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DESIGNING SAFE ROADS: WHO'S RESPONSIBLE?

Let me express my appreciation to Mr. Calvin Grayson, the Kentucky Transportation Center, and the Kentucky Transportation Cabinet for inviting me to participate in this Forum. The Planning Committee for the Forum has put together a program that should draw strong attention to highway safety. I hope that the participants are able to obtain plenty of good ideas for enhancing their local safety programs.

Now to my topic, "Designing Safe Roads: Who's Responsible?" The answer to this rhetorical question is easy. We are all responsible for designing safe roads. You know it, I know it, and that makes my presentation today easy. All I have to do is explain the relationship between highway design and safety. All you have to do is take good notes or at least pretend that you're awake during my presentation.

Highway Design

One immediate question needs to be resolved before I go any further in this discussion. What portion of the life of a roadway is most directly related to road safety? After all, a typical highway project goes through the following stages:

1. conception of the idea
2. general planning of the route
3. selection of the design criteria
4. design of the roadway
5. preparation of plans and specs
6. construction

7. operation
8. maintenance
9. rehabilitation

Actually, there are design components in each of these phases of the life of a given roadway. My talk will address design in general and may be applied to any of these phases.

Highway Designers

Engineers have long felt that design was an acquired skill. Engineering colleges are too busy teaching mathematics, sciences, and introductory engineering theory to do a complete job of teaching design. In the highway field, a great deal of on-the-job training is an essential part of learning design. Highway organizations typically assign their employees to several different types of duties before they settle into design jobs.

A minor crisis is on the horizon for the highway industry. A large block of senior employees is at or near retirement age. AASHTO predicts that as many as one-fourth of all highway employees could retire during the 1986-91 period of time. These experienced officials represent the best in highway design capability. Highway agencies across the nation are scrambling to find ways to replace these valuable employees.

FACTORS AFFECTING DESIGN

I am going to address three factors that I feel will have a large impact on the future relationship between roadway design and safety. There are certainly many other factors which might be mentioned, but I am concentrating on three of immediate and substantial impact.

1. National Mobility

America is the most mobile nation on the face of the earth. We make more trips for more purposes than any nation in the history of the world. Americans are glad to drive long distances through adverse weather and crushing congestion, and still call it personal pleasure. There are currently 159 million licensed drivers in the United States and 176 million vehicles. It is interesting to note that we have 10 percent more vehicles than licensed drivers. Over 1.8 trillion miles are driven in the United States each year. No matter which of these factors is used to measure mobility, no other nation comes close to the United States. The next nation in line has only about 60 percent of our mobility.

The inevitable end product of this mobility is more cars and more drivers on the road each year. Congestion may well be the hallmark of the future. Highway designers must remember to expect more cars going more places each year in the future.

2. Magnitude Of Accidents

In the mid-1940s, an official with the Bureau of Public Roads said, "This nation will not tolerate 40,000-50,000 deaths per year on our nation's

highways." Sadly, the American public not only tolerated that level of fatalities, but accepted this catastrophic loss of life for virtually 50 years. In addition to the enormous number of fatalities, there are also about 1.8 million people seriously injured in automobile accidents each year.

These huge numbers certainly indicate that this is not a trifling problem. This deserves the attention of managers and it deserves the attention and respect of highway designers.

3. Tort Liability Trends

The most sweeping change in the highway industry in the last 20 years has been the proliferation of court cases. Usually a person involved in an automobile accident sues, alleging negligence on the part of the highway department in constructing, maintaining, or operating a roadway. Highway managers were not prepared for this sudden immersion in a sea of legal issues. It appeared that most state departments of transportation were just not prepared. They just couldn't believe these suits were happening, and greeted the wave of suits with an ostrich defense. That is, they tried to ignore it, or look the other way, or hide their heads, hoping that it would go away. It doesn't take a genius to deduce the largest exposed portion of an ostrich's anatomy. The high level of exposure indicates that the ostrich defense is not appropriate defense strategy for the liability issue.

The best available data indicates that state departments of transportation paid about \$150 to \$200 million for settlements and judgments in 1987. Local governments paid at least that much. Therefore, a reasonable overall estimate is that tort liability cost highway agencies about \$300 to \$400 million in 1987. At least \$100 million more was spent at the state and local levels investigating these claims and defending these suits. The total price for tort liability in 1987 can thus be estimated at one-half billion dollars.

The legal grounds for most of these suits was negligence on the part of the highway agency. Negligence may be loosely defined as the failure to use due care, or the failure to act reasonably toward others. Another perspective is that a jury, in arriving at whether the defendant is guilty of negligence, may ask itself, "What would a reasonable man have done in these circumstances?" Highway agencies that have carefully thought out their plans for design, construction, and maintenance are usually in a better position to defend negligence cases because they have taken reasonable actions.

Is there a solution to the spiralling losses in court? I read a newspaper headline from Augusta, Georgia that said, "Local attorney shot to death." This humorous example may seem like a good solution to some of you. Another state has tried an unusual method to limit its liability. It has adopted a warning sign that reads "Warning—Substandard Roadway."

The best way to limit liability for tort issues is to have a roadway free of defects and to prevent any highway accidents from occurring. This would certainly minimize the number of claims against the agency. Unfortunately, this situation exists only in the minds of the most extreme optimists. It is not realistic to expect highways to be perfect, nor is it reasonable to have an accident-free roadway.

THE DUTY

The general function of government is to provide safe and efficient services for the people. In the highway business, this has been further defined by the courts as "keeping roads in a reasonably safe condition." The courts have further stated that the government "is not the absolute insurer of the safety of the public," nor can a public agency be required to use extraordinary care to anticipate unusual occurrences.

Probably the key word in the definitions in the preceding paragraph is "reasonable." I have already indicated that the lack of reasonable action may be construed to be negligence. Highway agencies want to take reasonable actions. If they have studied their mission and devised careful programs to spend public funds as wisely as possible, the courts usually feel they were acting in a reasonable manner.

It is easy for me to recite what you should be doing. After all, I am not trying to maintain an 80-year-old highway system. I am not facing a four-percent growth per year in traffic with no end in sight. I am not facing limited budgets and difficult decisions regarding priorities. But I can tell you this: if your roads didn't wear out and didn't become congested, there would be no need for your job. You will be faced with many difficult decisions throughout your career. These decisions will include the design of programs, the design of facilities and the carrying out of those design programs. Part of your design should be the inherent consideration of the safety of the motoring public.

STANDARDS

One of the ways that the courts establish negligence is to determine what a reasonable man would do. If a standard of care is available, the defendant's actions will be measured against it. Highway agencies that have devised standards and that have trained their employees to follow them have acted reasonably and have reduced their liability.

From the design standpoint, a proper standard would provide for the safe and efficient movement of people. It also would consider and provide for foreseeable future occurrences. For example, a short-term design policy that saved money by skimping on installation of traffic barrier might lead to liability if the designer was aware that many future vehicles would be forced off the road at a particular location. Knowing that future accidents would occur, but failing to consider them might not be a reasonable design procedure.

Standards Through Discretionary Decisions

In general, the concept of discretionary immunity is important. Where a manager has the responsibility and authority to make certain key decisions, usually in the planning process, the courts are reluctant to find him liable for his decisions. Highway engineers are engaged in discretionary decision making at many levels. The Secretary of the Transportation Cabinet makes difficult decisions regarding the best ways to spend limited funds. The local maintenance supervisor reviews all of the required maintenance jobs each

week, and prioritizes them to take advantage of his employees and financial resources. An excellent example of discretionary decision making is the careful design of a safety program, to save the most lives and prevent the most injuries for any given amount of available funds.

Geometric Design Standards

Highway designers have learned a great deal about geometric design. For example, designers have the opportunity to study accident rates as a function of degree of horizontal curve, roadway gradient, lane width, shoulder width, presence or absence of side slopes and many other factors. It is possible to try several different designs to determine those that are most cost-effective and do the best job of promoting safety. A recent report to Congress prepared by the Transportation Research Board, TRB Special Report 214, *Designing Safer Roads*, gives a state-of-the-art report on the relationship between the various geometric features and highway safety. I encourage you to obtain a copy and to use it in your roadway designs.

REHABILITATION

In the United States, there are virtually no new roadways being constructed. The last data that I reviewed indicated that we are adding less than one-half of one percent to our roadway system every 10 years.

Instead of building new roads, we are concentrating on maintaining and rehabilitating our existing roads. This is an expensive process, trying to save roadways designed 50 to 80 years ago. Usually they are too narrow, too crooked, and in poor locations. We must find ways to add lanes to them while they continue to carry existing traffic. We must find ways to salvage bridges that were never intended to carry so many cars, or to support trucks of such monstrous size. More than 50 percent of the bridges in the United States have now passed their 50th birthday.

The redesign and redevelopment of our existing roadway system offers the premier challenge to highway engineers. You must, as managers, determine a reasonable design standard to apply to these old roads. You must determine the trade-off between increased safety, increased capacity, and the best use of existing, limited funds. These will be extremely difficult decisions, but I feel that you, as highway managers, have the responsibility and authority to determine the best renovation/rehabilitation procedures.

HIGHWAY ENGINEERING INTO THE 1990s

It is my firm feeling that the 1990s will offer a continuation of the 1980s, with a growing emphasis upon rehabilitating our existing roads. Fortunately, I foresee that federal-aid categorical safety funding will continue. We will be allowed to extend our excellent railroad grade-crossing safety program and our strong hazard elimination program. The safety effectiveness of these programs has been proven over and over.

The best way to ensure that safety is an integral component of the design process at all stages of the life of a highway is to build it into your department's policies. Educated employees who are aware of the department's safety policies and who take care to exercise these policies prevent accidents and save lives. This provides the optimum use of public funds and ensures maximum safety for the traveling public.

SUMMARY

I've tried to give you my impressions of the factors that will affect the design-safety process in the coming years. My strongest feeling is that liability has the potential to dominate future highway decisions. The best way to avoid liability, or at least to minimize it, may be a carefully planned safety program. Eliminating the sites of highway hazards to the motorist eliminates many suits.

Design is a consideration at all stages of the life of a highway. My main message to you is that safety must be an integral component of the design process whenever and however it may be applied.