

# Highway Risk Management: A Case Study

Brent O. Bair, William J. Fognini, and John L. Grubba

Immunity for action taken by governmental agencies has almost disappeared across the United States. As a result, transportation agencies and their agents are being held accountable for improper design, construction, maintenance, and traffic engineering of their roadways. Thus, the Oakland County [Michigan] Road Commission, because of very high insurance costs, has launched a safety-first program. Safety has always been included in road design, but it has often been compromised due to the presumed necessity to provide for more capacity. The Oakland County Road Commission has reversed this priority; this paper describes the Oakland County risk-management program, which is intended to place safety first in all areas (including safety for employees). Risk management is new to the transportation field. However, its operation is simple—(a) reorganizing the management decision process; (b) encouraging all employees to participate in a road-hazard-identification process; (c) analyzing all identified hazards, traffic accidents, and legal claims; (d) documenting and determining priorities for planning project programming; (e) providing countermeasures for the identified risks; and (f) evaluating the results and feeding this information back into the planning process.

That the amount of major highway construction is decreasing and attention given to better management of existing systems is increasing is of course old news. The transportation system management requirements in the planning process have been around for several years now. However, there is one pressure for change that has seldom been addressed directly that may provide an unexpected stimulus for specific types of improvements. This pressure comes from liability exposure, and the resulting improvements will be in the area of greater highway safety. With the majority of the states having little or no immunity today and the courts adopting the theory of comparative negligence, the liability problem is growing and requires direct attention. The number of lawsuits and the sizes of awards and settlements have been increasing steadily. In the past, many public agencies have viewed liability as simply an insurance problem but, today, with many insurance companies abandoning the public liability market because of the high probability and severity of losses, it is becoming clear that more must be done than to simply look for another insurance carrier to write the risk.

Road liability represents perhaps the greatest liability exposure to public agencies. There is simply no other activity involving public agencies in which so many people are killed and maimed each year. Although highway safety has always been viewed as important and various amounts of funds have been set aside for safety improvement activities, safety has, at the same time, generally taken a back seat to improved mobility and decreased travel time. The relatively low level of expenditure for highway safety-related improvements over the past 20 years is perhaps the best evidence of this secondary position. It is possible, however, that the growing liability problem may provide the necessary stimulus to boost safety improvements to a much higher priority.

In fact, this is exactly the case in Oakland County, Michigan. The Oakland County Road Commission has designated safety as its number-one priority. A decision of this type, although admirable, is not necessarily easy to implement. The implications of this decision have had a wide range of effects on the agency's policies, one of which is that all decisions, including the budget, must be made with safety as the first consideration. Once the decision was made, it quickly became apparent to the road commission management that a comprehensive approach to the implementation of this priority was needed.

The road commission, consequently, began developing a program referred to as highway risk management. This represents an organized management approach to decision making. Although risk management is not expected to be a cure-all to liability and safety problems, it does promise to improve the situation.

## EXTENT OF THE PROBLEM

It may be helpful to begin by reviewing the background of the Oakland County Road Commission, including the extent of its safety and liability problems and the general reasons why it has come to put such emphasis on risk management and highway safety. The Oakland County Road Commission is not a small, unsophisticated, backwoods, local agency. Rather, it is the agency responsible for approximately 4000 km (2500 miles) of road system immediately adjacent to the sixth largest city in the nation, Detroit. This road system represents the second largest system under one jurisdiction in the state of Michigan, second only to the state highway system. The road commission's current annual operating budget is approaching \$40 million. Oakland County covers 2300 km<sup>2</sup> (900 miles<sup>2</sup>) and contains approximately 1 million people in 61 separate municipalities, almost as many people as reside in the city of Detroit. Due to the size of the county and the population involved, the roads under the Oakland County Road Commission's jurisdiction range from congested multilane facilities in the urbanized area to lonely rural gravel roads in the outer regions.

As was typical nationally, after World War II, Oakland County experienced rapid suburbanization that created demands for smoother, wider roads at a pace that far exceeded the road commissions's funding resources. While trying to keep pace with mobility needs, the road commission could not give adequate attention to less-pressing considerations such as future safety on the system. It was not that the road managers did not care or were ignorant of safety measures, it simply seemed logical to give highest priority to the demand for mobility. In addition, at that time, road managers were not constrained by liability considerations because road entities were immune from such. Without the liability pressure, the demand for safety could not balance the demand for mobility. In addition, the general rules of the road and existing laws required that the other driver compensate accident victims for damages.

That situation changed dramatically in the 1970s. Road commissions in Michigan lost most of their immunity, and no-fault automobile insurance was enacted into law. No longer can accident victims collect from the other driver, except under special circumstances. It appears that people involved in automobile accidents have begun to feel victimized by the system as well as by the crash. They have begun to seek other means to collect for their losses. Of the three elements involved in highway accidents—driver, vehicle, and road environment—the vehicle and the road environment are now receiving increased legal attention. With the recent adoption of the theory of comparative negligence by the Michigan court system, road agencies can now expect to participate financially to some level in many more court cases.

The Oakland County Road Commission has certainly

Figure 1. Risk-management approach.

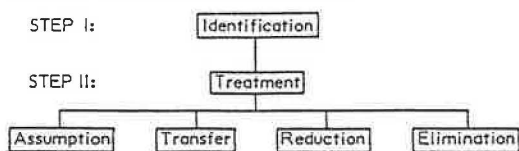
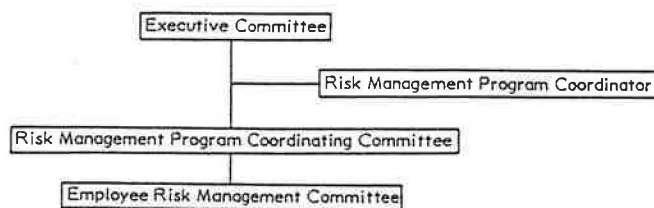


Figure 2. Risk-management organization: Oakland County Road Commission.



not been overlooked in the liability arena. In the five-year period from 1973 to 1978, the road commission's liability insurance premiums jumped from a little more than \$60 000 to \$1 500 000. In 1978, the road commission had approximately \$72 million worth of liability lawsuits pending against it, compared with its annual revenues at that time of about one-third that amount. Road commission policymakers and management began to look for causes of these problems and found that they did not have to look very far. Accident statistics showed that, over a five-year period, more than 820 persons had died and more than 87 000 had been injured on Oakland County roads. It was estimated that the cost to the public of all accidents in the county during that five-year period had been almost \$0.5 billion (and that is without placing a dollar value on human suffering). It became apparent that what the road commission was seeing in liability claims and insurance premiums was only a reflection of the carnage on the highways. It also became apparent that partial answers, such as increased insurance coverage, were not enough. Statistics alone proved that half measures, such as programs to make the car and the driver safer, fall woefully short. The road commission came to the conclusion that the third factor in highway accidents—the road environment—had been receiving too little safety-related, before-the-accident attention. Consequently, in September 1977, the road commission's policymakers directed its staff to develop a comprehensive program. On January 30, 1978, the highway risk-management program was launched.

#### RISK-MANAGEMENT APPROACH

The term "risk management" is borrowed from private industry. Only the addition of the term "highway" signals something new. The risk-management approach has been used extensively in private industry for decision making directed at managing risks of financial loss to the firm.

The basic risk-management approach involves two steps—risk identification and risk treatment—and four alternative elements under the risk-treatment step—risk assumption, risk transfer, risk reduction, and risk elimination (see Figure 1).

#### IMPLEMENTATION

The road commission, however, is incorporating the risk-management approach into a systems approach.

Five general steps in the process are being used, and they are as follows:

1. Reorganization,
2. Risk identification,
3. Analysis,
4. Planning and programming, and
5. Countermeasure implementation and evaluation.

#### Reorganization

Considerable emphasis is being placed on reorganization of the management decision process. The adoption of a priority such as safety is only as effective as the commitment of the staff carrying it out. One way to ensure involvement and eventual commitment is through the committee process. At the road commission, three levels of committees have been established to review safety problems and identify and implement improvements (see Figure 2).

At the top management level, an executive committee has been established to direct the program and to establish policies. This committee includes the managing director, the chief engineer, the general counsel, the assistant managing director, and the risk-management coordinator (who serves as staff officer to the committee). The executive committee sets policy and general procedures.

At the middle management level, a risk-management-program coordinating committee has been established. This committee includes primarily department heads, and the risk-management coordinator serves as chairperson. This committee reviews technical and procedural questions, develops new programs, and makes recommendations to the executive committee.

At the field and office employee level, an employee risk-management committee has been established. This group includes both hourly and supervisory personnel. Although the primary interest of this committee is employee safety, it also reviews the road safety problem. The employee risk-management committee makes recommendations to the risk-management-program coordinating committee. Although these recommendations are reviewed and commented on by the risk-management coordinating committee, all employee risk-management committee questions are forwarded to the executive committee for consideration. This creates more confidence among the field level employees that their ideas are being seen and are taken seriously.

#### Risk Identification

The road commission has five risk-identification projects under way. These include a procedure analysis, a claims analysis, inspection and inventory, police liaison, and accident and accident-data investigations. An early step was to determine and analyze all existing policies, procedures, and operations. The staff surveyed all of the more than 500 employees of the road commission and asked them to document procedures and make recommendations for improving safety. Employees in every department were asked for descriptions of every operation and procedure, as well as if and when a procedure is not followed and what priority the particular activity is given. Consequences of not following procedures were also identified. Employees were asked for any comments or suggestions they might have concerning the individual activities they were involved in. This approach was used because it was recognized that field employees are frequently a key to the identification

of existing problems. Because they are exposed to road conditions at all seasons of the year, they are generally aware of what is going on and where the problems are. The road commission investigating staff actually found that many employees had been frustrated when previously noted problems were not corrected.

An ongoing road-hazard-identification program for employees was also developed. This involved the use of a road-hazard-report form on which employees could record and trace actions taken on anything they had called to the agency's attention. For example, all employees (including clerks, secretaries, and others) were asked to watch for such things as damaged signs, serious potholes and edge ruts, and other potential road problems. If a problem was noted, the employee was asked to fill out a report form and send it to the appropriate department. The department receiving the notice was then required to record the action taken on the report form, send a copy of the completed form to the originating employee, keep a copy in their own files, and forward the original completed form to risk management for review. An intensive employee training program on what to look for and how to use the road-hazard-report form was conducted as part of this hazard identification effort.

### Analysis

A detailed analysis of claims against the road commission that were handled by previous insurance carriers has been conducted. The degree of liability and the frequency of accident types were examined and, from this, priorities were established and some specific activity recommendations for targeted countermeasures were developed. For example, because of the frequency and occasional severity of claims related to road maintenance problems such as snow and ice removal, pothole repair, and shoulder maintenance, additional resources have been directed at those activities.

An in-depth analysis of selected activities having high loss potential was also carried out. After specific activities had been identified through the employee survey and follow-up conversations, certain ones were selected for additional review and specific road improvement programs were developed.

Because the claims analysis indicated that staff were unaware of many things happening on the road system and many of the procedures analyses pointed up the lack of timely information or notice concerning potential problems, two different road inspection programs will be attempted in 1979 and 1980.

A detailed inventory of the entire paved road system will also be conducted in 1979 and 1980. This inventory will include the identification of roadside hazards, the inspection of problem sites such as railroad crossings, and the incorporation of road geometrics into accident data.

A policy liaison program is being established with all 62 police departments in Oakland County. Police officers are an important element in highway safety, both for enforcement and problem identification. Due to their high level of exposure to the road and their responsible position, police are an important resource that should not be wasted. Consequently, their additional input is being actively solicited.

The Oakland County Road Commission has had one of the most sophisticated accident-data systems available for at least nine years. Accident data have been computerized; both links and intersections are ranked according to various indices, such as accident frequency rates, severity rates, and accident rates per distances of vehicle travel. The incorporation of road geometrics

into the existing accident-data collection will, in the future, allow an even higher degree of sophistication in these analyses.

One of the problems of an extensive identification program is that, once you know about a problem, it is mandatory that you do something about it, regardless of your ability to do so. Once you have identified a problem, you are on notice. Because of this, many highway engineers in the past have avoided such identification processes, hoping that a plea of ignorance would be an adequate defense in court. The road commission has rejected this because, for a long time, the courts have been telling us that not knowing about a problem does not mean that the agency is not liable. If the problem has existed long enough, it is believed that the agency should have known about it. This theory is referred to as constructive notice.

The road commission has developed several steps for dealing with this problem of being on notice. For example, the agency's legal counsel, rather than occupying the traditional position of counselor available to answer specific questions and to provide guidance, has taken a much more active position in the day-to-day risk-management process. The legal counsel helps in identifying potential exposure and by assisting in the formulation of countermeasures. Thus, counsel is involved before the accident to try and prevent it, rather than only in defense after it has occurred.

### Planning and Programming

Being on notice also has its positive aspects. By aggressively seeking out potential problems, it is much easier to establish and document need when asking for outside funding. The Oakland County Road Commission is very aggressive in seeking sources of additional funds. The risk-management program has helped to specify funding needs.

Accident data and other information are currently being used to reevaluate multiyear construction and maintenance programs to ensure that safety problem areas are being addressed first. In addition, a review of proposed projects by a multidisciplinary team to identify additional safety improvements is being explored.

Finally, considerable effort is being expended on improving documentation and record keeping of all road commission activities, including maintenance. Better documentation of safety-related decisions should make possible improved decision making through subsequent monitoring and evaluation.

### Countermeasure Implementation and Evaluation

Funds have been set aside to provide specific countermeasures for problems noted in the identification program. The Oakland County Road Commission is attempting to do something about the problems identified, not just leaving them sit. Many of these countermeasures have been developed in the form of in-house demonstrations.

Numerous countermeasure programs have been initiated. These include a shoulder paving program, an intensified winter maintenance program (which includes testing alternative snow and ice removal actions and materials), and a guardrail and roadside-obstacle improvement program. All of these are in addition to those safety improvement programs using specific federal safety funds. The road commission has applied for and received at least its share of the categorical federal highway safety funds in past years, and applications for these funds continue to be submitted.

### IMPORTANCE OF EMPLOYEE INVOLVEMENT

Agency experience indicates that the importance of employee involvement at all levels simply cannot be stressed enough. Unless there is a commitment on the part of the people responsible for making the necessary improvements, any program, but especially one of this magnitude, will fail. This commitment is not easy to come by; rather, it must be earned. It must be proven to engineers and field laborers alike that the new priority should become an operational habit and not simply a temporary exercise in paperwork. This can be done through direct employee involvement in decision making and by repeated evidence from top management through obvious changes in top-level decisions. The committee process, although cumbersome at times, provides a mechanism for such employee involvement. If the committees are charged with developing recommendations within time constraints and many of those recommendations are implemented, the commitment is reinforced.

Another mechanism is to make individuals more directly responsible for failures in the system. This approach is being tried by the Oakland County Road Commission through the assignment of liability claim losses against appropriate departmental budgets. Department heads thus become directly accountable for financial losses in areas where they have some degree of control.

Even the employee-survey process, such as the analysis of procedures described above, can be useful. It allows the seldom-heard-from employee to vent frustrations and at least feel that he or she has had a chance to be heard. There may also be fringe benefits that are not necessarily reflected in the original instrument. For example, although more than 700 road-hazard-report forms have been turned in by road commission employees, there has also been a notable increase in radio and oral notification of problems. Thus, the forms themselves may not reflect the actual increase in employee awareness of problems and corresponding reporting. Again, through follow-up confirmation of suggested improvements, the commitment toward con-

tinued reporting is reinforced.

Repeated educational and training programs are also mandatory. The messages of priorities and duties relating to those priorities must be repeated again and again so that there is little question that the new program is here to stay. Finally, there must be continued reinforcement from top management. Commitment from the top must be the most evident.

### FUTURE DIRECTIONS

Many of the programs and activities described in this paper are in the form of in-house demonstrations, and staff will be analyzing and improving them. Eventually, the staff hopes to develop a system for the allocation of all road commission resources in the interest of safety. But, although determining the priorities of link and inter-section improvements is not always an easy and clear-cut process, the allocation of resources among the numerous construction and maintenance activity alternatives is even more difficult.

Through the adoption of safety as its number-one priority and the implementation of the highway risk-management program, it is believed that the Oakland County Road Commission has taken a more significant step toward improving highway safety than any other road agency in the nation.

An informal survey of approximately 70 public agencies responsible for streets and highways indicated that major safety improvement programs generally correspond directly with available federal safety funds. The Oakland County Road Commission's program far exceeds the federal program limitations. It is believed that the road commission's program will demonstrate that substantial improvements can be made in highway safety at existing levels of funding and that road agencies need not wait for new federal programs. There is no question that additional funding is warranted at all levels, but progress can be made in highway safety without waiting.

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*Abridgment*

## Matrix Project Management in Transportation: New York State Experience

William J. McLoughlin

The topic of matrix project management in transportation is explored, and the results obtained after two years of experience by the New York State Department of Transportation are described. The major problems of increased complexity of the transportation-project development process and the effects of inflation on project delays led to the creation of the program planning and management group in the fall of 1976. This new organizational structure, of which the program-project management section is a part, allows primary units that interact during critical stages of the project development process to be located within the same major

unit. The organizational structure of the program-project management section and the duties of its members are discussed. An analysis of the first two years of operation, 1977 and 1978, is presented based on decreased project slippage and dollar value of projects let. The average project slippage on 100 sample projects in the period January-December 1976 was 5.11 months and that on projects monitored in 1977 and 1978 was 2.45 months. By applying this slippage reduction against the 1977-1978 average inflation rate of 10 percent per year on a total letting of monitored projects for the same period of \$1.364 million,