approval. If approved, the action plan is implemented, and the LC/RM monitors the status of the plan.
5. If the LC/RM rejects the proposed plan, the plan must be revised. If the funding request is rejected by upper management, the plan must be revised.

### Priority Determination

Of 25 states (including the District of Columbia), 3 reported that they use mathematical formulas to determine priorities:

- Iowa uses a composite rating based on accident rate, number of accidents, and the dollar loss.
- Colorado uses a weighted hazard index (WHI):  $WHI = R_w - R_{wc}$ , where  $R_w$  is the weighted accident rate and  $R_{wc}$  is the weighted critical accident rate (see Table 3).
- Texas uses a benefit/cost ratio to determine the priority of a situation (see Table 3).

Most other states use degree of hazard to determine priority. For example, in one case, a situation is classified as having one of four priorities: urgent (represents immediate hazard

to the public and actions should be taken immediately), some danger to the public (the corrective actions should be taken as soon as possible during normal working hours), slight danger to the public (this should have a higher priority than regular maintenance activities), and finally, not urgent (this should be incorporated into the routine maintenance activities). Although examples of types of situations that fall into these categories were not given, an idea can be obtained from classifications used by other states. States tended to give life-threatening situations the highest priority and property damage situations the lowest priority. For example, Illinois gives highest priority to malfunctioning traffic signals, down Stop signs, snow and ice removal, pavement blowups, holes in bridge decks, shoulders lower than 3 in., and down Curve signs and No Passing signs. Illinois gives lowest priority to shoulders with less than a 3-in. drop, minor potholes, and delineators. The responses to the question are given in Table 4.

### Documentation of Notices and Actions

Of the 33 states that responded to the question, 27 keep documentation of both the notices and the actions taken. Documentation, then, can be used in defense of the state's actions in a tort liability case.

### Time Limits for Responses

Of the 32 states responding to this question, 14 post a time limit for corrective actions for reported defects. The time limit is established on the basis of potential degree of hazard. For example, one responded that for a traffic signal malfunction or Stop sign down, actions should be taken within 24 hr, and on less serious defects the statutory notice is 30 days. Another responded that the time limit was based on not only the type of defect but also on the location of the defect. For example, high-priority defects such as a knocked-down Stop sign would require immediate response. However, if the location is in a low-traffic area, the priority is reduced and the response does not have to be as quick. In another case, debris and spill on highways, regulatory and warning signs down, and storm dam-

**TABLE 3** Prioritization Methods**1. Colorado:**

$$WHI = R_w - R_{wc}$$

where

$$R_w = \frac{A_w}{VMT} \quad (1)$$

where

$$VMT = \frac{[(ADT) \times (\text{Section Length}) \times (\# \text{ days in time period})]}{10^6} \quad (2)$$

$$A_w = PDO + (5 \times INJ) + (12 \times FAT)$$

PDO = number of property damage only accidents

INJ = number of injury accidents

FAT = number of fatal accidents

$$R_{wc} = R_{wa} + 1.5 \times \left( \frac{R_{wa}}{VMT} \right)^{1/2} - \frac{1}{(2 \times VMT)} \quad (3)$$

where

R<sub>wa</sub> = statewide weighted average accident rate for the highway class in question**2. Texas:**

$$\text{Safety Improvement Index (SII)} = \frac{B}{C} \quad (4)$$

where

C = initial cost of the project

B = present worth of project benefits over its service life

where

$$B = \frac{(S + 0.5xQ)}{1.08} + \sum_{i=1}^Y \left[ \frac{(S + 0.5xQ) + (i-1)xQ}{(1.08)^i} \right] \quad (5)$$

$$S = \frac{R \times C_f \times F + C_i \times I + C_p \times P}{Y} - M \quad (6)$$

$$Q = \left( \frac{A_a - A_b}{A_b} + L \right) \times S \quad (7)$$

where

S = annual savings in accident costs

R = percentage reduction factor

F = number of fatalities

C<sub>f</sub> = cost of a fatality

I = number of injuries

C<sub>i</sub> = cost of an injury

P = number of property damage only (PDO) accidents

C<sub>p</sub> = cost of a PDO

Y = number of years of accident data

M = change in annual maintenance costs for the proposed project relative to the existing situation

Q = annual change in accident cost savings

A<sub>a</sub> = projected average annual ADT at the end of the project service lifeA<sub>b</sub> = average annual ADT during the year before the project is implemented

L = project service life

age are corrected as soon as possible. Potholes are patched within 48 hr, and traffic control signs are corrected immediately. In a further instance, a time limit is established on the basis of potential hazard, corrective actions required, and availability of personnel.

**Claims Handling**

Of the 36 states responding, 32 keep records of all claims. Twenty of the 36 states classify claims for further use. Of the 16 states out of 20 that specified how the data were being used, 14 use the information to establish risk management priorities, and 12 use the information as input to decision making for functional activities such as routine maintenance, safety programming, and traffic engineering. Seven states responded that the information is used to implement actions taken at the statewide level, and three responded that information is sometimes used to implement actions for specific sites.

**Criteria for Litigation**

States will normally settle if the probability of losing the case is high. Some states will litigate even if the probability of losing is high due to the unreasonable amount of settlement demanded by the plaintiff. Some of the other factors taken into consideration in the determination of whether to litigate or to settle are persuasiveness of witnesses, ability of plaintiff's attorney, reputation of the judge assigned, issues of law and precedents, potential monetary loss, cost of litigation, potential for settling precedence, and public perception.

**Information Systems**

Twenty-two states responded that they process accident information to identify hazardous situations. Accident reports are used to determine areas that must be investigated and to summarize hazardous elements. For example, in some states, accidents are recorded by district, region, type, and cause. This permits identification of trends and potential deficiencies warranting special review or investigation. Also, in 21 states, once a potential trend or deficiency is identified, jurisdictions throughout the state are immediately notified.

Of 26 states reporting, 18 store information on centralized information systems, 15 store the information in centralized accident files, and 15 store information on local information systems. Fourteen states use more than one form of data storage for risk management.

**Additional Strategies**

In California, presentations on tort liability are given to any interested groups, and that state is beginning to incorporate risk management concepts in management performance evaluations. In Texas, a short course is being taught to employees regarding risk management to reduce roadway tort liability. Other states commented on the importance of educating em-

TABLE 4 Priority Determination

State	Method
Arizona	Degree of exposure; severity over frequency
Arkansas	Degree of hazard
Colorado	Weighted hazard index $WHI = R_w - R_{wc}$ where $R_w$ is weighted accident rate and $R_{wc}$ is weighted critical accident rate. See Table 3 for further detail
Dist. of Columbia	All equal priority unless life-threatening
Hawaii	Based on safety, health and welfare of public
Idaho	Highest: life-threatening Lowest: problems not directly in traffic areas
Illinois	Highest: malfunctioning traffic signals, down stop signs, pavement blowups, holes in bridge deck, shoulders lower than three inches, down curve signs and no passing signs. Lowest: shoulders with less than a three inch drop, minor pot holes and delineators
Iowa	Composite reading based on accident rate, number of accidents, and dollar loss
Kentucky	Benefit/Cost ratio
Michigan	Based on safety and payouts
Minnesota	Degree of Hazard
Missouri	Priority 1: Urgent. Represents immediate hazard to public. Should respond as soon as possible. Priority 2: Some danger to the public. Should be accomplished as soon as possible during normal hours Priority 3: Slight danger to public. Repair should be accomplished with higher urgency than routine maintenance Priority 4: Not urgent. Considered common occurrence with no danger to public. Would normally be considered routine maintenance.
New Hampshire	Degree of hazard
Ohio	Seriousness of hazard
Oklahoma	Degree of hazard
Pennsylvania	Degree of hazard, exposure to risk, competing needs, availability of manpower, available funds, etc.
Rhode Island	The degree of crisis dictates priority. All situations are addressed within 48 hours.
South Dakota	First come, first served basis
Tennessee	Highest: life-threatening Lowest: property damage
Texas	Mathematical formula
Virginia	Judgment call by field engineers
Washington	Highest priority: malfunctioning traffic control devices and damaged road surface, and snow and ice removal
West Virginia	Case by case
Wisconsin	Prioritized weekly
Wyoming	Severity of injury

ployees regarding tort liability so that they will be conscious of it while they are performing their duties. The additional comments provided are summarized in Table 5.

### RISK MANAGEMENT PROGRAM OBJECTIVES

The organizational structure and elements of a state DOT's risk management program are a reflection of the particular objectives for risk management that have been established in that jurisdiction. The following is a summary of the survey responses regarding risk management objectives:

- To improve highway safety by identifying, analyzing, prioritizing, and recommending alternatives to change the

roadway environment in a manner that will reduce motor vehicle accidents;

- To reduce the department's exposure and loss due to liability;

- To coordinate and track all claims and litigation against the department, to process claims and manage a tort liability loss-mitigation program, and to direct the resources of the department to minimize the adverse effects of litigation on the department and the public;

- To serve as the tort claim representative for the department and coordinate investigative service with the attorney general's office; and

- To administer an employee safety program, to promote a cost-effective risk management effort statewide, to develop control mechanisms through training and counseling, and to

TABLE 5 Concepts Not Directly Addressed in Survey

State	Comments
California	Presentations made to a variety of interested groups on the subject of tort liability. Experiences and trends in the law are given at various meetings, conferences and training sessions for traffic, design, maintenance and construction employees.
Colorado	Colorado has "mandatory arbitration" for certain types of cases.
Kentucky	Currently conducting a research project to review tort claims against the Kentucky Transportation Cabinet and provide information to use in establishing a risk management program.
Louisiana	The Office of Risk Management acts as carrier for all state agencies including Department of Transportation and Development (DOTD). Its claims section handles all tort actions against state, and its loss prevention section oversees various safety and loss prevention activities and programs. The DOTD does have internal procedures for prioritizing and acting to correct potentially hazardous situations.
Minnesota	Employee training to explain the litigation procedure, as well as the importance of following specific design, maintenance, and construction policies and procedures, and the responsibility of proper documentation of actions taken in the field.
Missouri	Employee safety, hazardous material management, and property damage to state property.
South Dakota	Numerous training programs, defensive driving, safety evaluations, and certifications.
Texas	A short course titled "Risk Management to Reduce Roadway Tort Liability" is taught periodically throughout the state by Texas Transportation Institute, Texas A&M University.
Wisconsin	Workmen's Compensation, Hazardous Material Management, Safety Management, Fleet Liability

foster an awareness by all employees of the risk potential associated with their actions.

As indicated, there is a great variety in the goals and objectives as determined from the survey. Some are more clearly defined than others, some are more generic, and some are very focused.

#### RISK MANAGEMENT PROGRAM CRITERIA

Of the 24 states responding, 23 use more than one criterion to measure the success of their program. Twenty-two states use the total number of claims as one of the criteria, 21 use the cost of all claims paid, 19 use number of claims paid, and 14 use number of accidents as one of the criteria. Only two states responded that their programs are not evaluated. Five states responded that they use criteria other than those stated above. In the survey, one state also uses cost per claim, number of improvements completed, and standards or policies revised. Another uses safety improvement potential of proposed changes in policy and procedures as well as the other criteria, and one uses the reactions and opinions of DOT defendants. Overall, these criteria ranged from highly objective and measurable to quite subjective.

#### FRAMEWORK FOR RISK MANAGEMENT PROGRAMS

The results of the risk management survey that have been described constitute a basis for the development of a methodology to evaluate proposed and existing risk management

programs. They can also be used to assist in defining the organizational and functional needs for a state DOT's risk management program. These risk management elements and tasks are interrelated as indicated in Table 6. Table 6 also gives criteria that are appropriate for measuring the effectiveness of each element in terms of aggregate program performance rather than task performance.

#### Profile of a Typical Risk Management Program

Using these building blocks, a typical approach to risk management is derived from the state of the practice.

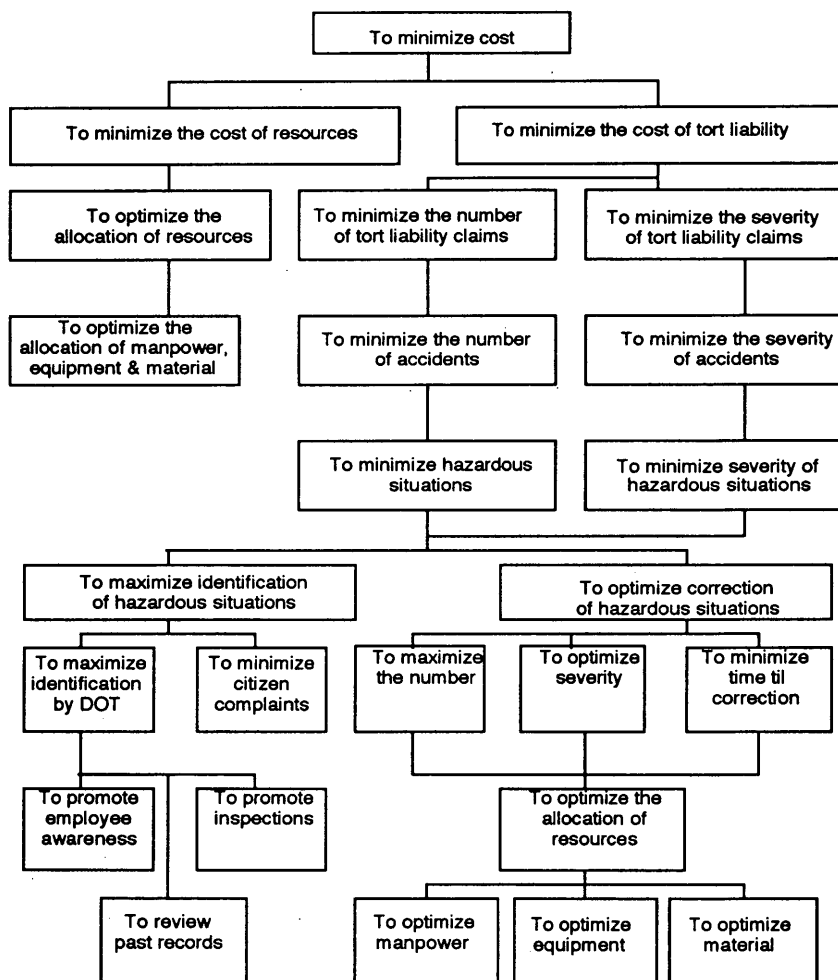
The states typically identify hazardous situations by citizen complaints, accident reports, and routine inspections. Once notified of a hazardous condition, a state usually has an established procedure for action. Only three states use a mathematical model for prioritization of defects for remedial action. Most states use a subjective degree of hazard to determine priorities.

After receiving a notice from a citizen concerning a possible defect, 17 of 33 states follow up any action with a call to the informant. Most states maintain documentation of the notices received and actions taken. Nearly half of the respondents have established time limits for taking action to mitigate different types of reported defects or problems. Time limits are based on the potential degree of hazard, ranging from 24 hr for traffic signals to 30 days for less serious problems.

The majority of states keep records of all claims; however, many do not classify them according to type of hazard to provide direct information for needed areas of improvement. Some only classify settled claims. In most cases, this information is not used to evaluate and establish risk management

**TABLE 6 Building Blocks for Risk Management**

Elements	Tasks	Criteria
Risk Identification	<ul style="list-style-type: none"> <li>Hazardous system identification</li> </ul>	<ul style="list-style-type: none"> <li>Number of hazardous situations identified; by employees; through citizen complaints</li> </ul>
Risk Evaluation	<ul style="list-style-type: none"> <li>Prioritization</li> <li>Ranking</li> </ul>	<ul style="list-style-type: none"> <li>Seriousness of injuries</li> <li>Number of accidents</li> <li>Number of claims</li> </ul>
Risk Control	<ul style="list-style-type: none"> <li>Reaction to notification</li> <li>Follow-up</li> <li>Time limits</li> </ul>	<ul style="list-style-type: none"> <li>Number of claims</li> <li>Number of situations corrected</li> <li>Number of accidents</li> <li>Number of fatalities</li> </ul>
Implementation	<ul style="list-style-type: none"> <li>Objectives</li> <li>Organizational structure</li> <li>Governing legislation</li> <li>Responsibility</li> <li>Policy &amp; procedures</li> <li>Support systems</li> <li>Claims handling</li> <li>Documentation</li> <li>Transfer</li> </ul>	<ul style="list-style-type: none"> <li>Response time</li> </ul>
Monitoring & Feedback	<ul style="list-style-type: none"> <li>Criteria</li> <li>Information systems</li> </ul>	<ul style="list-style-type: none"> <li>Total cost</li> <li>Cost of resources</li> <li>Cost of tort liability</li> </ul>



**FIGURE 1 Goals and objectives of a risk management program.**

policy. Normally, subdivisions throughout a state are notified of a particular defective situation.

Various criteria are used by states to decide whether to settle or litigate a case. Basically, if it appears that a case will be lost, it is settled. However, if a claim is unreasonably high, it may be litigated even though the chances of winning are slim.

Most states process accident incident information to identify the existence of hazardous situations. Data are typically available on all or combinations of the following: centralized information system, central accident files, and local information systems. At the time of the survey, many states were training employees with risk management procedures to reduce tort liability. Awareness is the objective.

#### **Development of Goals and Objectives for Risk Management**

At this point, it is appropriate to withdraw from the constructive details of the risk management program and to define a scope of the goals and objectives that are needed to begin to structure a program. What should a program accomplish? Since it is designed to minimize tort liability costs, that should be one of its main objectives. However, states must also realize that in minimizing tort liability costs, they do not have unlimited resources. This requires that they balance minimizing the cost of tort liability with the cost of resources. Figure 1 shows a possible hierarchical goal structure of a risk management program that takes these considerations into account. This effort is enhanced by the rapid identification of hazardous situations and their mitigation through manpower, equipment, and materials. Concepts such as those shown in Figure 1 should be investigated and associated analytical processes developed that provide a method for structuring and evaluating risk management programs in state DOTs. These methodologies would build on the ideas presented in this paper in consideration of program goals, objectives, and cri-

teria that identify and evaluate the primary tasks that constitute the program.

#### **CONCLUSIONS**

The preceding has been a summary of the common practices regarding risk management for tort liability in state DOTs. These observations provide a profile of risk management practice. When risk management programs become more clearly defined, the use of available information to develop risk mitigation strategies will dominate program improvements. The critical information areas are (a) identification of defective situations; (b) association of these defects with design, construction, operational, and maintenance practices; (c) communication of problems and solutions throughout the agency; and (d) maintenance of a comprehensive data base where claims are classified in such a way that sites, hazards, and remedial actions are identifiable. These findings can be used to structure a formal methodology for evaluating existing or proposed risk management programs.

#### **ACKNOWLEDGMENTS**

This research was sponsored by the U.S. Department of Transportation, University Transportation Centers Program, Region III, and the Virginia Department of Transportation. The authors are indebted to the states that provided the information for the study through the survey.

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*Publication of this paper sponsored by Committee on Tort Liability and Risk Management.*