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Trial Strategy and Techniques in Enforcing Laws Relating to Truck Weights and Sizes

A report prepared under ongoing NCHRP Project 20-6, "Legal Problems Arising Out of Highway Programs", for which the Transportation Research Board is the Agency conducting the Research. The report was prepared by Watson C. Arnold. Robert W. Cunliffe, TRB Counsel for Legal Research, was principal investigator, serving under the Special Technical Activities Division of the Board at the time this report was prepared.

THE PROBLEM AND ITS SOLUTION

State highway departments and transportation agencies have a continuing need to keep abreast of operating practices and legal elements of special problems in highway law. This report deals with the enforcement of load limit violations by overweight trucks through injunctive relief against the persons or corporations who load or unload the vehicles as well as the truck operators.

This paper will be included in a future addendum to a text entitled, "Selected Studies in Highway Law." Volumes 1 and 2, dealing primarily with the law of eminent domain, were published by the Transportation Research Board in 1976; and Volume 3, dealing with contracts, torts, environmental and other areas of highway law, was published in 1978. An addendum to "Selected Studies in Highway Law," consisting of five new papers and updates of eight existing papers, was issued during 1979, a second addendum, consisting of two new papers and 15 supplements, was distributed early in 1981, and a third addendum consisting of eight new

papers, seven supplements, and an expandable binder for Volume 4 was distributed in 1983. The text now totals more than 2,200 pages comprising 56 papers. Copies have been distributed to NCHRP sponsors, other offices of state and federal governments, and selected university and state law libraries. The officials receiving copies in each state are: the Attorney General, the Highway Department Chief Counsel, and the Right-of-Way Director. Beyond this initial distribution, the text is available through the TRB publications office at a cost of $90.00 per set.

CONTENTS

Introduction. 3
New Theory of Civil Prosecution 5

Trial Strategy and Techniques in Enforcing Laws Relating to Truck Weights and Sizes

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INTRODUCTION

Every state in the United States is burdened with the problem of dealing with the overloaded trucker. So flagrant is the violation of the load limit law that the law enforcement agencies are unable to cope with the situation. Law enforcement offices charged with enforcing the statutes against overweight loads on the highways are overwhelmed by the magnitude of the job and by the absolute blatant disregard of the law by some carriers.

So bad has the situation become that the legal carriers, the highway departments, and citizens generally have called on the attorney general of the various states to use his powers as the legal officer and representative of the people to stop this continuous violation of the statutes.

The question then arises as to what authority and in what manner may the attorney general prevent the widespread operation of truckers hauling on the public roads with loads in excess of the legal weight limits.

Texas has been one of the more successful states in handling this problem. The Attorney General of the State decided that the way to approach the problem was by way of the civil route rather than the criminal route, namely, by the seeking of injunctive relief against the persons or corporations who load or unload the overloaded vehicles as well as the operators of such vehicles.

The attorney general in conjunction with the Department of Public Safety, the Highway Department, and the local county and district attorneys can seek injunctive relief against the persons or corporations who are involved in putting the overloaded trucks on the state highways on the legal principle that such persons or corporations are either principals to the crime of overloading or else such persons or corporations are aiding or abetting such criminal acts. It must be remembered that in misdemeanors there is no distinction between principals and accomplices. *Cozine v. State*, 87 Tex. Cr. R. 92, 220 S. W. 102; *Stone v. State*, 133 Tex. Cr. R. 527, 112 S. W. 2d 465; *Cooper v. State*, 179 S. W. 2d 578 (1943).

Filing injunctions against the firms is much simpler than trying to catch the individual hauler. The firms are stationary and, further, have much better records than does the average truck driver. Taking everything into consideration, the loading or unloading firms are making money off the overloaded trucks as well as the driver of such trucks. The firms that are overloading the trucks are getting paid by the pound, thus the more they put on the truck the more money the trucker pays them. The firms accepting overloaded trucks are paying for the merchandise by the pound, and, therefore, the more pounds on a load the quicker their coffers are filled. Thus, these firms are benefiting monetarily from the overloaded trucks.

Many of the states have made studies on the problem of why the truckers continue to violate the overweight laws. These studies have been compiled and analyzed in the Federal Highway Administration booklet called *Overweight Trucks — The Violation Adjudication Process, Umbrella of Compromise* (July 1985).

All the papers on this subject come to the same conclusion, namely, that (1) the state criminal law or fine is not high enough to make the overloading unprofitable, (2) the local county or precinct judges cooperate with the truckers rather than with the state law enforcement officers, and (3) local county officials who are supposed to prosecute the cases, the local district attorneys or county attorneys, do not have time to tend to the overload cases, such cases being minor matters as compared to the murder, robbery, rape, and other criminal cases they have to handle. These three elements are the major reasons the overloaded truckers run rampant over the highways. Thus, if a person is to succeed in stopping the overloaded trucker, he must find a way that either avoids these three elements or in some way negates them. The technique set out in this paper answers all three of the foregoing negative complaints. Furthermore, it evades the element of delay in bringing the case to trial and the delay in the appellate process. This is because the method is in no way affected by how long it takes to try the case since the trucker is under an injunction not to overload until the case is disposed of on its merits. The trucker is under court orders to remain legal until the case is tried, which puts the trucker in the position of pressing for a trial rather than the state.

Many attorneys hesitate to ask for an injunction to prohibit the violation of a criminal act because of the age-old maxim that "a court of equity will not interfere with the violation of a criminal law." This maxim is a true quote of the common law; however, there are some exceptions.

A case directly in point and one involving a traffic law similar to the overloading law is the case of *Iowa v. United-Buckingham Freight Lines, Inc.*, 211 N. W. 2d 288, Sup. Ct. Iowa (1973). This case involved a request for an injunction to prohibit the defendant, an interstate common carrier, from violating a misdemeanor statute prohibiting double-bottom trucks more than 60 ft in length from operating on Iowa highways. The Polk District Court granted the injunction and the defendant appealed.

The defendant in the Iowa case, *supra*, had received 1,730 violations over a 15-month period, thus showing that the criminal law was not sufficient to stop this defendant from violating this particular Iowa misdemeanor statute. In upholding the trial court's granting of the injunction the Supreme Court of Iowa held,

> . . . [T]he determinative issues are whether a court of equity can enjoin violation of a traffic law which a defendant has repeatedly and intentionally violated and, if so, whether in this case it should do so. Clearly, conduct amounting to violation of a criminal statute can in a proper case

be enjoined. Defendant's contrary assertion is untenable.

(4) We also believe Sec. 321.457(6) is the kind of statute which regulates conduct subject to equitable jurisdiction. It is a traffic law enacted under the legislature's police power to promote public safety and welfare. Specifically, as a statute limiting the length of trucks on our highways, it is intended to keep the highways safe for other motorists. See *Wood Brothers Thresher Co., v. Eicher*, 231 Iowa 550, 560, 1 N. W. 2d 665, 660 (1942).

(5) It is not part of the State's burden to establish that the legislative policy manifest in the statute is justified or that defendant's repeated deliberate violations did in fact cause accidents. We recently said, "The State has an interest in seeing that the law is not continually violated. Where a statute is openly, publicly, repeatedly, continuously, persistently and intentionally violated a public nuisance is created." *State ex rel. Turner v. Younker Brothers, Inc.*, 210 N. W. 2d 550, 564 (Iowa 1973). The public is injured when the integrity of the statute is thereby undermined. Whether such conduct is denominated a public nuisance or not, the need for equitable intervention may thus be established. The label is not controlling. *State ex rel. Beck v. Basham*, 146 Kan. 181, 186, 70 P. 2d 24, 26-27 (1937), and citations; see also *National Ass'n of Let. Car. v. Independent Post S. of A. Inc.*, 336 F. Supp. 804 (W. D. Okl. 1971); *Planning and Zoning Com'n v. Zemel Brothers, Inc.*, 29 Conn. Sup. 45, 270 A. 2d 562 (1970); *Montana Milk Control Board v. Rehberg*, 141 Mont. 149, 376 P. 2d 508 (1962).

The record demonstrates a threat of irreparable injury in that Sec. 321.457(6) "does not offer a speedy, adequate remedy at law to prevent the practice(s) detailed here." *State ex rel. Turner v. Younker Brothers, Inc.*, supra, 210 N. W. 2d at 565; see *Planning and Zoning Com'n v. Zemel Brothers, Inc.*, supra; *State v. Hooker*, 87 N. W. 2d 337 (N. D. 1957). . . .

The cases recognize the fact that the attorney general has inherent authority to protect the general public interest of the state against everyone but the state itself.

Certainly, damage to the roadways, making the roadway deteriorate quicker, is of public interest. It is unquestioned that overloaded trucks are harder to stop than the ones with the legal loads, thus the overloaded truck is a danger to the traveling public all of which is of public interest. The public safety is directly affected by the overweight trucks in that the vehicles are unsafe when overloaded in light of braking ability, handling factors, equipment failure, and obstruction of traffic.

The criminal law remedy in most states is not adequate because the criminal penalties for overload violations are so minor as to have no deterring effect and, in fact, have become a price of doing business amounting to a license to overload. The attorney general of most of the states is mandated through the state constitutions and the common law to protect the public interest of the state as against private parties.

A public interest has been found in the prevention of fire insurance rates. *Queen Insurance Co. v. State*, 22 S. W. 1048 (Ct. Civ. App. Texas 1983), *rev'd* on other grounds; railroad reorganization and rates, *State v. Farmers' Loan and Trust Co.*, 81 Tex. 550, 17 S. W. 60 (1891); telephone rates, *State v. Southwestern Bell Telephone Co.*, 526 S. W. 2d 526 (Tex. Sup. Ct. 1975); and proper elections *Yett v. Cook*, 115 Tex. 205, 281 S. W. 837 (Tex. Sup. Ct. 1926).

In general, a court exercising equity jurisdiction does not have the power to enjoin a violation of the penal code. However, the court does have the power to enjoin an act that has a detrimental effect on the public interest, affects a property right, or would invoke equity jurisdiction in some other manner, notwithstanding the fact that the act enjoined is a criminal violation or a violation of statutes. *T & R. Associates, Inc., d/b/a/ Scarlett O'Hara's v. City of Amarillo*, 601 S. W. 2d 178 (CCA 1980), violation of zoning statute; *Gluck v. Texas Animal Health Commission*, 501 S. W. 2d 412 (Tex. Civ. App. 1973), brucellosis control; *Featherstone v. Independent Service Station Association*, 10 S. W. 2d 124 (Tex. Civ. App., Dallas 1928) (no writ), lottery; *International Brotherhood of Electrical Workers v. Southwestern Bell Telephone Co.*, 498 S. W. 2d 504 (Tex. Civ. App., Corpus Christi 1973) (no writ), violating electrical code; 43A C.J.S. Injunctions, §160.

The recent threat by the U.S. Department of Transportation that the states may lose substantial federal funds due, in part, to the widespread abuse of the weight limit laws as well as speeding laws, certainly should provide a substantial public interest for the attorney general to protect.

The prevention of damage to any state property is within the public interest. According to the AASHO Road Test at Ottawa, Illinois, *Highway Research Board Special Report 61* (National Academy of Sciences, 1962) established that it takes the passage of approximately 9,600 cars to equal the effect of the passage of one 80,000-pound truck, assuming maximum truck axle loading. Such exponential pavement damage factors dictate the implementation of a comprehensive vehicle weight enforcement program to protect highways and bridges from rapid deterioration.

It is a known fact, and a provable fact, that overweight in trucks causes extra deterioration to the roadways; however, to prove that a certain truck causes a certain amount of damage to a certain stretch of roadway becomes a rather burdensome element of proof. This proof takes an expert of the highest degree in weight and highway construction engineering. It takes this kind to testimony to get a civil injunction against businesses for being accomplices in overloading or accepting overloads from truckers. This type of technical testimony is not available to local county or district attorneys; thus, the civil injunction route must be accomplished by the State Attorney General. His accessibility to the Highway Department road engineers and the weight and measure personnel of the Department of Public Safety makes this testimony possible.

Because of modern science and computer techniques there are now a number of different methods to detect overloaded trucks.

With the increase of enforcement activities resulting from 23 U.S.C. 127, which sets forth the vehicle weight limitations for vehicles traveling on the national system of Interstate and defense highways, and with the passage of 23 U.S. Code 141, which section dictates that all the states must certify each year to the Secretary of Transportation that such state is enforcing the laws respecting maximum vehicle size and weight permitted on the federal and primary system or else have its apportioned

funds reduced, state and local agency trial attorneys have been plagued with judicial obstacles. Many judges suspend or dismiss outright bridge formula violations because of the complexity of the formula. Use of portable scales has resulted in judicial disputes on questions of certification of accuracy. Other issues where uncertainty exists include probable cause, elements of proof, proof beyond a reasonable doubt, judicial notice or the necessity to lay a foundation, and other aspects of trial or appeals technique.

Most of the 50 states have raised their load limits to 80,000 pounds. Of course, all of the states, regardless of their length laws, are bound by the rules laid down in the Surface Transportation Act of 1982, wherein the length question becomes moot.

Texas and a few other states have gone further than the normal transportation of overload statutes and have made it a misdemeanor for persons to cause a vehicle to be overloaded. This statute is aimed at the "pit operator." The Texas overload statute reads as follows:

> Article 6701d-11, 5(5)
> (b) No person shall load, or cause to be loaded a vehicle for operation on the public highways of this state with intent to violate the weight limitations in Subsection (a) of this section. Intent to violate those limitations is presumed if the loaded vehicle exceeds the applicable gross vehicular weight limit by 15 percent or more. This subsection does not apply to the loading or causing to be loaded of an agricultural or a forestry commodity prior to the processing of the commodity.

Some states have gone even further and made it a misdemeanor to accept overloaded vehicles.

The State Highway Departments have made it a standard practice not to accept overloaded vehicles on their job sites. However, in spite of all of these laws, overloaded trucks still run rampant over the highways of the country.

One of the foremost problems in enforcing the overweight laws is the fact that enforcement is left up to the local county attorneys or local law enforcement officials and the local courts. Neither the courts nor the county attorneys or local enforcement officials are amiable to prosecuting the local overloaded truckers. The proof of this fact lies in the statistics which show that in 1984 the Texas Department of Public Safety issued 34,000 tickets for overweight violations. Less than 10 percent of these tickets were prosecuted. In order for there to be effective relief from overloaded trucks, the prosecution or prevention measures must be unified and come from one source, which statewide would be the attorney general.

The Texas Attorney General's Office has been most successful in implementing a new theory of law enforcement relating to overloaded trucks. Also, enough time has elapsed since the theory of enforcement has been put into practice that it has had time to become an actual fact with court records and trials to prove its effectiveness.

The basic theory of the Attorney General's efforts to stop the overloaded trucks was to do so by the civil law rather than by the criminal law. By proceeding on the civil law theory the attorney general is vested with proper authority and with proper venue, whereas on the criminal law theory he would have neither authority nor venue.

Texas started to use this new approach in December 1984; by the end of June 1985, a mere 7 months, the overloaded truckers had paid the State over $1,300,000.00 in settlements and, according to Department of Public Safety figures, their law enforcement officers issued 8,000 less tickets in January of 1985 (the last statistics) than in January of the previous year, thus showing that truckers have begun to reform their way of doing business. The January statistics were the latest available. It is expected that each month the number of tickets issued will go down even more drastically. According to the Texas Department of Public Safety spokesman the number of tickets issued for overloading has been reduced by 31 percent since the new drive by the Attorney General, all of which is based on the new theory of civil prosecution as hereinafter outlined. This new approach consists of a series of steps that should aid the attorney general of the state in acquiring all the pertinent information involved in the prosecution. The charts provided in the discussion should aid the attorney in preparing his exhibits.

NEW THEORY OF CIVIL PROSECUTION

The Beginning

At the outset, by this new method to stop the overloaded trucker, the attorney general of the particular state involved should obtain from the Department of Public Safety a list of the 100 most flagrant violators. The list should begin with the company or person receiving the most tickets in the year, say 1983 (or whatever year is preferred), and grade down from there (see Figure 1). These violators will be the first to be sued. This method keeps down criticism as to how the defendants were chosen. It answers the political question, Why did you pick me? It shows fairness; the worst offenders were picked first. File on number one first and then go down the line. Treat everyone the same. In this way, one shows fairness and no political discrimination.

What type settlements will be made should also be decided beforehand. This writer suggests settlements based on the number of tickets or convictions and the average amount of the overload (see Figure 2). Thus, the state is again treating every defendant the same. The defendant's settlement figure is based on his own misconduct. If the same chart is used for everyone, no one has a valid complaint about favoritism. The chart shown in Figure 2 was prepared by the Texas Highway Department and is based on the damage done to the Texas highways because of overloaded trucks.

After the temporary injunction is issued most defendants will settle. As of this writing the State of Texas has collected $1,300,000.00 in less than 7 months in settlements. The main reason for these settlements is the cost of defending the case. Also, should the defendant lose the case, he will be confronted with about over a million dollars in damages because

TEXAS DEPARTMENT OF PUBLIC SAFETY
LICENSE & WEIGHT VIOLATOR LIST
REPORT COVERS JAN THRU DEC 1983

OWNER/LEASEE	TICKET #	CHGS	D.O.A.	CNTY	VIOL	C	PP	I.D.	LOC	ACT WGT	LEG WGT	DSP	FINE	COSTS	DOCKET #	OPERATOR
	766777	1	121083	149	42001	2	10	3229	3A	73700	69780	1	106.00	0.00	0000834747	
	687510	1	072083	088	42006	2	40	3786	3C	36780		1	30.00	0.00	0000000396	
	614122	1	042883	062	42001	2	10	3786	3C	77570	69310	1	88.00	0.00	0000009429	
	722564	1	051083	028	42006	2	20	4788	6B	37200		1	32.00	6.00	0000583025	
	662187	1	080283	027	42001	2	30	4337	6B	79400	68950		0.00	0.00	0000000000	
	718425	1	080183	015	42006	2	32	1166	3B	41600		5	0.00	0.00	0000330256	
	718415	1	072183	015	42006	2	31	1166	3B	37800		-	0.00	0.00	0003102008	
	718190	1	121283	089	42006	2	10	1180	3B	37720			0.00	0.00		
	658470	1	032583	089	42001	2	10	1110	3B	75700	71600	1	36.00	0.00	0000016406	
	656948	1	032583	089	42006	2	10	1180	3B	37120		1	31.00	0.00	0000016398	
	657743	1	052683	089	42001	2	40	1140	3B	80450	76700	1	31.00	0.00	0000001435	
	657745	1	052683	089	42001	2	40	1140	3B	75800	69700	1	36.00	0.00	0000001437	
	657746	1	052683	089	42001	2	40	1140	3B	79500	75620	1	31.00	0.00	0000001434	
	739852	1	101883	013	42006	2	10	3195	3C	35500			0.00	0.00		
	614191	1	052683	062	42001	2	10	3786	3C	77930	72190	1	63.00	0.00	0000009614	
	614123	1	042883	062	42001	2	10	3786	3C	77140	70160	1	75.00	0.00	0000009430	
	544565	1	012783	062	42001	2	10	3786	3C	79890	70100	1	103.90	0.00	0000008959	

TEXAS DEPARTMENT OF PUBLIC SAFETY
LICENSE & WEIGHT VIOLATOR LIST
REPORT COVERS JAN THRU DEC 1983

OWNER/LEASEE	TICKET #	CHGS	D.O.A.	CNTY	VIOL	C	PP	I.D.	LOC	ACT WGT	LEG WGT	DSP	FINE	COSTS	DOCKET #	OPERATOR

TOTAL CASES FILLED	000167
TOTAL CONVICTIONS	000141
AVG FINE (INCLUDES COURT COSTS	000053 71
TOTAL AMOUNT OVERWEIGHT	000964450
AVG AMOUNT OVERWEIGHT	005775 15

Figure 1. Chart illustrating two computer printout pages containing type of information furnished on weight violations. These pages are only a part of actual printouts issued by the Texas Department of Public Safety; the names of the truck owners and operators have been deleted from the original. (This figure in its entirety would constitute Exhibit 1.)

OVERWEIGHT ASSESSMENT

Amount overweight Pounds	Assessment per lb. Overweight Over gross weight	Over axle weight
0 - 2,000	$0.02	$0.03-axle overweight
2,001 - 5,000	0.03-gross overweight	0.04
5,001 - 8,000	0.04	0.06
8,001 - 12,000	0.05	0.08
12,001 - 18,000	0.06	0.10
18,001 - 25,000	0.07	0.12
25,001 +	0.08	0.14

Example - 3,000 lb. gross overweight; 2 axle vehicle; 50 convictions.

3,000 X .03 = $90.00 gross over weight assessment

$\frac{3,000}{2 \text{ axle}}$ = 1,500 X .03 = $45.00

$45.00 X 2 axles = 90.00 axle weight assessment

$90.00 + $90.00 = $180.00 for each offense

$180.00 X 50 Convictions = $9,000.00 settlement

Figure 2. Chart prepared by the Texas Highway Department illustrating basis for computing overweight assessment. (This figure would constitute Exhibit 2.)

he will be sued for the damage to the entire state system of highways. This damage figure alone poses a tremendous risk. The settlement figures are the easy and cheap way out for the defendants. So far, in Texas, no defendant has seen fit to try the case on its merit. The temporary injunctions have been contested, all to no avail. Also, the venue questions have been contested, all to no avail.

How To Stop The Overloaded Truckers

Step 1 — The Temporary Restraining Order

The first step in this lawsuit entails obtaining a temporary restraining order (TRO). At the time the state attorney goes before the judge with his pleading requesting a TRO, he must have with him his brief on "The Right of a Civil Court (Equity) to Enjoin for Violation of a Criminal Law." These cases have already been cited earlier in this paper. The court must be convinced that the general rule, to wit, "equity will not interfere with the enforcement of the criminal law" has many exceptions. This TRO to stop the overloaded trucks is one of them.

During the course of this pleading for the TRO, the attorney should show the judge the number of tickets the law enforcement officials have issued to the trucking company. The mere fact that the defendant has received a great number of tickets for overloading shows on its face that the present overweight law is incapable of stopping this company from overloading. It shows that the trucking company is paying fines on the same basis as gas and oil, inasmuch as the fines are classed as a cost of doing business. The judge should also be shown the printouts for the particular company that is being sued (as, for example, those shown in Figure 1). With this kind of evidence the judge should issue the TRO. The fact the TRO in all states must be heard in a short time (in practically all states not less than 20 days) is the first key to success in this endeavor. Time is of the essence in this proceeding.

The attorney for the state should then take his petition (see Figure 3) and the TRO (see Figure 4) signed by the judge to the court clerk or whoever in his jurisdiction issues citations and has the citations issued to the defendant. The sheriff or any other authorized official then serves the defendant.

From the day the defendant is served to the time of hearing, the trucking company is under the TRO not to overload. If the defendant does get a ticket for overloading during this time, its representative is guilty of contempt of court, which is a very serious matter in all jurisdictions.

Step 2 — The Temporary Injunction

After the TRO is issued and a time set for hearing thereon, the next step, and most important step, is the hearing as to whether or not the temporary restraining order is to be converted into a temporary injunction — the temporary injunction to last only until the case is heard and disposed of on its merits. The temporary injunction (see Figure 5) puts the trucker under a court order not to violate the law, to wit, not to drive overloaded vehicles on the state highways until its case is heard and disposed of by a court of law. Obtaining this temporary injunction is the most important step in the entire proceeding. If the temporary injunction is not obtained, the entire thrust of the state's proceeding is destroyed. Without the temporary injunction the trucking company will continue to violate the law, paying its fines, until the case is finally heard, which, considering the usual continuances, will be from 1 to 2 years from the date of service of citation. If the temporary injunction is granted, the defendant is on the defensive from the day the temporary injunction is issued to the day of the end of the trial on the merits. This could be a long time, depending on the court's docket. Instead of asking for continuances, the usual procedure, the defendant trucking company is pressing for trial so as to rid itself of the temporary injunction. If the defendant gets just one ticket during the temporary injunction, it is in contempt of court. This puts tremendous pressure on the trucking company.

It is at the temporary injunction stage or step that most cases break down. Most defendant lawyers know that if the state can win the temporary injunction, the odds are with the state that it can win the main lawsuit.

Why has the temporary injunction been so hard to obtain heretofore?

NO. _____

THE STATE OF TEXAS	I	IN THE DISTRICT COURT OF
	I	
V.	I	TRAVIS COUNTY, TEXAS
	I	
	I	_____ JUDICIAL DISTRICT

PLAINTIFF'S ORIGINAL PETITION

TO THE HONORABLE JUDGE OF SAID COURT:

COMES NOW the State of Texas acting by and through the State Department of Highways and Public Transportation, Plaintiff in the above-styled and numbered cause, and makes this, its Original Petition, complaining of and against , and for cause of action would respectfully show the Court as follows:

I.

Plaintiff, State Department of Highways and Public Transportation, is an agency of the State of Texas. Defendant, , is a corporation organized under and pursuant to the laws of the State of Texas which may be served with process by serving its registered agent for service of process, .

II.

Defendant, is in the business of loading and transporting certain materials and owns and operates a fleet of trucks on the State and Federal highways within the State of Texas for this purpose and also owns and operates a number of loading stations within the State. Defendant, acting by and through its agent and employees, has placed said trucks in service on State and Federal highways located within the State knowing that many of said trucks are loaded with overweight loads in violation of Tex. Rev. Civ. Stat. Ann., art. 6701d-11 and furthermore has from its loading chutes and docks caused overweight loads to be placed on trucks which Defendant knew were going to be driven on the highways and roadways of the State. Defendant, its agents, servants and employees have regularly placed, currently are placing, and will continue to place, in the future, overweight loads on Defendant's trucks and those trucks of other parties who load at Defendant's various loading docks.

III.

Such acts of overloading are of such nature to endanger the health, safety and welfare of the traveling public in that said overloaded trucks are unsafe and unfit for operation on the public highways. Additionally, said overloaded trucks caused the rapid destruction of said highways, not only greatly increasing the maintenance and reconstruction costs attributable to such highways, but also creating hazards and dangerous conditions.

IV.

Defendant is in the business of loading and transporting certain materials on trucks which travel along and over highways within the State of Texas. Defendant also owns and operates a number of loading stations within the State, from which stations and loading docks it loads trucks for transport of the various materials which the Defendant sells.

V.

Defendant corporation has been issued tickets for its violations of the statute aforementioned, but, nevertheless,

Figure 3. Example of plaintiff's original petition.

continues to weigh and load its trucks and trucks of others with overweight loads of sand, cement, and other materials for entry upon and travel on State-owned roadways, to the extent that at the present time the roads have been damaged in the sum of $1,000,000.00 as a direct result of this Defendant's deliberate overloading said trucks.

VI.

Plaintiff would show the Court that it is the owner of the Road and Highway System, in the State of Texas and that such roads and highways are constructed with base material and paved surfaces which are not designed for travel by motor vehicles weighing in excess of the legal limit and that loads in excess of this designated load limit cause excessive flexing of the paved surface, which flexing causes such paved surface to crack and permit water to enter the supporting base material of such road.

Plaintiff would further show that the combination of water and the excessive loads on the base material rapidly and inevitably causes the total destruction of the riding surface which would otherwise give years of maintenance-free service.

VII.

The public roads and highways are constructed with base material and paved surfaces, which are not designed to bear motor vehicles weighing in excess of the legal load limits, without additional loss in life of the road or highway over what would be expected if only legal limits were carried. The legal load limit varies depending on the design of the vehicle, but the gross weight may never exceed 80,000 pounds. Single axle loads cannot exceed 20,000 pounds and tandem axle loads cannot legally exceed 34,000 pounds. The carrying of loads in excess of any of these limits on such roads causes greater flexing of the surface than would be caused by legal loads. This flexing causes the surface to crack sooner than would be caused by legal loads and such cracks permit water to enter the surface and base material of such road. The inevitable result of the foregoing is a more rapid decrease in the design life and ultimate destruction of the road surface, which would otherwise give more years of service with minimal maintenance if subjected to only legal loads.

The danger to the traveling public and deterioration of the State and Federal highways, located within the State of Texas, which has in the past resulted, and will continue to result from Defendant's activities, created an immediate and continuing danger to the lives and the property of the public in its use of said roads and highways. The ability of the public to operate motor vehicles upon said highways with safety is substantially impaired by the activities of Defendant complained of herein.

VIII.

The conduct complained of by Plaintiff herein is continuing and causing irreparable harm to the health, safety and welfare of the traveling public for which the Plaintiff has no adequate remedy at law.

IX.

Defendant's activities constitute a nuisance per se as well as a public nuisance which the State has authority to sue to

Figure 3. Continued.

abate, in that the rights of the public have been invaded by the Defendant's repeated criminal law violation.

X.

The fact that Defendant has been cited and given tickets for overload violations shows that Defendant is a flagrant law violator and as such must be restrained. The repeated acts of this Defendant show its utter disregard of the civil and criminal law of this State. There is no remedy to stop this Defendant except by way of injunction.

XI.

To the date of filing hereof the conduct of Defendant has caused damages to the State and Federal highways of the State of Texas in excess of the minimum jurisdictional limits of this Court in an amount not less than $1,000,000.00.

XII.

The conduct of said Defendant is knowingly and intentionally causing its overweight trucks to be driven over the State and Federal highways of the State of Texas without regard to the health, safety and welfare of the traveling public and contrary to criminal statute opt to entitle the Plaintiff to recover exemplary or punitive damages in an amount not less than $50,000.00.

XIII.

Plaintiff would further show unto the Court that it is entitled by law to Attorney's fees as the Court may, from time to time, determine during the pendency of this suit and to costs of Court and such other costs as the Court may determine upon final hearing.

WHEREFORE, PREMISES CONSIDERED, Plaintiff prays that Defendant be cited in terms of law to appear and answer herein; that upon hearing and notice as provided by law, Defendant be temporarily enjoined pending final hearing in this cause from further violations of Tex. Rev. Civ. Stat. Ann., art. 6701d-11; that the Defendant be ordered to produce at the hearing, or any subsequent hearing, set by this Court on Plaintiff's Application for temporary injunction all records, bills of lading, ICC shipment records, weight tickets, scale tickets, purchase orders, sales receipts and sales records or other memoranda or record showing the weight, including tare, gross and net weight, of all goods, materials, stocks, items of inventory, wares, products manufactured for sale, products purchased from others for sale, or other items shipped by Defendant, such records to show origin of each such item shipped by the Defendant and the point of destination and the carrier, either interstate or intrastate, by which such items, goods, products or wares were shipped; all of said records requested by Plaintiff from the Defendant herein to be for the calendar years, 1982, 1983 and 1984. Plaintiff prays further that this Court issue a Temporary Restraining Order to enjoin the Defendant from disposing of, secreting, altering, destroying or concealing any of the aforesaid records and to show good cause, if any exist, why such records are not available upon request or presented to the Court as requested herein.

Plaintiff further prays that upon final hearing in this cause said temporary injunction be made a permanent injunction; that it have judgment of Defendant for its actual damages in the

sum of $1,000,000.00 with interest thereon to the extent and at the maximum rate provided by law; that it have judgment of Defendant for the sum of $50,000.00 as exemplary or punitive damages with interest thereon to the extent and at the maximum rate provided by law; and that it recover its costs of Court and Attorneys fees, and be granted such other and further relief to which it may show itself justly entitled at law or in equity.

Respectfully submitted,

ATTORNEY GENERAL OF TEXAS

EXECUTIVE ASSISTANT ATTORNEY GENERAL

_____

Special Assistant Attorney General
P. O. Box 12548
Austin, Texas 78711
(512) 475-4251
Bar Card No. 01344800

STATE OF TEXAS I
I
COUNTY OF TRAVIS I

BEFORE ME, the undersigned authority, on this day personally appeared Watson C. Arnold, to me well known, who, after being by me duly sworn did depose and say as follows:

"That he is familiar with the facts and allegations set forth in Plaintiff's Original Petition and that such facts and allegations are in all things true and correct."

_____

Special Assistant Attorney General

SWORN TO AND SUBSCRIBED BEFORE ME, this the _____ day of _____, 1985.

_____

Notary Public in and for the State of Texas

_____

Print or Type Name

My commission expires:

_____

Figure 3. Continued.

NO. _____

THE STATE OF TEXAS	I	IN THE DISTRICT COURT OF
	I	
V.	I	TRAVIS COUNTY, TEXAS
	I	
	I	_____ JUDICIAL DISTRICT

TEMPORARY RESTRAINING ORDER

The application of State of Texas, Plaintiff, for a temporary restraining order upon its verified petition has been presented to me, _____, Judge of the _____ District Court of the State of Texas, on this the _____ day of _____, 1985. It appears from the facts set forth in said petition that Defendant is, has in the past, and will continue, before notice and hearing can be had, to load or cause to be loaded motor vehicles with weights in excess of the lawful weights provided by TEX. REV. CIV. STAT. ANN., art. 6701d-11 (Vernon 1983), to the immediate and irreparable injury of Plaintiff as owner of the highways in that such overloaded motor vehicles inevitable and immediately damage the surface of the highways, traversed by said trucks. It further appears that such continued activity immediately and irreparably will invade the rights of the public in that such damaged highways are difficult to use and dangerous to the lives and property of the public attempting to travel upon such highways, and in that such overloaded trucks cannot be maneuvered and stopped safely and promptly, increasing the danger to the lives and property of the public due to collision. It clearly appears from the foregoing facts that such immediate and irreparable injury, loss or damage will result before notice can be served upon , the Defendant, and a hearing had on Plaintiff's Application for such restraining order, unless Defendant is forthwith restrained as prayed for in Plaintiff's petition, and that Petition is entitled to the restraining order as herein granted the same being within its allegations and prayer.

No security or bond shall be required to be given by Plaintiff.

It is accordingly ORDERED that the Clerk of this Court issue a Temporary Restraining Order, effective until the _____ day of _____, 1985, at _____ o'clock ____.m., restraining and enjoining Defendant, and its officers, agents, servants and employees, from loading or causing to be loaded motor vehicles, operated upon Plaintiff's roads and highways with weights exceeding those permitted by Art. 6701d-11 for such vehicles, said Temporary Restraining Order to remain in force and effect for a period of ten (10) days, and requiring Defendant to keep audit records for all loads it moves with weights shown for each load shipped during the term of such Temporary Restraining Order, and to retain any such record for the six (6) months preceding the date of such Order; and

It is further ORDERED, that at the hearing herein set on Plaintiff's Application for Temporary Injunction, that the Defendant produce all records, bills of lading, ICC shipment records, weight tickets, scale tickets, purchase orders, sales receipts and sales records or other memoranda or record showing the weight, including tare, gross and net weight, of all goods,

Figure 4. Example of temporary restraining order.

materials, stocks, items of inventory, wares, products manufactured for sale, products purchased from others for sale, or other items shipped by Defendant, such records to show origin of each such item shipped by the Defendant and the point of destination and the carrier, either interstate or intrastate, by which such items, goods, products or wares were shipped.

It is further ORDERED that at the hearing herein set on Plaintiff's Application for Temporary Injunction that the Defendant produce all of said records to be for the years 1982, 1983 and 1984; and

It is further ORDERED that Defendant is hereby restrained and enjoined immediately from disposing of, secreting, altering, destroying or concealing any of the aforesaid records and to show good cause, if any exists, why such records are not available upon request or presented to the Court as requested herein.

It is further ORDERED that Plaintiff's Application for a Temporary Injunction effective until final decree herein, as contained in his verified Petition, be heard before me at _____ o'clock ___.m., on the _____ day of _____, 1985, in the _____ District Courtroom in the Courthouse of Travis County, in the city of Austin, Texas.

At chambers, this the _____ day of _____, 1985, at _____ o'clock _____.m.

_____
Judge Presiding

Figure 4. Continued.

NO.

STATE OF TEXAS	I	IN THE DISTRICT COURT OF
	I	
V.	I	TRAVIS COUNTY, TEXAS
	I	
	I	JUDICIAL DISTRICT

TEMPORARY INJUNCTION ORDER

On this the _____ day of _____, 1985, came on for hearing the application of the State of Texas for a Temporary Injunction, restraining the Defendant, , from moving motor vehicles over on or upon roads and highways of this State which are owned, administered and maintained by the State of Texas, in violation of Art. 6701d-11, Vernon's Annotated Texas Civil Statutes; and it appearing to the Court that all parties hereto were duly notified and made appearance as evidenced by the signatures below, all parties announced ready to proceed on such application.

Thereupon, the parties announced that they had agreed and stipulated for purposes of this Order in this particular action only and Defendant making no admission for purposes of trial on the merits, that this Temporary Injunction should issue, in that the Defendant has in the past, and the State of Texas believes the Defendant might in the future, continue to operate motor vehicles with weights in excess of the lawful weights allowed by Article 6701d-11, Vernon's Annotated Texas Civil Statutes, to the immediate and irreparable injury of the State of Texas as owner of the roads and highways in question in that such future operation of overloaded vehicles might damage such roads and highways for which there is no adequate remedy at law and which injury will be immediate and irreparable if not restrained pending trial on the merits;

Figure 5. Example of temporary injunction order.

It is therefore ORDERED, ADJUDGED, and DECREED that:

(1) The Temporary Injunction as requested by the State of Texas is hereby granted as set forth herein.

(2) To protect the roads, bridges and highways of the State of Texas from immediate and irreparable damage and to protect the safety and property of the public pending final trial on the merits, Defendant, , its officers, agents, servants, employees and those person in active concert of participation with it, who receive actual notice of this Order by personal service or otherwise, are until trial on the merits herein, hereby restrained and enjoined from moving or operating, loading or causing to be loaded, motor vehicles, truck-tractors, trailers, semi-trailers or any combination of the same, owned or controlled by said Defendant, over on or upon any road or highway of this State, which is owned and maintained by the State of Texas, in violation of the overall gross weight limits set forth in Article 6701d-11, Vernon's Texas Civil Statutes. This Order does not address violation of individual axle weight requirements set forth in Article 6701d-11, Sec. 5(a), Vernon's Annotated Texas Civil Statutes, and it is ordered that the sum of the individual axle weights may be used to determine the overall gross weight of any individual vehicles.

(3) It is further ORDERED that the Defendant is hereby restrained and enjoined from disposing of, secreting, altering, destroying or concealing any and all records, bills of lading, ICC shipment records, weight tickets, scale tickets, purchase orders, sales receipts and sales records or other memoranda or record showing the weight, including tare, gross and net weight, of all goods, materials, stocks, items of inventory, wares, products manufactured for sale, products purchased from others for sale, or other items shipped by the Defendant and the point of destination and the carrier, either interstate or intrastate, by which such items, goods, products or wares were shipped.

It is further ORDERED that the records included and named in the above paragraph are for the calendar years 1983 and 1984.

It is further ORDERED that no bond be required of the Plaintiff herein and that the Clerk of this Court issue a Writ of Injunction in conformity with the terms of this ORDER.

It is further ORDERED that this case be set for trial on the merits on the _____ day of _____, 19____.

SIGNED AND ENTERED this _____ day of _____, 19____.

_____
Judge Presiding

APPROVED:

ATTORNEY GENERAL OF TEXAS

EXECUTIVE ASSISTANT ATTORNEY GENERAL

_____

Special Assistant Attorney General
P. O. Box 12548
Austin, Texas 78763
(512) 475-4251
TBC #01348000

Figure 5. Continued.

Because the defendant trucking company has always contended and the state has been unable to prove:

1. The defendant's trucks did all the claimed damage to the roadway when thousands of other vehicles have passed over this same roadway. It is undisputed that any passing vehicle does some amount of damage to a roadway.
2. What percentage of damage the defendant's trucks did to the roadway as compared to other trucks or automobiles.
3. How an overloaded truck can damage a roadway that is already in bad condition, which undoubtedly some of the roadways will be.
4. Not being able to distinguish the damage done to the roadways by the overloaded truck from the damage done to the roadways by the weather conditions. The defendant's experts will say that the recent rain, snow, sleet, heat, and the like were the main cause of the deterioration to the roadway rather than the overloaded trucks.
5. The state is unable to distinguish between the damage done to the roadway by the defendant's trucks as against the damage done by the weather (act of God), other vehicles, and faulty pavement design.

The foregoing and other such points in question are answered by the new method of proof in this trial technique. The state's main expert witness (for example, as in the case at hand, a professor who has written many theses and papers on pavement design and who qualifies as an expert on pavement) testifies that it is true that neither he nor anyone else can answer definitely any of the foregoing questions of the defendant, but that he can definitely say and prove (and goes on in the trial to prove, as will be seen later in this paper), that an overloaded truck of 20,000-pounds overload does as much damage to any roadway, regardless of the condition of the roadway, because of its extra weight, as would three trucks of legal weight, regardless of the size or legal weight load of the truck. Thus, trucks carrying 20,000 pounds of overload are wearing out the roadways three times as fast as legally loaded trucks (see page 7 of Figure 6). The expert witness then testifies as to how this theory of determining damage to roadways by overloaded trucks was formulated; how it is recognized as a correct theory by industry and by the Federal Highway Administration. He follows this explanation with a statement specifying the dollar amount of damage incurred by overloaded trucks. As shown in Figure 1, based on this theory, overloaded trucks, in the year of 1983, have done 123 million dollars worth of damage to the highways of the State of Texas. This same method of damages can be applied to any state.

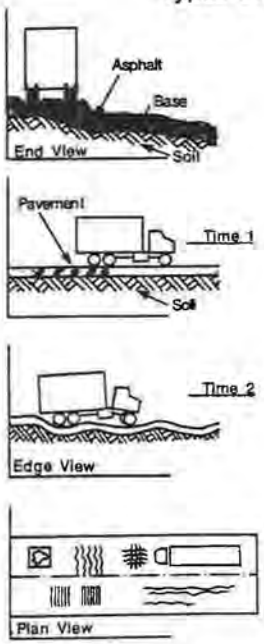
HIGHWAY
DAMAGE

INDEX

Page

1. ..... Highway Damage
2. ..... Types of Distress
3. ..... Preformance Comparison of Loaded and Unloaded Lanes
4. ..... Results of the AASHO Road Test
5. ..... Damage and Serviceability Equations
6. ..... Equivalent Axle Loads 18,000 lb Axle-1.0
7. ..... Truck Damage Equivalencies
8. ..... Graph of Serviceability vs. Axle Load

Types of Distress



Rutting

Roughness

SV = 0

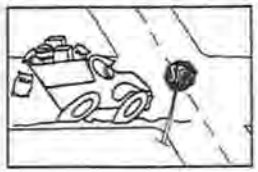
SV > 0

Cracking & Patching

2

Figure 6. Chart illustrating basis of proof of damage due to overloaded trucks. (This figure would constitute Exhibit 3.)

Performance Comparison of Loaded and Unloaded Lanes

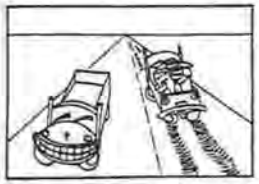


Shoving Pavement Load Damage

US 90A; Colorado and Wharton Counties

$$\frac{\overline{RC}\ \text{Loaded Lanes}}{\overline{RC}\ \text{Unloaded Lanes}} = 3.02$$

$$\frac{\text{Roughness Loaded Lanes}}{\text{Roughness Unloaded Lanes}} = 1.50$$



Rutting Load Damage

FM 3013, Colorado County

$$\frac{\overline{RD}\ \text{Loaded Lanes}}{\overline{RD}\ \text{Unloaded Lanes}} = 3.1$$

$$\frac{\text{Roughnss Loaded Lanes}}{\text{Roughness Unloaded Lanes}} = 1.54$$

3

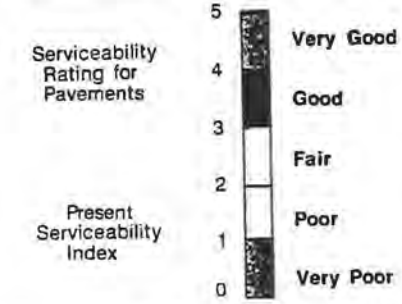
Results of the AASHO Road Test

Special Report 61A — History and Description of Project	Special Report 73 — Proceeding of a Conference	Special Report 61c — Traffic Operations and Pavement Maintenance
Special Report 61D — Bridge Research	Special Report 61E — Pavement Research	Special Report 61G — Summary Report

AASHO INTERIM GUIDE FOR DESIGN OF PAVEMENT STRUCTURES

4

Damage = f(Rutting + Roughness + Cracking)



Serviceability =(5−Damage)

$$PSI = 5.03 - 1.91 \log(1 + \overline{SV}) - 0.01\sqrt{C+P} - 1.38\overline{RD}^2$$

SV = Slope Variance
C = Cracking
P = Patching
RD = Rut Depth

5

Truck Damage Equivalencies

(Assumed Rigid Pavement 9" Thick and P_t = 2.5)

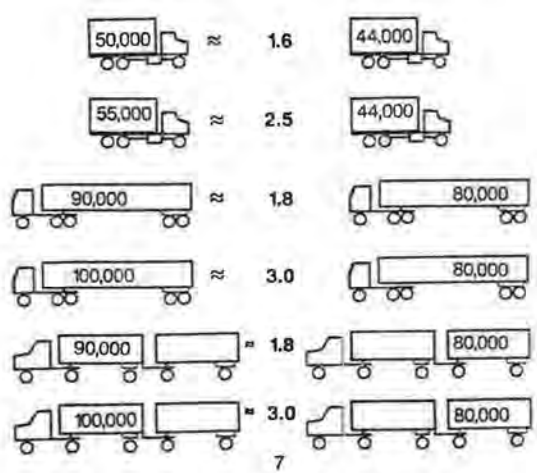
Equivalent Axle Loads

18,000 lb Axle − 1.0

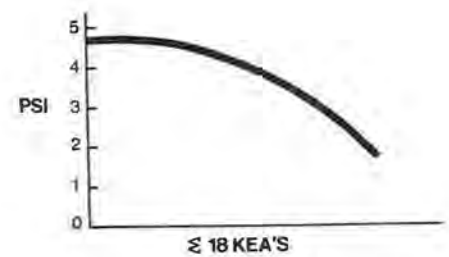
$$\text{Damage Equivalent} \approx \left(\frac{\text{Load on Axle x}}{\text{18,000 lb Axle}}\right)^4$$

Axle Load, lb	Damage
10,000	0.08
18,000	1.0
24,000	3.5
26,000	4.9

6



7



Serviceability vs. Axle Loads

8

Figure 6. Continued.

It is important to remember that the defendant is being sued for all the overload damage to the state highways, not for overload damage to any particular roadway. Also, he is being sued for the damage done by all overloaded trucks, not just for the trucks of one company. *The cases cited below* constitute one's authority for this type of lawsuit.

The attorney representing the state must repeat again and again to the court in asking for the temporary injunction that the state is not asking any penalty of any kind from this defendant, but only that the court enjoin him from violating the law or, to put it another way, that the defendant obey the law until his case is heard. This line of argument is highly persuasive. The State is only asking that the trucking company be ordered not to break the law until its case is heard. Out of 46 requests for temporary injunctions, the State of Texas has never lost even one request using this theory and this trial technique.

The following are a few of the major cases to quote regarding this theory of trial.

Borel v. Fibreboard Paper Products Corporation, 403 F2d 1076, U.S. Ct. App., 5th Cir. (1973), is a case wherein an asbestos worker named Borel sued a number of companies that made asbestos, not knowing which company's asbestos gave him asbestosis, the injury which caused his damage. The defendants' attorneys argued for an instructed verdict from the court contending there was not substantial evidence to support the jury's finding that each defendant was the cause in fact of injury to Borel. In considering this point the Federal Court said,

> . . . [A]ll of these factors combine to make it impossible, as a practical matter, to determine which exposure or exposures to asbestos dust caused the disease. . . .
>
> [22] C. We next consider whether there was substantial evidence to support the jury's finding that each defendant was the cause in fact of injury to Borel. The traditional rule is that a defendant's conduct is the cause of the event if it was a substantial factor in bringing it about. Prosser, Law of Torts Sec. 41 at 240 (3ed. 1971); Second Restatement of Torts, Section 431, 433, Malone. Ruminations on Cause-in-Fact 9 Stan.L.Rev. 60 (1956); Green, The Causal Relation Issue, 60 Mich.L.Rev. 543 (1962). Whether the defendant's conduct was a substantial factor is a question for the jury, unless the court determines that reasonable men could not differ.
>
> [23] In the instant case, it is impossible, as a practical matter, to determine with absolute certainty which particular exposure to asbestos dust resulted in injury to Borel. It is undisputed, however, that Borel contracted asbestosis from inhaling asbestos dust and that he was exposed to the products of all the defendants on many occasions. It was also established that the effect of exposure to asbestos dust is cumulative, that is, each exposure may result in an additional and separate injury. We think, therefore, that on the basis of strong circumstantial evidence the jury could find that each defendant was the cause in fact of some injury to Borel.
>
> Relying on expert testimony that asbestosis does not usually manifest itself until fifteen, twenty, or even twenty-five years after initial exposure, Pittsburgh Corning Company and Armstrong Cork Company contend that they cannot be liable because Borel was not exposed to their products until after 1962 and 1966 respectively. As we have pointed out, however, the length of this latent period varies according to individual idiosyncrasy, duration and intensity of exposure, and the type of asbestos used; in some cases the effect of the exposure may manifest itself in less than five or ten years. Thus, even the most recent exposures could have added to or accelerated Borel's overall condition.

IV.

[24] Having concluded that each defendant was the cause in fact of some injury to Borel, we now come to the question of apportionment of damages. In general, a defendant is liable only for that portion of the harm which he in fact caused. A problem arises, however, where, as here, several causes combine to produce an injury that is not reasonably capable of being divided. In the instant cause, the trial court resolved this issue by holding the defendants jointly and severally liable for the entire harm. Asserting error, the defendants argue that if the injury cannot be reasonably apportioned, the plaintiff must bear the entire loss unless it can be shown that the tortfeasors acted in concert or with unity of design. The defendants' arguments is [sic] best illustrated by *Sun Oil v. Robicheaux,* Tex.Civ.App. 1930, 23 S.W.2d 713, a case in which several defendants, acting independently, were polluting a bayou from which the plaintiff was taking water for irrigation. The court held that an action at law for damages could not be maintained jointly against the defendants and that each was liable only for the part of the injury which he caused. The court stated:

> Under such circumstances each tortfeasor is liable only for the part of the injury to damages caused by his own wrong; that is where a person contributes to an injury along with others he must respond in damages, but if he acts independently, and not in concert of action with other persons in causing such injury, he is liable only for the damages which directly and proximately result from his own act, and the fact that it may be difficult to define the damages caused by the wrongful act of each person who independently contributed to the final result does not affect the rule.

23.S.W.2d at 715.

The effect of the Robicheaux rule was to make it impossible to join several wrongdoers whose independent acts caused an injury which, although theoretically divisible, was indivisible as a practical matter. The burden was placed on the plaintiff to prove with reasonable certainty what portion of the total damage was attributable to each defendant. Failing that, recovery would be denied even though it was undisputed that each defendant caused some harm.

In 1952, the Robicheaux case was expressly overruled by the Texas Supreme Court in *Landers v. East Texas Salt Water Disposal Co.,* 151 Tex. 251, 248 S.W.2d 731.[30] In that case, an oil company and a salt water disposal company each owned pipelines running near the plaintiff's land. At about the same time, each pipeline broke, pouring oil and salt water onto the plaintiff's land and into his lake. The plaintiff sought to hold the defendants liable for the entire harm. In upholding the joinder of the two defendants, the court noted that prior cases "seem to have embraced the philosophy . . . that it is better that the injured party lose all of his damages than that any of the several wrongdoers pay more of the damages than

he individually and separately caused. If such has been the law, then from the standpoint of justice it should not have been; if it is now, it will not be hereafter." 238 S.W.2d at 734. The court then announced the new rule:

> Where the tortious acts of two or more wrongdoers join to produce an indivisible injury, that is, an injury which from its nature cannot be apportioned with reasonable certainty to the individual wrongdoers, all of the wrongdoers will be held jointly and severally liable for the entire damages and the injured party may proceed to judgment against any one separately or against all in one suit. Id.

The effect of the Landers case may be stated as follows: Where several defendants are shown to have each caused some harm, the burden of proof (or burden of going forward) shifts to each defendant to show what portion of the harm he caused. If the defendants are unable to show any reasonable basis for division, they are jointly and severally liable for the total damages.[31] The defendants attempt to distinguish Landers by asserting that it applies only to situations where the tortious acts occur simultaneously. As the court noted in Landers, however, there was no allegation in the plaintiff's complaint that the defendants' tortious acts occurred at the same time. The court specifically refused to limit its holding to cases in which "the negligence of the wrongdoers contributing to the injury was operating simultaneously." 248 S.W.2d at 735. Later Texas cases have also applied the Landers rule to non-simultaneous tortious acts.[32] See *Continental Elec. Mfg. Co. v. Navajo Freight Lines, Inc.*, 5 Cir. 1971, 447 F.2d 1174.

[25] Applying these principles to the present case, we conclude that the defendants may be held jointly and severally liable for the total damages.

Another more recent case that affirms the principle advanced in this treatise involving joint tort tortfeasors who damage state property, to-wit, the roadways, by running overloaded trucks thereon, is the case of *Rita Rene Martin et al. v. Abbott Laboratories et al.*, 102 Wn. 2d 581, Sup. Ct. (1984). In this case a mother who had taken diethylstilbestrol (DES) during pregnancy and her daughter who had developed cancer sought damages from numerous DES manufacturers and a successor corporation to a DES manufacturer. The plaintiff could not identify the specific manufacturer of the DES taken by the mother. It was undisputed that between 200 or 300 companies manufactured and marketed DES between 1947 and 1971. Rita Rene Martin was born on October 4, 1962. Her mother, Shirley Ann Martin, obtained a prescription for and ingested DES from May 1962 until the date Rita Martin was born. On January 4, 1980, Rita was diagnosed as suffering from clear cell adenocarcinoma of the vagina. The Martin's sued only 13 of the 200 to 300 makers and distributors of the drug DES. One of the major contentions as advanced by the defendants was that all the possible tortfeasors were not before the court. The court rejected this contention quoting *Ferrigno v. Eli Lilly & Co.*, 175 N.J. Super. 551, 420 A.2d 1305 (1980). The court in the Martin case *supra* went on to say:

We hold that Plaintiff need commence suit only against one defendant and allege the following elements:

(1) That the plaintiff's mother took DES; [The State owns the roadways]*
(2) That the defendant produced or marketed the type of DES taken by the plaintiff's mother; [Defendant operated overloaded trucks on the State roadways]*
(3) That the defendant's conduct in producing or marketing the DES constituted a breach of a legally recognized duty to the plaintiff. [The defendants overloaded trucks violated the law and caused excessive damages to the roadways]*

At the trial, the plaintiff will have to prove each of these elements to the satisfaction of the trier of fact. We emphasize, however, that the plaintiff need not prove that a defendant produced or marketed the precise DES taken by plaintiff's mother. Rather, the plaintiff need only establish by a preponderance of the evidence that a defendant produced or marketed the type (e.g., dosage, color, shape, markings, size, or other identifiable characteristics) of DES taken by the plaintiff's mother; the plaintiff need not allege or prove any facts related to the time or geographic distribution of the subject DES. While the type of DES ingested by the mother should be within the domain of her knowledge, facts relating to time and distribution should be particularly within the domain of knowledge of the DES manufacturers and distributors. Individual defendants are entitled to exculpate themselves from liability by establishing, by preponderance of the evidence,

(1) That they did not produce or market the particular type DES taken by the plaintiff's mother; [Didn't drive overloaded on Texas roads]*
(2) That they did not market the DES in the geographic market area of plaintiff's mother's obtaining the drug; [They drove only out of state]*
(3) That they did not distribute DES in the time period of plaintiff's mother's ingestion of the drug. [Didn't have any overloaded trucks on the Texas roads at this time, 1983 or 1984]*

[2] The defendants that are unable to exculpate themselves from potential liability are designated members of the plaintiff's DES market, defined by the specificity of the evidence as to geographic market area, time of ingestion, and type of DES. These defendants are initially presumed to have equal shares of the market and are liable for only the percentage of plaintiff's judgment that represents their presumptive share of the market. These defendants are entitled to rebut this presumption and thereby reduce their potential liability by establishing their respective market share of DES in the plaintiff's particular geographic market. Upon proof of a market share by a preponderance of the evidence, that particular defendant is only liable for its share of the market as it related to the total judgment. To the extent that other defendants fail to establish their actual market share, their presumed market share is adjusted so that 100 percent of the market is accounted for. [The defendants in the overload

*Bracketed statement added to paraphrase special issues to be used in the overload cases.

case would establish their market share of responsibility by the number of overloaded tickets they received from the arresting authorities or by the number of miles they have driven over the state roadways.]*

Application of this rule of apportionment is illustrated by the following hypotheticals. Assume that plaintiff's damages are $100,000 and defendants X and Y remain subject to liability after exculpation by other named defendants. If neither establishes its market share then they are presumed to have equal shares of the market and are liable respectively for 50 percent of the total judgment, X, $50,000 and Y, $50,000.

Assume defendant X establishes that it occupies 20 percent of the relevant market, and defendant Y fails to prove its market share. Defendant X is then liable for 20 percent of the damages, or $20,000, and defendant Y is subject to the remaining 80 percent, or $80,000.

Assume that defendant X establishes a market share of 20 percent and defendant Y a 60 percent market share. Then defendant X is subject to 20 percent of the judgment, $20,000, and defendant Y to 60 percent of the judgment, $60,000. The plaintiff does not recover her entire judgment because the remaining 20 percent of the market share is the responsibility of unnamed defendants.

The defendants may implead third party defendants in order to reduce their presumptive share of the market or in order to establish an actual reduced market share.

This ability of a defendant to reduce its liability reduces the disproportion between potential liability that a particular defendant caused the injury by imposing liability according to respective market shares. In the case where each party carries its burden of proof, no defendant will be held liable for more harm than it statistically could have caused in the respective market.

*Bracketed statement added to paraphrase special issues to be used in the overload cases.

Step 3 — The Trial

The first witness to testify should be a member of the State Department of Highways and Public Transportation. He will testify that the State is responsible for the cost of maintaining the state highways and the federal highways in the State on the Federal Highway System. He will further testify that the title to the state roadways and federal highways is in the State.

He states that the home office of the Highway Department is in the State Capitol (whatever the county) and that all monies for road maintenance and repair come from the home office in the capitol and such monies are then funneled out to the various districts. This testimony is to give venue in the county of the State capitol.

The second witness to testify should be the Department of Public Safety officer or any other law enforcement officer who testifies how many tickets have been issued to the defendants in the year, for example, 1983 for overloading. (In Texas for the year of 1983 the Department of Public Safety issued 34,000 tickets for overloading.) If possible have these tickets as evidence if need be. A computer printout of the tickets would do just as well and be less bulky. Have the proper person to testify as to the authenticity of the records, the tickets, or the printouts, whichever are used. This same officer or record-keeper should also testify as to the number of convictions. He should also testify as to the average number of pounds of overweight these defendants have been carrying in the particular year of interest.

After the Department of Public Safety officer has testified and introduced the myriad of overload tickets (one will probably have a thousand or more overload tickets if a number of defendants who have not settled have been joined in the one case), the state's expert witness should take the stand. The following is illustrative of what takes place during the course of the trial. After the expert witness has identified himself, he testifies his specialty is pavement design. He further testifies he has worked with highway department and road building engineers all over the world. He then tells how he has worked with the State and Federal authorities, especially the U.S. Department of Transportation and the Federal Highway Administration. The expert witness is then asked if he has written any books or treatises on the subject of pavement, pavement life or pavement design. He testifies that he has written over 150 articles on the subject and that 125 have been published. The State then holds up a whole box of books written by the expert witness. He identifies some of them and they are introduced into evidence.

He is then asked the question, And did you also write these books? The State's attorney points to the box where the books are located, the witness answers "yes". The attorney does not introduce the rest of the books.

The expert witness's testimony then proceeds as follows (as to qualifying the expert witness and as to his actual testimony see Figures 6 and 7):

1. He testifies that in 1958 through 1960 the Federal Government conducted the American Association of State Highway Officials Road Test in Ottawa, Illinois, under very strict guidelines for the purpose of formulating a formula for damage to roadways by auto and truck travel. He testifies that the leading authorities from all over the United States were there to take part in and to help direct the tests. The tests were conducted under very strict guidelines. All sorts of weather conditions were imposed from freezing, to rain, to hot sun and any other condition that would affect pavement, asphalt, or any other materials used in road building. He further goes into the details of this test. As a result of the test the following formula was produced which formula is used worldwide to prove roadway usage and damage. According to the formula it makes no difference as to the condition of the roadway. The roadway can be full of pits and cracks or it can be smooth as glass; no matter what the condition, the damage of a vehicle going over it, according to the weight of the vehicle, does the percentage of damage as shown by the formula. The formula is: Damage Equivalent is equal to Load on Axle x 18,000 lb Axle to the 4th power.

The expert witness then goes on to say, and points to a prepared exhibit (see Figure 6), that a truck weighing 80,000 pounds (the maximum legal weight) does X amount of damage to the roadway. He further says that a truck weighing 90,000 pounds (10,000 pounds overweight) does X amount of damage, which is to say the same amount of damage two trucks would have done, and so on. In other words, the overloaded trucks are wearing the road out twice as fast. The prepared exhibit is then introduced.

The witness then testifies that he was part of the team of experts that came up with the figure that overloaded trucks in the year of 1983 did 123 million dollars of damage to the State and Federal highways in Texas.

The expert witness will testify that highways are designed for a certain number of years of use. Most state highways and the federal highways are designed for 20 years of use. He will testify that although some parts of the highways have become more industrialized than anticipated and have resulted in more traffic and thus are wearing out faster than the 20 years, such fact has nothing to do with the damage done by the overloaded trucks. The overloaded truck, depending on the amount of overweight, is wearing out the roadway as fast as two, three, or four legally loaded trucks. The highways are constructed to carry a load limit. In this instance on state and federal highways the load limit is 80,000 pounds. He further testifies that the cost of material and labor is constantly going up; that pavement damage to the highways by overloaded trucks alone is 6.3 million a year in 1980 dollars; that approximately 10 percent a year should be added for inflation.

The witness further testifies that it is impossible to determine that a certain truck did a certain amount of damage to a certain stretch of roadway because of the various unknowns and intangibles — for instance, the condition of the tires on the trucks, the exact weather condition on each day, the impossibility of proving how many other vehicles drove over the road and their amount of damage, and so on. Thus, the only way to prove the damage to the highways because of overloading is to prove how much sooner the roads wear out with overloads than with legal loads.

This witness's testimony, plus his cross-examination, will definitely prove the damage done to the state highways by the overloaded trucker.

All of the foregoing is a new and novel way of stopping the overloaded trucker and thus increasing the life span of our public highways. This is a method to be used if the criminal statutes of the state are failing in their effect on the overweight problem.

DIRECT EXAMINATION

QUESTIONS BY COUNSEL FOR PLAINTIFF

Q. State your name, please.

A. _____, Jr.

Q. Dr. _____. Where are you employed.

A. The University of Texas at Austin at the Center for Transportation Research.

Q. How long have you been with the University?

A. Since 1968.

Q. And what is your position with the University?

A. I'm professor in civil engineering and also the director for the Center for Transportation Research there at the University.

Q. What is your business address?

A. _____ Hall, Room __, University of Texas at Austin.

Q. How long have you been in the teaching profession.

A. Since 1968.

Q. And from what university did you get your PhD.?

A. University of California at Berkely.

Q. Please tell us your academic degrees and the schools from which they were obtained.

A. I got my Bachelor of science degree in 1957 from the University of Texas, and my Master of science degree in civil engineering from the University of Texas in 1962, and my doctorates degree in engineering at the University of California at Berkely in 1969.

Q. In what fields have you specialized, Dr. _____?

A. In the area of transportation; specifically in the area of pavements.

Q. Would that include road construction pavement?

A. Yes, that's correct.

Q. What extra work have you done to prepare yourself in that particular field?

A. I was employed for a number of years at the Texas Highway Department. And then I've been working in research in the area of pavement design and preparing design manuals, etcetera, for a number of years now.

Q. What professional societies are you a member of?

A. American Society of Civil Engineering; the American Concrete Institute; the American Society of Testing Materials.

Q. And I'll ask you whether or not you've written any papers or treatise on pavement or pavement design.

A. Yes, I have.

Q. Without naming all of them, I'll ask you around how many have you written.

A. Around 300 or something.

Q. Now, Dr. _____, I'll ask you whether or not the state has employed you to testify in this case as to damage done to the highways by overloaded trucks.

2

A. I've been asked to come and testify.

Q. Would you tell us in your experience, and from your knowledge, from your work, how studies were made to determine, first of all, damage to pavements or roadways.

A. Well, of course, there's been a number of studies where you do condition surveys, and examine the effects of trucks passing over it. And, of course, there was the ASSHO Road Test that was conducted in the period from roughly 1958 or '59 to 1962. I believe it was somewhere in the neighborhood of $25 to $30 million at that particular time to study it. One of the major objectives was to study the relative effect of different axle weights on the damage of highways.

Q. And when you say ASSHO, what does that stand for?

A. I call it the AASHO Road Test. Now it's AASHTO, American Association of State Highway and Transportation Officials. But the official name of the road test was ASSHO Road Test which was the official name at that particular time.

Q. What agency financed this test and what agency requested that it be done?

A. Well, it was financed from the states. AASHTO is comprised of the various state highway departments and transportation agencies. So every state is a member. And AASHTO, and along with the Federal Highway Administration, also worked to develop this road test.

3

Figure 7. Expert witness's testimony and his cross-examination.

Q. All right, sir.

PLAINTIFF'S COUNSEL: Counsel, you may look at this and if you have an objection you may do so.

DEFENSE COUNSEL: No objection.

Q. Dr. _____, just going over it quickly, what does this first picture here depict?

A. The types of stress that will be present on a pavement that come about from load damage.

Q. And the next page.

A. It's a comparison of some roadways where heavy loaded trucks going in one direction and empty trucks going in the other.

Q. All right, sir. And the next page?

A. This just covers the various results of the actual road test that I referred to earlier.

Q. And the next page.

A. This is an indication of damage. It's a concepts of damage as they've been developed and used in pavement design.

Q. And the next page.

A. That's the relative equivalent axle load based on a damage concept.

Q. And then this next one is page 7, I believe.

A. That's truck damage equivalency showing the effect of different loads on trucks.

Q. And page 8.

A. That's serviceability versus the axle load showing how highways wear out.

Q. And I believe that's it.

Q. Dr._____, let's start with page 1 here. Really page 2. Will you tell us what this page represents, please.

A. Yes.

Q. And, for the record, we're showing page 2 of Plaintiff's offered Exhibit No. 3.

A. Okay. What we're trying to illustrate here, there are several different types of distress that would show up on a pavement under repetitive loads of vehicles. And this particular one is a cross section of a pavement, and we call this rutting. You'll see in the wheel path a vehicle, and you see that a rut has formed, that is, a permanent deformation of the surface. And that is detrimental because of safety and general wear out of the pavement. And then this is roughness. Just to kind of conceptually illustrate, if we had a pavement, and we built it smooth initially, then we use a term that we call slope variance, or just means how smooth it is, what do you feel the seat of your britches that you ride over this roadway. And the slope variance here is 0. In other words, it means it's relatively smooth.

Now, time and applications, there's a roughness that gets into it, and, therefore, the slope varies.

As you can see here up in the yellow portion it's horizontal. A straight line has numerous applications, then there starts to be a built-in roughness, that slope variance is greater than 0. So roughness is a term we use. Now, rutting and roughness.

Some of the other obvious things, you'll see cracking that occurs. For example, in the wheel path, what we call alligator cracking that's associated with loads and repetitive loads, or we may see patching where some of this has been repaired. So, cracking and patching, roughness and rutting, are some of the types of distress we see out on the pavement.

Q. Now turn to page 3 of Plaintiff's Exhibit No. 3.

A. This is some information that was taken in Colorado and Wharton Counties which, as I mentioned earlier, is near Columbus. And in that particular area there's a lot of heavy trucks moving towards Houston with gravel; and there're going in one direction loaded and in the other direction they're coming back empty. And this just shows "R.D." is an abbreviation for rut depth. If you'll remember the previous drawing we had was rut depth was one of them. So we said the average rut depth in the loaded lanes divided by the average rut depth in the unloaded lanes where the empty trucks were. And you see the rut depth in this particular roadway was on the average three times in the loaded lanes as the unloaded lanes.

Now, this roughness in the loaded lanes, or that slope variance term that we use, and I'll just call it roughness, the roughness in the loaded lanes divided by the roughness in the unloaded lanes was one and a-half times as great.

Now, this is another section of road. I believe this particular one's in Coloredo County. And it's the same type of information again. The loaded trucks are going in one direction, the empty trucks in the other. And this is rut depth in the loaded lanes to rut depth in the unloaded lanes. Again, it's about 3 to 1. And the roughness to the loaded lanes to the roughness in the unloaded lanes is about 1 1/2 times as great. So, from this you can infer that there seems to be -- there is more damage in the loaded lanes than the unloaded lanes.

Q. Now let's turn to page 4 of Plaintiff's Exhibit 3.

A. Well, this is the results of the AASHO road test. There was actually seven volumes. I guess we have six of them here that presents the results of the AASHO road test. Now, this was a very scientific study that was done with different thicknesses. Approximately 300 different test sections. They had six different loops. And on each loop they had different axle loads. And in one lane they had single axle and in the other they had tandem axle. Then they had different thicknesses of pavement structure.

8

As you can see from the pictures on the cover, you can see the trucks going around and around in a loop, and then they could investigate how much damage resulted on this particular thickness of pavement with a given axle load; and on another loop that was built the same way on the same type of soil on the same type of condition, how much damage was done under a different set of conditions.

Q. I'll ask you whether or not the AASHO Road Test is an accepted document in all states as to pavement damage, pavement care, etcetera.

A. Yes, it is the basis of the information that equivalencies, load equivalencies, that states use.

Q. And also the engineering profession.

A. Yes.

Q. As to road depth.

A. Yes, that's correct. In general that's correct.

Q. Go ahead, Doctor.

A. These are just the results. It was a tremendous test from the standpoint of providing information. Well, men with a lot of experience use that, and then this has been the basis.

Now, as a result of that, AASHO wanted a design guide for pavement structures so that they could go about designing and also determining the influence of loads, and how do you take into account mixed traffic out on the roadway. You have everything from a

9

Volkswagen to a heavy truck. How do you take that into account, this mixed traffic, and come up with a pavement design. Well, that's what this particular blue book was a design guide that was developed sort of a result from the AASHO Road Test and experience of various individuals.

Q. And you yourself did the road book. Is that correct?

A. Yes. I participated with another individual, but we prepared that. I guess in the final say I was the one that really was the one that ended up preparing it, being responsible for it.

Q. Now let's turn to page 5 of Plaintiff's Exhibit No. 3. What does that depict?

A. Well, this is an expression that sort of arrived out of the road test. It's a serviceability rating for pavements, and we call it the Present Serviceability Index. It's some way to rate pavements. And we used, at the road test a very simple scale was developed. It said, okay, 5 is the best pavement you can imagine and 0 was the worst condition of pavement. And so you see a general scale that has developed. Very good, 5 to 5, 3 to 4 is good, etcetera, on down to 0 to 1 is very poor. And this was derived from users.

What the present Serviceability Index said, the Present Serviceability says how well does this roadway serve the public today. No inference as tomorrow, etcetera, but what is it today. And so we call that

10

Figure 7. Continued.

the Present Serviceability Index. We arrive at that by saying, okay, if we define damage as those thins -- and I'll just say this is a functional thing. It's obviously a very complex equation. But it's a rutting, those damage factors are rutting, plus roughness, plus cracking. Then we can always say the serviceability at any given time is equal to 5, which is a perfect condition, minus any damage that may occur.

That's a conceptual illustration of equation. This is the actual equation that's used. This is a slope variance term. This is the cracking and patching, and these are the rut depths.

Q. And what is "P.S.I."?

A. Present Serviceability Index.

Q. And so this is the algebratical formula, I'd say.

A. Right. We call it algerithm. A good way to express it is algebratic formula.

Q. Now let's go to page 6 of Plaintiff's Exhibit 3.

A. As a result of these various test sections that were there on different loops and different loads, then equivalencies of damage could be developed. In other words, you could say it's based on axle applications. And you could say that this axle does twice or three times as much damage as another axle. And so you could get to relative damage of effect of axles. And from this then evolved the what we call the equivalent axle damage. We always base everything in most states and

agencies throughout the world generally base everything on 18,000 pounds semi-axle. And that was at that particular time the legal axle in most states in the U.S., and now, of course, it's been increased to 20. But 18,000 is a reference.

Now, there's a complex formula, but this basically demonstrates -- I use a damage equivalent and I show approximately equal to the load on an axle divided by the load on an 18,000 pound axle to the 4th power. When you start raising things to the 4th power damage occurs fast.

If I take an 18,000 pound axle and we put it up there, of course, the damage equivalence is 1. If I take a 10,000 pound axle we see the damage equivalency is .8. If I go the other way, 18,000 to 24,000 pounds, in other words, I increased the axle weight 33 percent, my damage factor has increased 3.5 times or 350 percent. So for a 33 percent increase in load, I have increased my damage on the highways by 350 percent. Or if I go on to 26,000 pounds, you see that the damage equivalency factor is 4.9. So it does 4.9 times as much damage. One application of this, then, is equivalent to 4.9 applications of the 18,000 pound load.

Q. Now, let's turn to page 7 of Plaintiff's Exhibit No. 3 and will you tell us what this depicts.

A. This shows some legal loads on trucks and some equivalency damage factors. The blue basically what would be

the legal truck load and the red would be a violation of the law. Now, by definition on this truck indicated blue. On that axle configuration you could put 44,000 pounds legally. If you increased that 50,000 pounds, then that one application of that 50,000 pound truck has done the equivalent damage of 1.6 of the legal trucks.

Q. Let's go right down the scale.

A. Then if you would increase that load to 55,000, then it would have done -- one application of this 55,000 pound load, a truck would do the equivalent damage of 2.5 legally loaded trucks of that configuration.

Now, then, we go to this particular truck, an 80,000 pound load on it, legal load. That's the one we generally refer to I believe a lot of times referred to as 18-wheeler.

Q. Right there, the 80,000 pound is the maximum legal load in Texas, is it not?

A. That's correct.

Q. All right. Go ahead.

A. If you put 90,000 pounds on that axle configuration, and using those damage equivalency factors, then that 90,000 pounds is equal to 1.8 applications of a legally loaded truck. If you increased that to 100,000, then you see that is roughly equivalent to three legally loaded trucks, the application to three legally.

Q. If, on an 80,000 pound truck, if it's increased to 100,000, that's a 20,000 pound increase, is it?

A. Right. So you could roughly say 25 percent increase in load has done 300 percent as much damage.

Q. So, 20,000 over the eighty, one truck does as much damage as three trucks.

A. Yes, that's correct.

Q. All right, Sir. Go ahead.

A. Then this is another legal configuration. And you see basically it has the single axles, and it has the semi-and the trailer behind it. And, you see, it has 90,000 pounds on it, and the legal configuration on that truck would be 80,000. The legal load on that configuration would be 80,000. And so it's roughly 1.8. One application of this truck does the same amount of damage as 1.8 applications of a legally loaded truck. And if you increased that load on that truck to 100,000, again 25 percent increase, then it does three times as much damage as a legally loaded truck as marked by the blue.

Q. Now let's go to page 8 of Plaintiff's Exhibit 3.

A. Well, this indicates that as you increase your, well, it's basically a graph of this Present Serviceability Index function that we talked about earlier. Remember we said we started up here, 5 was the best we could be 0 is the worst condition. So this is some kind of -- this is a rating scale. Then on the horizontal scale

14

is the equivalent 18 kip single axle load. So we take this mixed traffic and increase it. And so as the number of loads increase on this roadway, this is what we call the damage function. It would wear out at this particular rate. So, if I came here and said that this was the line that was susceptible, then at this particular point we would say the roadway had failed with this number of applications. If you start increasing the load on the trucks, then this comes down faster. It doesn't last as long.

Q. Now, tell us what a kip is, Dr. _____.

A. A kip, pardon me for using that term. It's just something that comes to me in engineering, it's 1,000 pounds. I sometimes mix it up and say kips.

PLAINTIFF'S COUNSEL: Plaintiff would introduce its Exhibit No. 3, your Honor.

DEFENSE COUNSEL: Your Honor, I am going to object to the admissibility of this exhibit to the extent it relies upon formulae that are not present here today in any textbook form but are merely cut out of something to place on the exhibit. I think we're entitled to see the underlying records to see if they purport to say what they say the Doctor does. And we would object on that basis.

PLAINTIFF'S COUNSEL: If it pleases the Court. The witness has been qualified as an expert in the field. This exhibit merely shows, pictures depicting part of the formula which formula was derived from the AASHO Road Test which is in

15

engineering like Gray's Anatomy in torts. It's our opinion that certainly this is admissible as this man's word.

THE COURT: Overrule the objection. The Court will admit Plaintiff's Exhibit No. 3.

Q. Dr. _____, tell us, how long federal highways are built to last generally speaking.

A. Well, you're talking about highways that are financed by the federal government. They're state highways, generally, but there're financed by the federal.

Q. Okay.

A. Normally there's designed to last 20 years.

Q. Tell us in that design, when the engineers design a highway, are they first -- is it first determined how long they want it to last?

A. Yes, that's first.

Q. And then do they determine how many hundred thousand vehicles will roll over that highway? Is that correct?

A. Yes.

Q. Tell us how highways are designed.

A. Well, basically, you establish a design period of 20 years that you want to design from 1985 to the year 2005, for example. And you estimate the number of vehicles that's going to be over it. Then you convert that to equivalent 18 kip single axle loads. Then you use that number in an equation to determine the thickness of the layers of the pavement structure.

16

Figure 7. Continued.

Q. So, then every time any vehicle rolls over a highway it does some damage.

A. That is correct.

Q. Now, is it a fact that the greater the weight the more the damage?

A. That's correct.

Q. Are these highways constructed basically for the maximum use or maximum roll-over by vehicles on the theory that the maximum load will be 80,000 pounds?

A. Well, you're talking about on with the design of pavements?

Q. Yes.

A. Well, of course, the trucks are estimated. And when you estimate the number of equivalencies you're estimating basically on legally loaded trucks of a certain configuration, and certain types, and that number is used, as I said, to come up with a paves structure.

Q. Is it or is it not a fact that when these trucks are over the 80,000 pounds, then they are causing more damage to the highway than an 80,000 pound truck would?

A. That's correct. So it's taking away damage or it's taking away the life of the pavement at a faster rate than it was designed for.

Q. So one that has overloaded trucks is going to last less time than one on a legally loaded.

A. Yes, that's correct.

Q. And now your page there that showed the trucks and how many trucks it would take to match that overload--

A. How many legally loaded trucks it would need to take to match that overload, one overloaded truck.

Q. I believe one of the exhibits was that a truck that's overloaded 20,000 pounds is equal to three legally loaded trucks. Is that correct?

A. Yes, yes.

Q. All right, sir. Have you had occasion to examine some of the weight tickets of this Defendant.

A. Yes. There were some of the tickets available to us.

Q. All right, sir. If you have them there, tell us some of their overloads, how much they were.

Q. Give us a ticket and a day.

A. I have a summary.

Q. Did you prepare it only on convictions?

A. Yes, this is for convictions.

Q. Tell us some of the overloads of these trucks.

A. Okay. Here's one, for example, that the allowable gross weight on this particular vehicle was 89,100 and it was overloaded to 67,800.

Q. So how much overload was that?

A. So you're roughly in this instance talking about, be 18,000 pounds.

Q. All right.

A. And the equivalencies on that, back to the factor, one application of that 67,800 pound load was equivalent to

3.74 applications of the truck if it had been legally loaded.

Q. Name us some more on this list.

A. I could just go down. They range -- here's one that's52 percent, I guess. The weight on it was 79,540. On that particular legal load configuration was 73,000, or it was overloaded 6,240 pounds.

Q. Let's turn to page 2 of your exhibit, of your paper there. Is there one there, a number 13, that's 56,600 over? The first one.

A. Of course, on that particular allowable load configuration would be 78,600 and it had 135,000 pounds on it.

Q. All right.

A. Or gross vehicle weight violation of 56,600 pounds.

Q. Now, that vehicle was overweight 56,600 pounds. Is that correct?

A. Right.

Q. Dr. _____, taking that 56,600 overload, how many legal trucks is that equal to?

A. Four point 4, roughly.

Q. Now let's go to the next one, 35,250 overload.

A. It was loaded up to 105,700. The legal load on that axle configuration was 70,450, or 35,000 overloaded. It did 4.75 times as much damage as the truck if it had been legally loaded.

Q. Let's look at the next one. How much is it overload?

A. Thirty-seven thousand eight hundred. It did 5.3 times as much damage as a legally loaded truck.

Q. Then you skip down here to some more. What about the 42,600 pound overload?

A. It did 6.46 or 6.5 roughly times as much damage as a legally loaded truck.

Q. I'll ask you whether or not the illegal loads of this company is not abnormally high.

DEFENSE COUNSEL: I'm going to object unless he can lay a predicate on knowledge of the trucking industry. I don't know abnormally high to what? Eighty thousand loads we haul a year or the trucking business?

PLAINTIFF'S COUNSEL: I'll make the predicate.

Q. Dr. _____, are you familiar with the average overloads of trucks and pavement and this kind of thing?

A. Yes. I've looked at a lot of truck information over the years working both with the Highway Department and doing research, yes. Obviously, that's high load.

Q. Is it abnormally high?

A. I would say it is.

Pass the witness.

CROSS EXAMINATION

QUESTIONS BY DEFENSE COUNSEL:

Q. Doctor, your're going to have to bear with me. My Aggie math degree is failing me as to that point. What does the "E" stand for? Is this a formula here?

A. Eighteen kip equivalent axles.

Q. No, where does nit -- go ahead, sir.

A. That just takes into account the mixed traffic on the roadway. In other words, there's different axle loads on the roadway.

Q. Where did this formula come from?

A. It was derived from the AASHO Road Test. In those books that we showed in the red books earlier and also in that blue book where we showed the covers of it a few minutes ago.

Q. Did you derive the formula?

A. No. The formula was developed as a result of the road test. We used it in that design manual.

Q. I can't remember on the other sheet. But is the formula present on any of the other sheets?

A. Not the summation of the equivalency. That's just adding them up. If you take that other sheet a minute ago--

Q. Which sheet do I need to go to?

A. Just take that one particular one.

Q. Okay.

A. If you had those six trucks there on the roadway, then I would add them up. I'd add 1.6 plus 2.5, plus 1.8 plus 3. That's what we call equivalent axle. So this would be whatever that total comes up. What would that be? So you'd say there was 13.7 equivalent 18 kip axles due to these vehicles here.

Q. So, page 7 relates to the formula on page 6 in some manner?

A. Well, it shows that there is a wear-out, a function that occurs. It's a way of putting all this mix traffic on the roadway together.

Q. Okay. Now, I want to go through this very briefly on voir dire part of this. The damage equivalent numbers on page 6, which I believe you have transposed on page 7.

A. Yes. First of all, this is equivalent axle load. If you turn back on page 7, you see down with equivalent axle, if it was 24 kip, it would be 3.5.

Q. And you've transposed that.

A. Yes, I've transposed that.

Q. Where does the formula on page 6 come from and the equivalent axle load?

A. I said that's an approximation so I could demonstrate it. The 4th power approximately duplicates a very complex formula that's in those AASHO results -- pardon me, that blue book that I shown earlier.

Q. Is it present in the blue book?

A. It's present in the blue book, yes.

Q. Well, it is present on the sheet of the blue book that's attached.?

A. No. It's contained in the blue book.

Q. Did you derive this formula?

Figure 7. Continued.

A. This formula is just an approximation of it to show like I say, it's a very complex formula. You can approximately get the same results if you take it to the 4th power.

Q. Did you derive the approximate formula, than?

A. I worked in the derivation of it.

Q. Okay. Who with, sir?

A. _____, who was with the Federal Highway Administration at that time, _____, who at that time was chief engineer of highway design at the Texas Highway Department.

Q. Excuse me. Go ahead. I'm sorry.

A. And my position at that time?

Q. Yes, sir.

A. I worked with the Texas Highway Department at that particular time.

Q. And your position at that time with the Highway Department?

A. I believe a design research engineer, the title.

Q. So you jointly worked with these other gentlemen at that time and deriving this approximate formula.

A. Well, deriving the original formula. Pardon me. I misunderstood your question. In deriving the original formula. This is just an approximation that a lot of people use if you want to illustrate the effect.

Q. I'm sorry to be repetitious here, but as far as the formula on page 6, which is the approximate to the other one, who derived this approximate formula?

A. That's in literature someone came up with.

Q. Can you tell me what literature?

A. It's in a Highway Research Board publication in connection with the results of the AASHO Road Test. I can't give you the exact publication. I can find it.

Q. Have you -- strike that. Page 5, here's our Present Serviceability Index. Did you derive this formula, sir?

A. No. ____ and I developed that in connection with the AASHO Road Test.

Q. Is this the more complex formula?

A. No, that is not.

Q. This is another formula.

A. That's another formula. That just shows how damage is related to a rating of pavements. And the other formula uses this P.S.I. concept.

Q. And this formula on page 5 is also on this report, the AASHO test report?

A. Yes, that's correct, that's in there.

Q. And page 4, most of it is the AASHO Road Test?

A. That's a copy of the front of these different reports that came from the road test.

Q. The report themselves are larger than.

A. Oh, yes.

Q. On page 4.

A. They'll stack up. Each one of them is about 3/4 of an inch or so thick.

Q. And where were these tests performed? What areas of the United States?

A. In Ottowa, Illinois.

Q. On asphalt or concrete?

A. Both.

Q. Page 3, there are four formulas on here which give you certain indecies. Did you prepare those formulas or where did they come from?

A. They come from a publication by the Texas Highway Department, our Texas State Highway Department, Department of Transportation.

Q. Is that document here today, sir?

A. I do not have that document available today, no. They have a series of these. I just pulled out a couple of them. There are many more examples. We just took those to illustrate.

Q. The coefficient of SV which appears on page 2, maybe I'm using the wrong--

A. Slope variance.

Q. The slope variance, is that a term of art, or one you use personally, or where did you get that term, the term SV, slope variance?

A. That came from the development of that P.S.I. equation that I mentioned earlier that developed in connection

with the road test. It's recorded in the road test equation and a paper by ____ and I.

Q. Is this the P.S.I. formula on page 5 or is this the other--

A. Yes, this particular one, slow variance. It's a damage.

Q. I see. So page 2, whatever--

A. The factors that we show here on page 2 show up on this particular equation of P.S.I.

Q. On page 5.

A. On page 5.

Q. I believe you said there was some other P.S.I. formula that was the --

A. It relates how these axles applications affect P.S.I. The last page is conceptual illustration of that. It shows the P.S.I. deteriorating with an increase in actual applications.

Q. Now, on page 3, do you have personal knowledge of the numbers and measurements of this highway down in Colorado and Wharton Counties?

A. No. I did not personally do those. I took those out of a document a research report that had been prepared.

Q. Are those documents here today which give you the 3.02.

A. No, we did not bring -- I believe you had asked that questions earlier and, no, I did not bring that document. It's available.

Q. All right.

26

Q. Doctor, you're not here to testify, are you, sir, that the list of tickets you have that everyone of those are 50,000 pounds over?

A. No.

Q. In fact, there's quite a few on there, and I think we could spend a good deal of the Court's time that are two or three thousand pounds overweight. Is that correct, sir?

A. That's right.

Q. All right. Do you have any knowledge as to the size of this defendant and the number of trucks and the hauls they made in a 12-month period?

A. No, I do not.

Q. What about the number of convictions for an excavator that makes over 117,000 hauls of 25 miles in a year. Is 18 overweight violations, as you have testified, is that unusual?

PLAINTIFF'S COUNSEL: If it please the Court. I'm going to object to that question in that counsel has no evidence in the record, the figures he's quoting whatsoever. He's asking the witness, I assume, a hypothetical question on just not evidence as presented in this case, which is improper on a hypothetical.

DEFENSE COUNSEL: Your Honor, he's testified on direct that he's familiar with the trucking industry. I'm just asking since he is so familiar with the overages, if he has

27

knowledge of the number of tickets given to a major trucking company.

THE COURT: Admit the testimony.

Q. Do you have knowledge as to whether or not a company which makes over 117,000 hauls of 25 miles average, and receives 18 convictions for overload, do you know if that is or is not an unusually high number?

A. I couldn't comment on that, counsel.

Q. Are you aware of the number of overweight tickets some trucking companies get? Do you have any knowledge as to the number they get in a year for any size company?

A. I've looked at some printouts that were prepared by the Texas State Department of Public Transportation. Some of them, yes.

Q. Some of those companies get hundreds of tickets for overweight in a year.

A. That's correct.

Q. So you're not here to testify that the 18 trucks out of however many hauls my client may make on a given day, whether that's representative of the number of trucks or other hauls that client makes.

A. No. I'm here to testify on the impact of those trucks on the system.

Q. Let me ask you very briefly if I could. You said you got your Master's in 1962.

A. Yes, that's correct.

28

Figure 7. Continued.

Q. And between then and your degree from Berkely, were you doing anything except for being in school?

A. Well, I believe I indicated I have a Bachelor's degree in 1957 from the University of Texas, and shortly thereafter I went to work for the Highway Department. And while I was working full time I went to to school at night and got my Master's degree.

Q. After you got your Master's what did you do?

A. I continued to work with the Highway Department until I left to work on my PhD. in California.

Q. And after you got your PhD. in '69, who did you work for after that date?

A. In '68 I started to work with the University of Texas. I was almost through with my dissertation and then I had to go back in the summer of '69 and finish up. I actually got my diploma in '69 even though I started work with the University of Texas, started teaching in '68.

Q. What positions did you hold with the Highway Department?

A. I was design and research engineer with the Highway Department. Started off as ar engineer assistant, I guess. After my graduation worked up to design engineer.

Q. Since you've been with the University of Texas, following or about the time of your PhD., have you performed any services for the Highway Department or the State of

Texas other than this proceeding and perhaps related proceedings?

A. I've done a lot of research of the Highway Department.

Q. Is your department at the University of Texas, such as the Highway Institute maybe at A&M, are they on some type of grant program for this research from the Texas Highway Department?

A. It's not a grant. A grant infers that you can get the money do -- we actually enter with a research contract that we'll study this particular area that they're interested in. For example, if they're interested in studying rest areas, the impact of lack of maintenance on rest areas, then we'll do that. We may pull in some tusiness people and engineers, and then we'll form a team and do that research for them, and then we'll form a team and do that research for them, and then we'll issue a report to them. But we're not on retainer.

Q. Well, does money change hands for this research?

A. Yes, you bet.

Q. Have you worked on projects for the Highway Department in your position at U. T.?

A. Yes, that's correct.

Q. That were covered under whatever these agreements were.

A. Yes, that's correct.

Q. Is your work here today, and your preparation to today, and your report, was that done under an investigative-type research program?

A. It was done with the Attorney General's Office. Our actual contact's been with the Attorney General's Office on this project.

Q. What I'm asking is, is this the first time you've worked with the Attorney General's Office?

A. This is the first time I worked with the Attorney General's Office.

Q. And what about your department a the University of Texas, have they assisted the Attorney General in any previous investigation or other highway-related work?

A. I'm sure they have but I can't really quote a specific one. So I would just have to say I don't really know at this time.

Q. But in this case you were contacted from the Attorney General's Office as opposed to being directly involved with the Highway Department.

A. Yes, that's correct.

Q. Have you consulted with the Highway Department in the preparation of your work for today's hearing as well as related matters?

Q. Are you currently involved with the Highway Department or is U.T. involved with the highway Department in other of these research projects?

A. Yes, we do research.

Q. Currently?

A. Yes, currently

Q. Do you know where the defendant is located?

A. No.

Q Have you performed any studies or investigative work concerning the routes these 18 trucks may have taken in 1983 or the 20 trucks took in '84?

A. No, I have not.

Q. So you don't have any knowledge, then, about what roads may or may not have been damaged?

A. I don't know what road. I was talking more in principle, whatever pavement they are these relative damage factors would be applicable.

Q. Let me ask you in relation to your general testimony about roads in general and what trucks or other vehicles can do. As I understood what you said, when the federal highways, or state highways which are recipients of federal money, are built they have a projected life of 20 years?

A. They have a design life of 20 years, yes, generally.

Q. Is there a report prepared for each highway such as interstate or U. S. highway in which the studies for how long the life will -- the effect of urbanization and so forth?

A. You say is a report prepared. I guess a design was made that involves certain inputs, loads, etcetera, and

32

material properties, etcetera, that are required to design and come up with a uniqueness.

Q. What I'm asking is, if I wanted to find out whether Interstate 35 was built, for example, which I believe runs through Austin -- is there a report in which this 20-year life, and the number of cars estimated, and the kips, or the axles, and all that you testified about were estimated by someone, is that codified in the report?

A. I would hesitate to answer that at this particular point in time since I really don't get that involved in day-to-day operations of the Highway Department. So I really couldn't answer that question.

Q. Well, how do you know, that the highways are designed 20 years, and that they take into account in that design the effects of axle loads, and number of vehicles, and so forth?

A. I have designed them before myself.

Q. And you've taken the 20 years.

A. That's correct.

Q. What highways have you designed, sir?

A. The most recent one I worked on is through the interstate exchange north of San Antonio on Interstate 35 and several sections on to the north of Interstate 35. And then in my days with the Highways Department I worked on many, many miles of design of highways through the state.

33

Q. Interstate highways?

A. Yes, interstate, farm-to-market, the whole range.

Q. In reference to those interstate highways, can you remember studies being done or estimates being done by anyone concerning the effects of traffic and what pavement design we need?

A. We have monitored the condition of the roadways since 1974 and the deterioration of those roadways.

Q. Other than monitoring, I'm basically referring to new construction. I believe you testified you were involved with new construction projects for the interstate highway system in the State of Texas.

A. Yes, that's right.

Q. Did the specifications ever differ on any of those highways?

A. You try to reflect the thickness that is a reflection of the type of roadbed material that's out there. If there's poor material, then you generally come up with a thicker pavement, or if it's a good material, then a thinner pavement.

Q. What I'm trying to find out, is, in your experience with new federal highway construction, which would be the interstate U. S. highway systems in which this 20-year life is estimated and, thus, specifications are drawn to allow for the 20-year life, who is it in the design team that studies the effects of traffic, the

34

Figure 7. Continued.

effects of urbanization, the effects of weather, and all other matters that go into specifications?

A. The Planning and Survey Division of the Highway Department makes estimates of the equivalent 18 kip axle load that will be on a given facility.

Q. And the highways that you worked on for 18 kips was furnished to you on written form?

A. Yes, that's correct.

Q. You don't have any of those documents here today for any of the roads on which the defendants trucks have operated?

A. No, I don't have any today.

Q. Do highways, sometimes deteriorate more quickly than originally planned?

A. Yes.

Q. What role does increased urbanization, increased construction bear upon the life of a federal highway with a 20-year life?

A. Because of an estimate, let's say, for example, that 20 million, you'd estimate 20 million, equivalent 18 kip axle loads during a lifetime, and then urbanization comes in, or heavier loads, or anything can take away that 20 years. And so it won't last the 20 years if all of a sudden there's a lot of heavy industry development and more trucks are there, than the 20 million? Then that 20 million may be in 10 years rather than 20 years.

Q. Are you familiar with the nature of the urbanization in the north Dallas area, particularly along Interstate 65, LBJ Freeway, over the last 10 years?

A. Just in a brief way of driving through there as a tourist.

Q. The traffic is quite heave in that area, isn't it?

A. That's correct.

Q. The effect of that traffic as well as new construction with legal loads by trucks bringing equipment in would have an effect upon the life of the highway, wouldn't it.

A. Yes. Any load takes away some of the life of the pavement and when you overload it you just take away faster.

Q. Excluding for the minute overloaded trucks, whoever they are, whether they were the 18 of my client or whoever, the highways are designed according to you on a 20-year life based on certain traffic, certain large trucks, all these things are taken into account. Is that correct?

A. Yes, and estimates are made based on the equivalent 18 kip.

Q. That 20-year life will be reduced to the extent that there is more traffic and more trucks for whatever reason, new construction, or whatever else, that could not have been predicted or was not predicted, is that true?

A. Yes.

Q. Dr. _____, I have been asking you about some of the other causes of highway deterioration based upon the 20-year life expectancy. Other than overloaded trucks about which the state is complaining, we discussed increased traffic, increased urbanization, or increased traffic for whatever reasons. And I was asking you in reference to maintenance.

A. Yes.

Q. What impact does maintenance have on a highway after it's built?

A. The last exhibit showed the roadway deteriorating with the traffic application, the lack of maintenance will cause that to go down a little faster rate. It will affect the rate of that deterioration.

Q. When we're talking about maintenance, what are we talking about on highways?

A. Well, for example, sealing cracks, patching, little patching here and there, or putting a seal coat on. That seal coat being a layer of, if it's asphalt highway, for example, putting a thin layer of asphalt followed by stones.

Q. On a cracked sealing, or other sealing coats placed on highways, is the purpose of that to prevent water from entering into the subgrade below the concrete or the asphalt?

A. When you seal cracks, yes, that's to prevent the entry of water and other deleterious material from entering.

Q. And when water from rain enters into the pavement, whether it be asphalt or concrete, and gets into the base and the subgrade, what does that do to the pavement?

A. That makes it weaker.

Q. And what is the ultimate effect on that weakened subgrade upon the surface of the highway as traffic moves across it?

A. It would deteriorate faster.

Q. Are you familiar with the pumping effect?

A. Yes.

Q. And what is the pumping effect that is caused by that water?

A. I assume you're talking about pumping under poured cement and concrete pavements. And when the trucks go over it, it causes a pressure, water build-up, and the water squirts out. Simulates a pump. Ejects the water, then materials come out with the water.

Q. And the pavement is -- detionated when any vehicles drive over it. Isn't that correct?

A. Yes. The impact varies with the weight of the vehicle. The heavier the vehicle, then the more pumping will occur.

38

Q. And you get a pavement failure eventually with this pumping due to lack of maintenance, if there is a lack of maintenance.

A. Yes, that's correct.

Q. And with asphalt you get potholes.

A. Yes, that's correct.

Q. Are you aware of the maintenance efforts or the lack thereof on the highways over which the defendant operates his trucks?

A. No, I can not comment on that.

Q. So you cannot comment on the life of those highways whether they've been reduced by heavy traffic, lack of maintenance, or any other reason.

A. I cannot comment on the lack of maintenance because I'm not familiar with the maintenance that's taken place. So I really couldn't comment on the maintenance.

Q. Are you familiar with permits which can be given to vehicles in the State of Texas including motorized cranes or other equipment that is by its nature heavier than the 80,000 pounds?

A. I'm vaguely familiar that there is a process by which they can get a permit.

Q. In an area where those vehicles may travel over the roadway, do they damage the highway?

A. Yes.

Q. Do they damage it more than the 80,000 vehicles, if they weigh more than 80,000 pounds?

39

A. This would depend on the number of axles and their configuration under the particular vehicle.

Q. As regards to the AASHO Road Test, are you familiar with another theory or criticism being directed at that road test that it does not include maintenance or lack of maintenance in its analysis?

A. There was day-to-day maintenance at the AASHO Road Texas. They had a maintenance engineer. His name was _____.

Q. Did the road test come up with an opinion or analysis based on its data?

A. Yes, based on the observations and data collected there were some results presented. Are you talking about relative to maintenance?

Q. I'm talking about relative life of a highway after its construction.

A. The test came up with a series of equations. It says if you have this load, this many applications, then there would be a certain amount of deterioration.

Q. And in those equations was maintenance a factor?

A. No, there is not a variable for maintenance in that equation.

Q. Shouldn't maintenance be included or the effect of maintenance in determining how long a highway will last?

A. It's implied by the nature of the road test. There was some maintenance there. And so that's implied in the

40

Figure 7. Continued.

equations. But if you ask me as a researcher, I would like to have a model that says the effect of maintenance in there, a variable.

Q. And the variable means just that. It can vary from whatever constant they used in their road test.

A. Yes.

Q. Have there been any other criticisms directed at the AASHO Road Test?

A. Yes. There's always the age factor, say, whether it was over a 2-year period or what would happen if it had been 20 years.

Q. Have there been any subsequent reports that have come out that have been published since the AASHO report was published in 1962?

A. Of this magnitude, no.

Q. Has there been a school of thought that has come out in the engineering circles with which you may be familiar that is contrary to what you testified here today, that being that two trucks of 45,000 pounds do more damage than one truck of 90,000 pounds? Do you know of that opinion or school of thought that exists in the engineering view?

A. It depends on how you put it on the axles. If you put two axles down and put all 45,000, or if you put 40,000 of that 45,000 pounds on one axle, it may do more damage than spreading it out over that 45,000, or 80,000 pounds, over a series of axles.

Q. On your chart up there where we had all the trucks, you spread it out on the axles?

A. Yes.

Q. You stated you have published approximately 300 papers. Is that correct, sir?

A. Yes.

Q. And where have they been published?

A. In the Transportation Research Board, the American Society of Civil Engineering, American Concrete Institute, and a lot of them are Center for Transportation Research publications.

Q. Are you a soils engineer also, sir?

A. I'm a pavement engineer. It encompasses soils. I'm not a soils engineer that designs foundations of a building. But as it applies to pavements, I'm a soils engineer.

Q. And so you're familiar with lime stabilizing clay or cement stabilizing sand, and that sort of thing.

A. Yes.

Q. Are you familiar with the relative weights of the various materials, sand, clay, as you travel across the state?

A. When you say the relative weights, what do you mean?

Q. One cubic year of sand may not weight what one cubic yard of clay weighs.

A. Yes.

Q. Is there a variation in the weight of material?

A. Yes.

Q. Is there also differing weights based on whether that material is wet or dry?

A. Yes.

Q. The density of it.

A. Yes.

DEFENSE COUNSEL: I have nothing further at this time, your Honor.

REDIRECT EXAMINATION

QUESTIONS BY PLAINTIFF'S COUNSEL:

Q. I'll ask you whether or not it makes one iota of difference whether road is in horrible condition or whether the road is in top condition, as to whether or not a truck with 50,000 pound overload, or whatever overload, under your formula still does as much damage as three ordinary trucks.

A. That's a relative damage. That's correct.

Q. All right, sir. So if it's a bad road, that overloaded truck, it's going to wear out that much quicker, or if it's a good road it doesn't make any difference, does it?

A. Your statement is correct.

Q. So the condition of the road doesn't have anything to do with the damage of the overloaded truck, does it, as to the amount of damage, the relative damage?

A. The relative damage.

Figure 7. Continued.

APPLICATIONS

The foregoing research should prove helpful to highway and transportation administrators, their legal counsel, federal administrators, and others involved in the prosecution of trucking companies that violated the highway load limits. The approach to trial strategy described, using Texas as a case example, should provide valuable insights to others who are involved in seeking injunctive relief against the trucking companies. Attorneys should find this paper especially useful in their work as a concise reference document in overweight truck cases.

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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