USING RESEARCH IN DEFENDING TORT LIABILITY CASES

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Introduction

One possible result of a traffic accident is a tort-related lawsuit in which the plaintiff (the complainer) will accuse the defendant of negligence. The basis of the suit may be an alleged negligent action (or actions), or negligence for not responding in a prudent manner to a known hazardous condition.

The defendant in a highway tort lawsuit is often the driver of one of the vehicles involved in the accident whose improper driving behavior contributed to or caused the accident. Quite often the governmental entity responsible for the roadway on which the accident occurred is either sued directly by the plaintiff or is brought in as a third party by the initial defendant. Regardless of how the governmental entity becomes involved in the suit, it must prepare a defense. The entity must explain how it designed, operated, and/or maintained the roadway on which the tort related accident occurred, and why it chose the procedures, policies, and design criteria that were used.

The governmental entity's defense of a case must include presentation of facts relevant to both the tort-related accident and the roadway's condition at the time of the accident. Obviously, facts and information collected at the accident site (usually by the investigating officer) are the primary data used to explain the circumstances surrounding the accident. Additional information collected at the accident site sometime later (days, weeks, months, or years) is also considered as primary information. These data as well as vehicle dynamics computations, human factors considerations, and the laws of physics provide the basis for reconstructing the accident. Quite often, the accident reconstruction helps to pinpoint the factors which contributed to the accident and to determine who or what caused the accident to occur.

Sometimes sufficient information to perform an accident reconstruction is not available, available accident-related information is practically nonexistent, or the roadway cross-section or alignment was altered between the time of the accident and the lawsuit investigation. Sometimes the critical issue of a lawsuit does not involve the dynamics of the accident but the design of the roadway, the signing, or lane markings present, or the presence or absence of specific "safety" design features (e.g., guardrails, crash cushions, breakaway signs, etc.). And sometimes the critical issue may involve the motorists themselves and how they were alleged to be confused or influenced by the roadway conditions that existed at the time of the accident.

These secondary issues can only be addressed by investigating the state-of-the-art of highway design, operations, and maintenance that existed at the time accident, and to some extent, the current state-of-the-art as well. Human factors considerations as related to the driver of an automobile must also be investigated. Much of this information is based on the results of research findings.

The typical image of research is a staff of engineers and technicians wearing white coats and either looking through microscopes or massaging a computer. Certainly this type of environment is associated with numerous research activities. However, research is much broader than this stereotype.

Research may involve a review of documentation from previous research results or practical applications of technology. It may be the result of personal interviews or data collection "in the field", which may include such items as traffic counts or signal timings. Research also includes the implementation of research findings through technology transfer via seminars, conferences, and short courses.

Unless research findings can be disseminated and made available to the user of the new technology, the research efforts are virtually worthless. It is imperative, therefore, to document research findings in an organized manner so that they can be found with minimal effort.

This paper addresses the methodology used to find and use research findings in the defense of a highway-related tort lawsuit. In addition, a sample case is used to explain how these issues were developed and used in an actual case in the state of Louisiana.

Secondary Data Collection

After determining the secondary facts or issues relevant to the tort lawsuit, it may be desirable to locate documentation that addresses these facts or issues. Considerable amount of information is available from various sources both within and outside the United States.

Probably the most exhaustive listing of potential sources of information can be found through information retrieval services. This type of service is available to anyone that pays the fees to tie into the system. Most large universities and many large private companies utilize this service. Texas A & M University calls their system AIRS, an acronym for Automated Information Retrieval System. AIRS allows an individual to utilize eleven different information services (e.g., National Transportation Information Services) and "search" for various publications that address a topic (e.g., wet-weather accidents, horizontal curves, and fatalities). The search results provides a listing of various publications that address the topic or topics (possibly as few as two or three or as many as several hundred) and briefly describes the content of each.

The publications may be textbooks, design or operational manuals, research publications, information summaries, magazine articles, or papers presented at various professional meetings, symposiums, and seminars. These publications are often authored by recognized experts in the field of transportation engineering, or "sanctioned" by professional organizations or research facilities, including the following.

TRB - Transportation Research Board

On November 11, 1920, after a series of preliminary meetings and conferences, the National Research Council, at the request of the U.S. Bureau of Public Roads (now the Federal Highway Administration), the state highway departments, the American Society of Civil Engineers, and a number of highway oriented organizations and educational institutions, created the Advisory Board on Highway Research. Four years later, the name was changed to the Highway Research Board.

The Board was established as an arm of the private and nonprofit National Academy of Sciences because of the Academy's reputation for objectivity and ability as a scientific advisory body to the govenment. The Board today, as when it was established, is a nongovernmental organization although its ties with government on all levels have been strong through the years.

During the late 1960s, the HRB expanded its scope to permit the development of a broader program encompassing consideration of other modes of transportation and the interactions of transportation with the other aspects of society. The Board's name was changed in March 1974 to the Transportation Research Board, giving official recognition to the increased emphasis on a balanced approach to transportation problems.

The work of the Board involves both technical matters and policy issues. Often the Board acts as an objective source of facts on which others may base policy. At other times, the Board creates expert panels to conduct studies and make recommendations on policy issues when the need for such action is clear and where the issue is within the Board's sphere of expertise.

Editor's Note:

TRIS is a computerized information file sponsored by the Federal Highway Administration, the highway departments and departments of transportation of the 50 states, District of Columbia, and Puerto Rico and by the Urban Mass Transportation Administration, and the National Highway Traffic Safety Administration of the U.S. Department of Transportation. Other TRB sponsors, including the Motor Vehicle Manufacturers Association, the National Asphalt Pavement Association, the U.S. Corps of Engineers and the Association of American Railroads also provide TRIS financial support. The TRIS file contains information on various modes and aspects of transportation including planning, design, finance, construction, maintenance, equipment, traffic operations, management, marketing and other topics. The file, now containing over 300,000 records, may be accessed in a variety of ways. Online dial-up access is provided through a commercial service, DIALOG Information Service, Inc. Telephone inquiry response is provided by the TRIS staff as an alternative to online access. In addition, three printed abstract bulletins produced from the TRIS file provide modal information access: Highway Research Abstracts (formerly TRIS Abstracts), Urban Transportation Abstracts, and Highway Safety Literature.

The TRIS Library collection includes approximately 18,000 books and reports as well as 350 subscriptions to current transportation journals with a modal emphasis on highway transportation and public transit. A significant amount of information is maintained on other modes as well. The TRB Library is the primary source for all TRB publications TRB's unique position of leadership in the transportation field gives the TRB Library access to the broad network of organizations and individuals affiliated with TRB. These provide the library with an excellent source of referral to supplement its internal information resources.

NCHRP - National Cooperative Highway Research Program

In 1962, the Transportation Research Board was assigned direction of the National Cooperative Highway Research Program under which the NCHRP staff administers contracts for research on specific topics selected by AASHTO. Results are published in a series of NCHRP REPORTS, NCHRP SYNTHESES, NCHRP RESEARCH RESULTS DIGESTS, and NCHRP LEGAL RESEARCH DIGESTS.

AASHTO - American Association of State Highway and Transportation Officials

The American Association of State Highway Officials was established in 1914 as an association of state, territorial, and District of Columbia highway departments and the Federal Highway Administration. In 1973, its name was expanded to bring in state departments of transportation. Officials of these agencies govern its operations. Engineering activities are carried on through standing committees which, among their other duties, prepare specifications, manuals, and standards representing current practice.

Publications of AASHTO include, among others, TRANSPORTATION MATERIALS (SPECIFICATIONS AND TESTS), SPECIFICATIONS FOR HIGHWAY BRIDGES, GEOMETRIC DESIGN POLICIES; and numerous other guides and policy statements. All these works are authoritative.

The association also publishes the AASHTO Quarterly. It reports on current highway and transportation subjects and reflects trends in thinking and legislation.

FHWA - Federal Highway Administration

The Federal Highway Administration is the agency within the U.S. Department of Transportation designated by Congress to administer most of the highway programs of the federal government. It was created in 1893 as the Office of Road Inquiry of the U.S. Department of Agriculture. For twenty years, under several names, its function was to gather available knowledge and to teach others how to build roads. It was the Post Office Appropriations Act of 1912 that gave the first assignment for actual road building; functions were further expanded by the Federal-Aid Highway Act of 1916. In 1918, it became the Bureau of Public Roads of the Department of Agriculture. Under a federal reorganization effective July 1, 1939, it was transferred to the Federal Works Agency and became the Public Roads Administration. In 1949, under another reorganization of the government, it was transferred to the Department of Commerce and again named the Bureau of Public Roads. In 1967, it was tranferred to the newly formed Department of Transportation. In 1970, the agency's name was changed to the Federal Highway Administration.

ITE - Institute of Transportation Engineers

The Institute of Transportation Engineers is an international, individual member, scientific and educational association. The purpose of ITE is to enable engineers and other professionals with knowledge and competence in transportation and traffic engineering to contribute individually and collectively toward meeting humans needs for mobility

and safety, and to promote professional development of members by the support and encouragement of education, stimulation of research, development of public awareness, exchange of professional information and maintenance of a central point of reference and action.

ITE's programs include publications, technical committees, professional development seminars, preparation of standards, training, and local, regional and international meetings.

Research Organizations

Various research organizations across the United States have conducted research in transportation engineering-related topics. Their findings are published and are normally available to the public. Two of the most recognized organizations are the Texas Transportation Institute (TTI) at Texas A & M University and the Institute of Transportation Studies at the University of California at Berkeley. Other universities having transportation research capabilities are the University of Texas at Austin, the University of Michigan in Ann Arbor, Penn State University, Georgia Tech University, North Carolina State University, and Purdue University. The Traffic Institute at Northwestern University has also been involved in transportation engineering research for many years.

This listing is by no means all-inclusive. Many other research organizations and universities can be used as a resource for identifying and providing helpful secondary information for highway tort-related lawsuits.

Available Information

What kind of information is available through these professional and research organizations? The answer is virtually anything desired. Research and traffic operational findings have been documented for so many years that very few topics remain untouched. Probably the most familiar publications are the design criteria manuals published by AASHTO. The latest manual is referred to as the "Green Book" and it is entitled A Policy on Geometric Design of Highways and Streets. (1) This 1984 publication essentially replaced the 1973 "Red Book", A Policy on Geometric Design of Urban Highways and Arterial Streets. (2), and the 1965 "Blue Book", A Policy on Geometric Design of Rural Highways. (3)

Other publications may be less recognized but are of similar importance, including the Guide for Selecting, Locating, and Designing Traffic Barriers, (4) also known as the "Yellow" Book. The Guide provides a considerable amount of information relative to the purpose of and warrants for traffic barriers.

There is no doubt that considerable transportation engineering-related research information is readily available if an individual knows where to look. Once found, how can it be used in the defense of a tort lawsuit? The next three sections of this report provide some guidance for using this information in respect to three general areas: roadway design, roadway operations, and human factors.

Roadway Design Considerations

In a tort suit, proof of negligence must be clearly demonstrated by the plaintiff. One of the most effective methods to establish this proof is to show how the public entity failed to design, maintain, or operate the roadway according to recognized standards, operational procedures, or policies.

Although clearly identified as design criteria "policies" or "guidelines", the aforementioned "Blue" (3) and "Red" (2) Books have been consistently accepted by the courts as the "nationally recognized standards" for highway and street design. The 1984 "Green Book" essentially replaces the "Blue" and "Red" Books. Hence, it is sure to be touted as the latest edition of the "nationally recognized design standards" for highway and street design.

The "Green Book" is a collection of design criteria pertinent to the time of its writing (1984); hence, the publication is considered as representative of the "state-of-the-art" design criteria. It must be emphasized that the "Green Book" is not a publication of design standards. The forward of the book clearly states that "the intent of this policy is to provide guidance to the designer by referencing a recommended range of values for critical dimensions. (1) (Emphasis added) The "Green Book", therefore, does not present a series of precise roadway design standards. Instead, the "Green Book" can be defined as a policy (which is included in its title) of design guidelines which recommends various ranges of dimensional values for consideration in design.

A common argument by the plaintiff in a tort case is that the roadway in question did not meet "current" design standards. This statement is often true. Most older roadways do not have the wide travel lanes, wide stabilized shoulders, or the bridge widths currently identified in the ranges of design values in the "Green Book". Again, the forward of the "Green Book" clearly addresses this argument in the following statements:

> "The fact that new design values are presented does not imply that existing streets and highways are unsafe. . . . This publication is intended to provide guidance in the design of new and major reconstruction projects. It is not intended as a policy for resurfacing, restoration, or rehabilitation (R.R.R.) projects". (1)

It must be emphasized that as design standards change, there is no requirement to reconstruct all roadways to meet the new standards. Such a requirement would be impossible to satisfy. No roadway would ever be completed because all roadways would have to be constantly upgraded. Furthermore, the funding requirements would be absolutely incredible.

For the reasons stated above, there is no sound reasoning why roadways should be consistantly upgraded to satisfy changing design criteria. A good illustration of this principle can be described as follows. Suppose a city desires to require that from henceforth, all residences would be required to have a 30-foot setback from the property line instead of the 25-foot setback established by the city ordinance. Does it make sense to require all residences having a 25-foot setback to be relocated an additional five feet away from the front property line?

Another good illustration is found in the automotive industry. Even though new safety design features are constantly being developed, the automakers do not recall all their vehicles back to the manufacturing plants for reconstruction every time a new design standard is introduced. Of course, on occasion the automaker has to recall some of its automobiles to correct some deficiency. In similar fashion, many departments of highways in various states have installed breakaway signs as replacements to "fixed" roadside signs, and have installed crash cushions (attenuation devices) in freeway gore areas to protect drivers of out of control vehicles.

The plaintiff's argument that the roadway in question did not meet current "standards" is best countered with the statements in the forward of the "Green Book" itself. In support of the government entity's defensive position, the "Green Book" can be used to illustrate that the roadway involved in the litigation actually met "current" design criteria and guidelines specified in the 1984 publication. The fact that a roadway design in the 1950's satisfies the state-of-the-art design criteria manual ("Green Book") is strong supportive evidence that the public entity is building and maintaining modern roadways.

Roadway Operations Considerations

Tort lawsuits related to roadway operations normally concern alleged deficiencies of traffic signals, signs, and markings. Standards and guidelines for the use of the traffic control devices are found in the state's adopted version of the Manual on Uniform Traffic Control Devices (MUTCD). (5) It is important to understand that the "requirements" for installation of traffic control devices are based on uniformity of application. Uniformity essentially means that the same type of device should be used for the same type of roadway condition, thereby encouraging drivers to develop and maintain driver expectancies.

The MUTCD uses the terms "shall", "should", "may", and "intended for use" to demand or suggest specific applications of traffic control devices. The "shall" condition is mandatory and should not be violated. ("The STOP sign shall be an octagon...") (5) The "should" condition indicates a strong recommendation for application but it is not a mandatory condition. At the same time, there should be a logical reason for not following the "should" condition. ("Where two main highways intersect, the STOP sign or signs should normally be posted on the minor street...") (5)

The term "may" is permissive and does not connote a recommended action. (A STOP sign beacon may be used in conjunction with a STOP sign...") (5) The term "intended for use" essentially is considered to be a general guideline but by no means is it considered as a mandatory or recommended condition. ("The Curve sign is intended for use where engineering investigations of roadway, geometric, and operating conditions show the recommended speed on the curve to be in the range of 30 to 60 miles per hour and equal to or less than the speed limit established by law...") (5)

Quite often, the plaintiff contends that the absence of a "proper" or "required" sign was the proximate cause of an accident and that the absence of said sign was a violation of the MUTCD. In reality, the absent sign may be one in the MUTCD that is to be applied to a "may" or "intended for use" condition and whose absence is not a violation of the MUTCD. It may be imperative to discuss the purpose and intent of the MUTCD to support the defensive positiion of the governmental entity.

"Warrant" is another term used in the MUTCD that is often used improperly. Often a plaintiff contends that a STOP sign or a traffic signal was "warranted" and the governmental entity was negligent for <u>not</u> installing the warranted STOP sign or traffic signal. In reality, warrants are used by engineers as devices to assist them in making a decision. Warranting conditions generally mean that "when certain conditions are met, installation of a STOP sign or traffic signals (for example) <u>may</u> be considered desirable." (5)

Even when warranting conditions are met, there are <u>no</u> "shall" statements or requirements for installation of the warranted traffic control device. The MUTCD specifically states:

> "Traffic control signals should not be installed unless one or more of the signal warrants in this Manual are met. Information should be obtained by means of engineering studies and compared with the requirements set forth in the warrants. If these requirements are not met, a traffic signal should neither be put into operation nor continued in operation (if already installed)." (5)

In simpler words, traffic control devices should not be installed unless warrants established for their installation have been met. Conversely, if warrants for their installation are met, there is no mandatory requirement for their installation. Engineering judgment must be used to determine if the installation of the traffic control device is the best solution for the existing problem. Other alternatives are available and some other improvement may be considered preferable.

Maintenance and construction sites have a high risk of litigation because it is convenient to blame an accident on the fact that the roadway was not "normal" and that the driver was confused when he entered the work zone. The motorist information system is very important in a work zone because this is the method used to provide the necessary warning and guidance to the motorist. Considerable research in this area has led to a vast array of recommended practices.

Traffic control devices used in work zones should be brief and simple to understand. Too much warning or too much information, a condition often defined as a requirement by plaintiffs, is actually a detriment to the motorist. Too much information has a tendency to confuse the motorist rather than help him. The MUTCD provides a listing and description of appropriate signs and guidelines for placement of traffic control devices in work zones so that appropriate guidance and warning is provided. Once again, engineering judgment is required to determine how those appropriate traffic control devices should be placed.

Two roadway conditions which are often described as "proximate causes" of accident occurrences are potholes and edge drop-offs. The simple fact that either a pothole or an edge drop-off condition existed often leads to an oversimplified conclusion that the condition must have caused the accident. Research findings, however, have placed potholes and edge drop-offs in proper perspective.

An August, 1983, Texas Transportation Institute report entitled, "The Influence of Roadway Surface Holes on the Potential for Vehicle Loss of Control", (6) states that:

> "It is apparent that a hole must be realtively large to constitute a significant safety influence when rim or tire damage are the guiding criteria. At common highway speeds, in excess of 40 mph, a hole must be in excess of 60 inches long and three inches deep to constitute a threat to the smallest automobiles. On urban streets, with traffic speeds as low as 20 mph, holes must still be over 30 inches in length and over three inches deep to have the potential of damaging tires and/or rims."

In simpler terms, vehicles are operationally influenced only by large potholes; small potholes provide no more than a slight bump for motorists. A motorist who claims that he hit a pothole (normally a small one) and that the impact threw his vehicle off of the roadway or flipped it over probably has not portrayed the facts. He may have driven off of the roadway to avoid hitting the pothole. In that case, the driver has initiated the run-off-the-road maneuver, rather than being "thrown off" by the pothole.

Edge drop-offs have been addressed at length in a 1982 Texas Transportation Institute publication entitled "Pavement Edges and Vehicle Stability -- A Basis for Maintenance Guidelines". (7) A typical edge drop-off accident, as described in the publication, involves a vehicle going off the right side of the pavement, and when the driver attempts to return to the roadway, the inside of his vehicle's right front tire rubs against the side of the exposed pavement. This rubbing of tire against the pavement is called "scrubbing". The driver continues to turn his steering wheel to the left in an attempt to overcome the "scrubbing" action, and when the tire eventually mounts the drop-off, it is turned counterclockwise or to the left. The vehicle immediately swerves to the left, possibly past the centerline or completely out of control. Whatever occurs after this depends on many factors, but serious results are possible.

In order for this "scrubbing" action to occur, two factors must be present. First, the length of the pavement drop-off must be sufficient so that the driver makes a concentrated effort to return to the roadway. If a short section of pavement drop-off is present (e.g., 25 feet), the motorist will travel through the section so fast that he will be unable to begin the scrubbing action. However, the depth and slope of the drop-off is even more critical. Drop-offs have to be essentially like a tabletop (90 degrees) and at a depth of about four inches before the condition is considered to be of "questionable" safety. Drop-offs at angles of about 45 degrees can be much greater without creating a drop-off problem.

Vehicles that travel off of the roadway on the right side and have an accident, but never re-enter the paved roadway surface, have not been affected by a drop-off condition. Drop-offs do not exert any force on a vehicle in a lateral direction from the roadway surface; consequently, the drop-off could not have influenced the accident. It was simply present at the time of the accident.

Human Factors

In describing the factors contributing to his accident, a plaintiff will often present a scenario that is a physical impossibility or unrealistic compared to a typical motorist. Human factor elements, which have been identified and studied for many years, become very important aspects of the case. Too often they are taken for granted or overlooked.

A driver's reaction time is often defined as about 0.75 seconds. This may be true if the driver is poised and ready to respond to an emergency situation. Motorists normally drive in a more relaxed manner calmly scanning the environment for information. When traveling in this fashion, the motorist will not respond as quickly; normally, 1.0 to 1.5 seconds are required before the motorist can respond to an emergency situation. Some motorists will require even more time.

Plaintiffs sometimes described their actions before impact in extensive detail, indicating that a substantial amount of time was taken to attempt to avoid the accident. However, facts at the scene will often refute the testimony because accidents normally occur within a few seconds and little time is available for a motorist to attempt accident avoidance. A good example of such testimony would be a plaintiff's claim that he struggled to mount a 25-foot-long drop-off for several seconds while traveling at a speed of about 55 mile per hour. At that speed, the driver would travel the 25-foot length of the drop-off in about 0.3 seconds. He would not have time to even respond to the condition much less struggle through it.

The affect of alcohol on a driver is often ignored at the time of trial. Regardless of the measured blood alcohol content (BAC) or evidence that a strong smell of alcohol was noticed at the scene of the accident, the "affected" driver is assumed to have all the driving capabilities of the normal driver. He is assumed to have typical reaction times, to think logically, to make rational decisions, and to be physically coordinated. Nothing could be farther from the truth.

Considerable research has been conducted on the effects of alcohol on drivers and the results have been very consistent. Drivers are negatively influenced by even a small amount of alcohol in their bloodstream. There is no doubt that virtually all drivers at BAC levels of 0.05 percent cannot drive safely, even though the legal limit of intoxication is 0.10 percent in most states. Alcohol causes reaction times to increase, deteriorates motor skills, interferes with the logical thinking process, causes night blindness, and increases the chances of a driver becoming distracted. At certain BAC concentrations, drivers will drive faster than normal, accelerate when they should stop, and stop when they should accelerate.

Considerable attention should also be given to the condition of the driver at the time of the accident. His emotional condition (anger, depression, fear, etc.) and his physical condition (ill, fatigued, on medication, etc.) may be important from an accident reconstruction approach. Considerable amount of information addressing those conditions is available through various research sources.

Sample Case

A 1986 highway tort lawsuit in the state of Louisiana provides an excellent example of using research findings for defense. The case evolved from a nighttime, single-vehicle accident on a rural two-lane Louisiana highway. The driver of the vehicle (the plaintiff) claimed that as he drove his vehicle around a curve to the left at the speed limit, he struck a 24-inch diameter pothole which forced his vehicle to the right. As his vehicle reached the edge of the roadway, a 6-inch drop-off was encountered.

The right front tire of the vehicle supposedly dropped off the pavement, and the "force" of the vehicle downward supposedly caused the vehicle to strike the pavement edge. The impact supposedly broke the right, front tie rod. The driver indicated that he lost complete control of his vehicle at that point and the vehicle veered to the right and struck a pile of shells left by a state maintenance crew. The vehicle supposedly flipped and rolled over as a result of the impact. The driver was thrown out of the vehicle and suffered serious and permanent injuries.

The investigating officer reported that the vehicle entered the curve at an excessive speed and essentially "straightened out the curve". Out of control, the vehicle struck a ditch which "ran" essentially perpendicular to the roadway, and then began to flip and roll over. The driver "smelled strongly" of alcohol, but a "legal" BAC test was not conducted due to time constraints.

Accusations by the plaintiff included the state of Louisiana's and the parish's failure to properly warn of the curve, to properly warn of the drop-off, and to properly maintain the roadway surface. More specifically, the alleged 6-inch edge drop-off condition was identified as the proximate cause of the accident. In presenting his case, the plaintiff provided witnesses (friends) to the accident who verified the presence of the pothole and the edge drop-off condition. Furthermore, witnesses (friends) who had seen him shortly before the accident assured the court that the plaintiff was not "drunk" and was capable of driving carefully and safely. An expert witness testified that his investigation and analysis of the accident site and of the information relative to the accident supported the contentions of the plaintiff.

The state of Louisiana and the parish utilized its own investigators as well as its own expert witnesses in examining the accident site and available information relative to the accident. The site investigation revealed logical findings which strongly supported the opinions and comments of the investigating police officer.

There was no question that the vehicle simply did not negotiate the curve and struck the ditch. No other explanation was plausible. No

concrete evidence (a photograph for example) including the officer's investigative report "proved" that either a pothole or an edge drop-off condition existed at the time of the accident. In fact, the only photograph of the accident scene introduced at the time of trial included a view of the wrecked vehicle and the roadway slightly "downstream" from the vehicle. No indication of an edge drop-off could be found when viewing the photograph.

Efforts prepared for defense of the suit involved development of facts and opinions to support and "prove" that the accident occurred as suggested by the investigating police and to refute the claims and opinions of the plaintiff and his witnesses. Attention was given to these critical case issues:

1. Alcohol impairment;
2. Pothole involvement;
3. Edge drop-off involvement;
4. Tie rod breakage;
5. Vehicular dynamics; and
6. Signing.

State-of-the-art information for the first three topics were obtained from available literature. An AIRS search for publications addressing the effects of alcohol and other drugs on drivers identified over 100 readily available references. Review of about one-half of those references revealed a considerable amount of useful information. A report based on this information was prepared to describe in detail the effects of alcohol on drivers. Emphasis was placed on the facts that drivers under the influence of alcohol suffer from nighttime visibility problems, have difficulty negotiating curves, have deteriorated motor skills, and have a significantly higher risk of an accident than a sober driver.

More importantly, a large number of research publications were consistent in reporting that even <u>one</u> drink of an alcoholic beverage negatively affects a driver and that additional alcoholic intake rapidly worsens his condition. The reports further support the fact that most drivers at a BAC level of 0.05 percent (much below the 0.10 percent legal limit of intoxication) are not capable of driving safely. Heavy drinkers may be able to drive more safely at the 0.05 percent BAC level than social drinkers because they are more conditioned for it. The plaintiff admitted to having drunk enough beer within a period of time so that a 0.05 percent BAC was feasible. He also indicated that he was a social drinker. Therefore, he virtually admitted to the fact that he was in no condition to drive safely.

The publication entitled "The Influence of Roadway Surface Holes On The Potential For Vehicle Loss Of Control" (<u>6</u>) was used to address the influence that the "alleged" pothole would have had on the accident. Research findings reported in the publication clearly indicated that a

vehicle traveling at a speed equal to the plaintiff's admitted vehicle speed would have to hit a pothole approximately 60 inches in diameter and 6 inches deep before the vehicle's movement would have been affected. The alleged pothole was only 24 inches in diameter. Impact with much smaller potholes would have resulted in a slight noise and mild bump, but vehicular movement would not have been affected. The plaintiff never indicated that he saw the pothole or attempted to avoid it. Hence, the alleged pothole would not have influenced the movement of the plaintiff's vehicle.

The publication entitled "Pavement Edges and Vehicle Stability -- A Basis for Maintenance Guidelines" (7) was used to address the alleged drop-off condition. The plaintiff's vehicle never re-entered the roadway after leaving the pavement on the right side; therefore, the accident was not the typical "edge drop-off" accident. There was no indication that scrubbing had occurred. Hence, primary emphasis was placed on the broken tie rod theory.

Prior to the trial, several vehicles of the same year, make, and model as the plaintiff's were found and inspected in the city of Metarie, Louisiana. The clearance between the ground and the right tie rod was measured for each vehicle. The vehicles' undercarriages were also inspected to determine which parts of the vehicle would be struck if the vehicle would have "eased" off a six-inch drop-off.

It was determined that the clearance distance between the ground and the tie rod were consistently in the vicinity of 5.5 inches. Furthermore, approximtely 0.5 inches above the tie rod was the frame of the vehicle, an extremely strong structural member. Hence, it was obvious that if the tie rod had been struck on the pavement, it could have only moved about 0.5 inches before the frame would have been struck, taking the full force of the blow.

Approximately 40 wrecker companies in the Houston area were interviewed by telephone and asked if a single vehicle, run-off-road accident normally resulted in a broken tie rod. The responses were inconsistent. Some indicated that it was common, others indicated that it was rare. When asked to describe an accident which usually resulted in broken tie rods, the answers were very consistent. A single vehicle striking a curb or ditch at a high angle or sliding sideways usually had a broken tie rod. Hence, the plaintiff's accident as defined by the investigating officer was the type in which a broken tie rod would be an expected result.

A tie rod assembly unit from the same year, make, and model vehicle as the plaintiff's was purchased from an automobile junkyard. The tie rods were removed and tested for breaking strength. The findings indicated that a force of about 18,000 pounds per square inch (psi) was required to bend the rod, and a force of about 120,000 psi was required to break the rod.

The force which would have been placed on the plaintiff's vehicle tie rod if the vehicle had "eased off" a 6-inch drop-off was computed using the basic laws of physics. The results indicated a force of approximately 16,000 psi. Hence, the alleged impact on the plaintiff's vehicle's tie rod was less than what was necessary to even bend the rod, and significantly less than what would be required to break it. The findings indicated that the broken tie rod theory was ridiculous.

The plaintiff also testified that he had no control of his vehicle after his tie rod broke. Actually, the loss of one tie rod does not prohibit the driver of an automobile from controlling his vehicle because he can continue to turn the other front tire. Loss of both tie rods would prohibit the driver from being able to steer his vehicle. When a tie rod breaks, the "loose" tire will continue to follow the path of least resistance and essentially turn in unison with the controllable tire.

This concept was illustrated at trial using a battery-operated car. The front right tire of the toy car could be disconnected from the steering mechanism, in the same fashion as a tire is disconnected from a vehicle's steering mechanism when a tire rod is broken. The toy car was "steered" inside the court room with the front right tire attached and with the front right tire disattached. No difference in operational movement between the two conditions could be detected.

After addressing (and negating) the accusations of the plaintiff, the defense presented its explanation of the accident occurrence. The roadway curve had a proper warning sign consistent with the requirements of the MUTCD. (5) An advisory speed plate was also installed to encourage vehicles to slow down while traveling around the curve. Because there were no potholes or an edge drop-off condition, no additional warning devices were required.

The plaintiff apparently was influenced by alcohol (by his own admission) which slowed down his reaction times, affected his motor skills, and "encouraged" him to travel faster than normal around the curve. The plaintiff entered the curve too fast, traveled off of the roadway on the right side, and struck the ditch at an angle, which sent his vehicle into a vault and roll-over maneuver. The tie rod probably broke on impact. The plaintiff was thrown through the windshield of the vehicle, out of the vehicle, and suffered serious injuries.

The court agreed with the defense. No negligence was found on the part of the state or the parish.

Summary

This paper has attempted to discuss the importance of research results and other secondary information in the development of a tort lawsuit defense. There is a considerable amount of information available to the public that can be used to describe the highway engineering state-of-the-art, and to explain how roadways are designed, operated, and maintained. This information is helpful to explain the facts of a lawsuit, and to justify the decisions made by the public entity relative to its roadway's condition. After all, the facts of the lawsuit are much more important than theories and opinions. Juries and judges are certainly more influenced by factual information that they can understand rather than by unfounded innuendo.

As discussed in the sample case, it is important to pursue the facts in a diligent and thorough manner. Every theory or opinion stated by the plaintiff was analyzed in detail and then completely refuted with facts and research findings. This secondary information was invaluable in the sample case, and it will prove equally valuable in virtually every highway tort lawsuit defense.

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