

"A presentation by Dan Chamberlain at the 1998 ATLA Annual Convention at Washington, D.C. Mr. Chamberlain is an Officer of the Tort Liability Section of ATLA."

By: Daniel S. Chamberlain
800-269-3443
Indianapolis, Indiana
<http://www.uslaws.com>

Note: If you would like a copy of the endnotes, please [contact Dan Chamberlain](#) by e-mail.

I. Introduction.

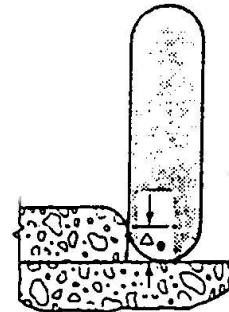
This paper shall serve as a guide to handling highway defect and design cases involving road shoulder edge drop, and how to maximize recovery by the use of demonstrative resources like video animation. A checklist is provided that will guide an attorney handling a highway defect case. Finally, critical information on highway design and defect issues may be obtained, in most cases free of charge, via the Internet.

II. Pavement Edge Drop Off.

One of the most common highway defects is a pavement edge drop off. An edge drop is a vertical discontinuity between adjacent road surfaces. As early as 1954, it was recognized that "[u]nstabilized shoulders frequently are dangerous because the elevation of the shoulder at the pavement edge may be several inches lower than the pavement."

The vertical discontinuity separates the soft or unstabilized shoulder adjacent to the paved roadway, but may also occur during roadway repaving projects and in highway construction zones.

The repair of unpaved road shoulders adjacent to pavement edges as well as the repair of deteriorated pavement edges is a maintenance activity that requires continuous effort on the part of all state and local highway agencies. AASHTO recommends "[r]outine maintenance for shoulders . . . as part of a regular schedule. The measures to be used and the frequency of their use should be regulated by traffic volumes and loadings, general condition, time of year and the structural materials making up the shoulders" Indiana requires that the roadway "shall be kept in such a condition that such traffic will be adequately accommodated. [B]arricades shall be placed at 200 foot intervals where drop-offs greater than 3 inches (7.6 cm) are adjacent to the shoulder until the aggregate [gravel] or earth wedge [dirt] is placed." For purposes of roadway construction or highway repaving, "[s]houlders shall be graded and shaped to assure reasonable safety to traffic before opening any completed pavement to traffic."



If the edge drop is steep enough, normally above (3) three inches, the vertical discontinuity can create a potentially hazardous situation for drivers that attempt to steer over it. The normal reaction of a driver is to promptly return the vehicle to the traveled portion of the roadway. The urgency the driver feels to accomplish the return may be increased if the shoulder surface is not smooth. The probability of a successful recovery is dependent upon the re-entry angle between the tire and the pavement edge, the height of the edge drop, and the shape of the pavement edge. The hazard is maximized if the wheels of the car hang up or scrub along the vertical face of the drop. Such a situation can lead to an unexpected change of direction on the part of the vehicle that may prove difficult to control.

III. The "Scrubbing Effect" and Re-Entry Steer Angle.

The re-entry steer angle refers to the relative position of the right front vehicle tire and the pavement edge after the tire has left the paved portion of the roadway. The steer angle is generally characterized as high, moderate and shallow. A high or moderate steer angle may cause the tire to scrub the pavement edge during re-entry. As the steer angle is increased, the wheel develops a large amount of resistance against the pavement edge. Once the pavement edge is mounted, an immediate lateral acceleration and velocity combine to produce rapid lateral movement. Loss of vehicle control or lane encroachment may occur.

The "Scrubbing Effect", as the term was originally defined in 1976, has been recognized as a significant safety problem. The phenomenon known as the "Scrubbing Effect" and resultant loss of vehicular control was described in the following scenario:

1. A vehicle is under control in a traffic lane adjacent to a pavement edge where an unpaved shoulder is lower than the pavement.
2. Through inattention, distraction or some other reason the vehicle is allowed to move into a position with the right wheels on the unpaved shoulder and just off the paved surface.
3. The driver then carefully tries to gently steer the vehicle to gradually bring the right wheels back up onto the paved surface without reducing speed significantly.
4. The right front wheel encounters the pavement edge at an extremely flat angle and is prevented from moving back onto the pavement. The driver further increases the steer angle to make the vehicle regain the pavement. However, the vehicle continues to scrub the pavement edge and does not respond. At this time there is equilibrium between the cornering force to the left and the edge force acting to the right.
5. The driver continues to increase the steer input until the critical steer angle is reached and the right front wheel finally mounts the paved surface. Suddenly in less than one wheel revolution, the pavement edge force has disappeared and the cornering force of the right front wheel may have doubled because of increases in the available friction on the pavement and the increases in the right front wheel load caused by cornering.
6. The vehicle yaws radically to the left, pivoting about the right rear tire, until that wheel can be dragged up onto the pavement surface. The excessive left turn and yaw continues and it is too rapid in its development for the driver to prevent penetrating the oncoming traffic lane.
7. A collision with oncoming vehicles or spin out and possible vehicle roll may then occur.

Given this scenario, the claims adjustor, the defense lawyer and ultimately the jury will be asleep or confused before the presentation of damages. As a result, a video animation and other visual aids will quickly and efficiently demonstrate the dangers presented by the road shoulder drop off and radical loss of vehicle control caused by the "Scrubbing Effect."

IV. Edge Drop Off in Excess of (3) Three Inches is Dangerous.

The "Scrubbing Effect" was "considered to occur at edge height levels from one to five inches. Scrubbing is not a safety concern at one inch edge height but is possible. Scrubbing loses safety significance for automobiles as edges exceed five inches, since automobiles are rarely able to mount edges this high. For trucks, however, scrubbing will be important at greater edge heights."

If you or a family member has been injured as a result of a highway defect or if you are an attorney that would like to discuss your clients case for co-counsel or referral opportunities, please feel free to contact Attorney Dan Chamberlain at 1.800.269.3443.

Researchers have failed to reach a consensus on a safe pavement edge height for the naive driver. It appears that most researchers agree however that "edge drops of no more than 3 inches should be allowed. And then only if signed for speeds no greater than about 25 mph. Since there may be problems in slowing traffic to that degree in many situations, it is desirable that attempts be made to limit edge drops to a value significantly less than 3 inches. On this basis, 2 inches is safe, when signed at 40 mph, and 1 inch is safe for freeway speeds.

V. Shape of the Pavement Edge. Pavement edge slope plays a key role in a driver's ability to maintain vehicular control after driving onto the shoulder. The general rule is that the greater slope or curve in the pavement edge leading from the shoulder to the roadway will provide a safer environment to regain the paved roadway. For example, a pavement edge with a 90 degree vertical angle will be marginally safe up to three inches in pavement edge height. A pavement edge that is slightly rounded will be marginally safe slightly less than 4 inches of edge height. Whereas, a pavement edge with a 45 degree slope will be reasonably safe up to six and one-half inches in pavement edge height. It must be noted that the edge height and pavement edge slope are independent variables in shoulder drop off safety and are dependent upon vehicle speed, vehicle size, driver skill and the criteria listed above.

VI. Ten Steps to the Successful Preparation of a Highway Defect Case.

- 1. On-Sight Attorney Investigation.** - There is no substitute to a thorough on-sight investigation. An attorney should go to the scene of the incident as soon as practical. Schedule the visit to coincide with the time of the occurrence. Important details may be discovered. The angle of the sun's rays, a street lamp that is burned out, weeds or bushes that restrict line of sight, visibility or other details that may have been overlooked or dismissed by the client or the investigating police agency. If the incident occurred at night, schedule a second visit during the daytime.
- 2. Interview the Witnesses at the Scene.** - Meet with the witnesses at the scene of the incident, including police officers, tow truck personnel, ambulance driver and emergency medical technicians. Videotape the interview. Ask the witnesses to explain their testimony. Instruct the witnesses to point out significant details.
- 3. Claims against a Governmental Entity.** - In jurisdictions that recognize limited Governmental immunity, an attorney must file appropriate tort claims notices. Notices should be directed to all governmental agencies immediately. Our office includes the following in tort claims notices, "In the event that there is any other governmental entities that are or may be, wholly or partly liable to the claimant, please provide the undersigned, by certified mail, the entity name, address, and agent. Further, you are commanded to provide a copy of this notice to such potentially responsible party. Unless notified within five days of the date of mailing to the contrary, this notice shall be deemed sufficient to comply with the provisions of the Indiana Tort Claims Act, [Indiana] Code, [34-4-16.5-1, et. seq.]."
- 4. Talk with neighbors.** - Residents, at or near the scene of a vehicular incident, may be important sources of information about highway defects. Prior complaints, conversations, public hearings, or other discussions may provide fertile grounds to establish notice and liability.
- 5. Vehicles or Workers at or near the scene.** - Pay careful attention to all vehicles depicted in photographs or present during an on sight investigation at the scene of the incident. Such vehicles may reveal potential defendants like the county, city, state or other private construction crews repairing road defects or performing highway construction or roadway repaving.
- 6. Physical Evidence - Vehicular.** - Preserve the vehicles involved in the incident. If possible, obtain title to the vehicles after the collision. The vehicles may hold the key to liability. Scrapes on the undercarriage indicate that the car bottomed out prior to the collision. Scuffed rubber or a flat tire may show that the driver had attempted to return the vehicle to the roadway. File a motion for a temporary restraining order, if necessary, to prevent the destruction, sale or repair of the vehicles prior to inspection.
- 7. Physical Evidence - Roadway.** - Survey several hundred feet prior to and after the incident. Such physical evidence may include gravel or dirt thrown from the roadway indicating that the driver attempted to regain control of the vehicle and return the vehicle to the roadway. Skidmarks may show the point where the driver was able to create traction with the paved surface. Yaw marks may indicate where the collision occurred or where the mechanical failure caused the vehicle to lose control. Most physical evidence will be indistinguishable within a few months.
- 8. Expert Analysis.** - Despite attorney and investigator review, there is no substitute to competent evaluation by a witness qualified to determine whether any highway defects may have caused or contributed to the incident. An expert may be able to give opinions on the adequacy of traffic control devices including signage, road construction or design flaws including placement of utility poles and road maintenance.
- 9. Lawsuit and Detailed Discovery.** - File

a Complaint and issue detailed discovery to determine the identification of additional potential defendants. Also, notice the 30(b)(6) deposition, duces tecum, of the county engineer, building contractor and agencies responsible for maintenance and upkeep of the roadway.¹⁰ *Educate the Claims Adjustor and the Defense Attorney*. - A road shoulder drop off may be responsible for a single car collision or may be a contributing factor to a multiple vehicle collision. A client may describe the sensation of the vehicle "dropping off" the side of the roadway and not realize the significance. Assume that the claims adjustor and defense lawyer are naive about drop off hazards. Educate the claims adjustor and the defense attorney early in the case. Provide copies of the treatises and studies listed in this submission. Locate state regulations and case law to support your position. By providing this information to your adversary and to your expert, you will be ahead in case preparation and perhaps over-the-top at a mediation or settlement conference.

VII. Standards, Codes and Other Resources available via the Internet.Listed below are excellent resources available to trial lawyers on the Internet. Most websites provide free information that may assist in the preparation of your case. Additional links to useful websites may be found on ATLA Net at the Motor Vehicle Collision, Highway and Premises Liability Litigation Section homepage. (<http://www.atlanet.org>)

AASHTO - American Association of State Highway and Transportation Officials, 444 North Capitol Street, NW, Suite 249, Washington, DC 20001 Telephone: (202) 624-5800, Fax: (202) 624-5806 <http://www.aashto.org/>

ANSI - American National Standards Institute, 11 West 42nd Street, New York, New York 10036 Telephone: 212.642.4900, Fax: 212.398.0023 <http://web.ansi.org/default.htm>

ASME - American Society of Mechanical Engineers, International, 145 E. 47th St., New York, NY 10017-2392, Telephone: 800-THE-ASME <http://www.asme.org>

ASTM - American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshocken, Pennsylvania USA 19428-2959 Telephone: (610) 832-9585, Fax: (610) 832-9555 <http://www.astm.org/>

NHTSA - National Highway Traffic Safety Administration, Office of the Administrator (NAO-10), 400 Seventh St., SW, Washington, DC 20590 <http://www.nhtsa.dot.gov/>

NIST - National Institute for Standards and Technology, Gaithersburg, Maryland, Telephone: (301) 975-3058 <http://www.nist.gov/>

TRB - Transportation Research Board, National Research Council, 2101 Constitution Avenue NW, Washington, DC 20418 Telephone: 202-334-2000 <http://www.nas.edu/trb/>

EXHIBIT "A" - COMPLAINT

1. That at all times relevant herein, the Plaintiff, Marzella Grimes was a resident of the State of Indiana. 2. That at all times relevant herein, the Defendants, Marion County City-Council and Marion County Department of Transportation (hereinafter, CITY), were governmental entities located and operating within the State of Indiana. 3. That at all times relevant herein, Construction Co., Inc. (hereinafter, CONSTRUCTION) was a corporation duly authorized to transact business within the State of Indiana. 4. That on or about September 8, 1993, at approximately 11:15 a.m., the Plaintiff was operating a school bus on County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana, when the right front tire dropped approximately one foot to the shoulder of the roadway causing the Plaintiff to lose control of the vehicle and crash into a telephone pole. 5. That at all times relevant herein, County Road 800 West was under the care and control of the Defendants. 6. That prior to the time of the incident, CONSTRUCTION, was hired by the CITY to complete a roadway resurfacing project on County Road 800 West. 7. That at or about the time of the incident, CONSTRUCTION, was in the process

of resurfacing County Road 800 West.8. That at all times relevant herein, the roadway shoulder was in excess of 3" higher than the adjacent road surface in violation of Indiana Law.9. That the Defendants were negligent in the design, construction, resurfacing, and maintenance of the roadway in question and its adjacent shoulders.10. That the Defendants failed to comply with the Indiana Department of Highways Standard Specifications requiring the placement of barricades every 200' along the pavement edge drop-offs in excess of 3".11. That as a direct and proximate result of the Defendants' negligence, the shoulder of County Road 800 West in the area where the Plaintiff was driving at the time of the collision, was in an extremely dangerous condition which precluded the Plaintiff from maintaining control of her vehicle.12. That proper statutory notice has been given to the Defendants pursuant to I.C. 34-4-16.5-1 et seq.13. That as a direct and proximate result of the Defendants' negligence, the Plaintiff was injured and has incurred the following damages and expenses:A. Injuries to her body, some of which may be permanent;B. Medical and hospital expenses, and she may incur future medical and hospital expenses;C. Lost wages and an impairment to her future earning capacity; and,D. Pain and suffering, which she will likely incur in the future.

EXHIBIT "B" - SAMPLE INTERROGATORIES

INTERROGATORY NO. 1: Have the Defendants or any other entity, agency, or person authorized by the Defendants made an investigation into the incident that occurred on September 8, 1993, at approximately 11:15 a.m., when the Plaintiff was operating a school bus on County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana? If so, for each such investigation, please state the following:A. The name of the person(s) that requested the investigation;B. The name of the person(s) that performed the investigation;C. The dates of the investigation;D. At what location(s) was the investigation made;E. Whether any written notes or memoranda of any kind were made in connection with the investigation, including verbal or written summaries or reports;F. Whether a written or verbal report of the investigation was made and to whom;G. The dates of each verbal or written report;H. The name of the person making each such verbal or written report;I. The facts, conclusions, or opinions expressed in such written or verbal report;J. The present location of each such written report; and,K. The name and address of the person having custody of each written report.

INTERROGATORY NO. 2: Identify any and all governmental entities, companies, individuals, contractors and/or subcontractors that performed work on County Road 800 West, including its roadway shoulders immediately adjacent to the paved portion of the roadway, within five miles east and five miles west of its intersection with County Road 200 East located in the eastern most portion of Marion County Indiana (hereinafter, AREA),during the last 10 years. For each, please state:A. The name and address, Resident Agent, Corporate Status, for each ;B. Description of all work started, but not completed;C. Description of all work started and completed;D. The monetary cost of the work and whether the cost was paid and by whom;E. A list of all documents concerning all work, whether completed or not, including, but not limited to contracts, time cards, material order sheets;F. The name and address of the person most knowledgeable about the work;G. The reason that the work was initiated and whether the same was completed;H. All standards, codes, policies and procedures that control the work including, but not limited to the nature, quality, and materials used in the construction.

INTERROGATORY NO. 3: Identify each and every person, firm, entity, or organization which was involved with the planning, design, construction, maintenance, repair and upkeep of the AREA during the last 10 years. For each, please state the following:A. The name and address, Resident Agent, Corporate Status, for each ;B. Description of all work started, but not completed;C. Description of all work completed;D. The monetary cost of the work and whether the cost was paid and by whom;E. A list of all documents concerning all work, whether completed or not, including, but not limited to contracts, time cards, material order sheets;F. The name and address of the person most knowledgeable about the planning, design, construction, maintenance, repair and upkeep of the AREA;G. The reason that planning, design, construction, maintenance, repair and upkeep of the AREA was initiated and whether the same was completed;H. All standards, codes, policies and procedures that control the planning, design, construction, maintenance, repair and upkeep including of the AREA

INTERROGATORY NO: 4: Has the care, custody and control of the AREA as the same is defined in the Indiana Department of Transportation Specification Manual (1988), passed between any governmental entities, companies, individuals, contractors and/or subcontractors, and if so, when and for what purpose?

INTERROGATORY NO. 5: Identify all persons whom you expect to call as expert witnesses at trial. As to each expert witness, please state the following:A. The subject matter in which the expert is expected to testify;B. The substance of the facts and opinions to which the expert is expected to testify;C. Summary of the grounds for each of the expert's opinions; and,D. Please identify all standards, codes, policies and procedures that said expert has relied upon or will rely upon in rendering each of the expert's opinions.

INTERROGATORY NO: 6: Identify each and every expert who has been retained or specially employed by the Defendants in anticipation of this litigation or in preparation of the trial of this cause and who is not expected to be called as a witness at trial.

INTERROGATORY NO: 7: Have the Defendants ever installed or caused to be installed within the last 10 years any markers or signs designed to indicate a shoulder drop-off or defective road shoulder in the AREA or adjacent thereto? If so, what sign or marker was installed and when?

INTERROGATORY NO: 8: Did the Defendants ever move or cause to be removed any road signs within the AREA within the last five years. If so, for each sign moved and/or removed, please state the following:A. The reason for the action;B. The description for each and every sign;C. The date said action occurred;D. The governmental agency or private entity responsible for the action; and,E. The location of each sign prior to the action and whether was reinstalled elsewhere, and if so, where.

INTERROGATORY NO: 9: Please describe, in detail, all roadway maintenance upkeep and repair plans or schedules, if any, whether written or otherwise, for the AREA, including road shoulder maintenance. Attach to your responses hereto, all written materials including receipts, time cards, calendars or any other information pertaining to the roadway maintenance, upkeep and repair.

INTERROGATORY NO: 10: Has there been any change in the AREA since its construction with respect to the width of the roadway, its location or route, its grade, subsurface, drainage and road shoulders? If so, for each change, please state the following:A. The date on which the change was made;B. The name and address of the person, firm or entity who made the change;C. A description of the change;D. The reason for the change; and,E. The name, address and job title of the person who authorized the change.

INTERROGATORY NO: 11: Have the Defendants furnished any labor, materials, or equipment for the repair or maintenance of the segment of the AREA since September 8, 1993? If so, please state the following:A. The date on which each repair or maintenance work was performed;B. A description of the work done;C. The frequency with which the repair or maintenance work was done;D. The last date prior to September 8, 1993 when the repair or maintenance work was done; and,E. The name and address of the person, firm or entity who performed any such work.

INTERROGATORY NO: 12: Has any complaint been made by any person to any State or County Official prior to September 8, 1993 with respect to the design or condition of the AREA? If so, for each complaint, please state the following:A. The date made;B. Name and address of the person who made it;C. The name, address and job title of the person to whom each complaint was made;D. Whether such complaint was written or oral;E. A description of the complaint;F. Whether any action was taken because of the complaint and if so, description of such action; and,G. The name and address of the person who has custody or control of each written complaint.

INTERROGATORY NO: 13: Has any claim for damages been made against the Defendants by anyone other than the Plaintiff for injuries received on the AREA in the past 10 years? If so, for each such claim, please state the following:A. The date of the claim;B. The name and address of the claimant; and,C. The

description of any such disposition made of the claim and the amount of any settlement or damage verdict.

INTERROGATORY NO. 14: Please state whether you claim that the damages of the Plaintiff was caused in whole or in part by any "non-party" (meaning "a person who is, or may be, liable to the claimant in part or in whole for the damages claimed but who has not been joined in the action as a defendant by claimant"), and if so, state:A. The name, current address, telephone number, social security number, date of birth, and last known place of employment of each such non-party;B. The factual basis or legal grounds upon which you base such claim;C. The full names, current addresses, telephone numbers and places of employment of each person known to the Defendant or his attorneys or investigators who have knowledge of facts or relevant information concerning such claims; and,D. Identify all documents within the Defendant's care, custody or control, and the name and current address of the custodian thereof, upon which the Defendant relies to support such claim.

EXHIBIT "C" - NOTICE OF TRIAL RULE 30(B)(6) DEPOSITIONS

Pursuant to Trial Rule 30(B)(6) of the Indiana Rules of Trial Procedure, notice is hereby given that counsel for the Plaintiff in this action will take the deposition of Defendant, City of Indianapolis, beginning at 10:00 a.m. on October 17, 1996, at the law offices of McHale Cook & Welch, 320 N. Meridian Street, Suite 1100, Indianapolis, Indiana.Examination is requested on the following matters:

1. The construction contract entered into between the City of Indianapolis and Construction Co., Inc. for the resurfacing of roadways in Warren Township including the roadway at or near the intersection of County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana.2. Requisition No. RF04963.3. Contract documents for resurfacing with related items in Warren Township, City of Indianapolis, DOT-RS-93-803.
4. All information relating to the resurfacing of County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana.
5. All information concerning Indiana Department of Highways, daily report and diary concerning the road reconstruction project at County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana.6. The diagrams depicting County Line Road near its intersection with County Road 200 South in Marion County, Indiana.7. The relationship between the City of Indianapolis and Construction Co., Inc., with respect to the subject resurfacing of the roadway at County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana.8. Each stage of the road resurfacing project at issue in this case and when each stage of the project was completed and the person most knowledgeable about the same.9. The incident that occurred herein on September 8, 1993 near County Road 800 West and its intersection with County Road 200 South in Marion County, Indiana, involving Marzella Grimes.10. Hazards created by the difference in height from the paved road surface to its adjacent road shoulder.
11. All signage or warnings placed along County Road 800 West from August 1, 1993 through September 14, 1993.
12. All standards, codes, policies and procedures that concern the resurfacing project for County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana.Pursuant to Trial Rules 30(B)(6) and 34 of the Indiana Rules of Trial Procedure, notice is further given that the Defendant, City of Indianapolis, is requested to produce on the day prior to the taking of the deposition on October 17, 1996, at 10:00 a.m. at a location to be mutually agreed upon between counsel, the following documents and tangible things which are in its possession to remit counsel for the Plaintiff to inspect and copy any of these documents. The items to be produced are as follows:REQUEST FOR PRODUCTION

- i. Any and all documents, whether previously produced or not, concerning each subject matter identified in the examination section listed above.
- ii. All photographs depicting the subject roadway at issue at any time in this matter.
- iii. All bid materials for the road construction project including photographs, measurements, etc.
- iv. A chronology of the road resurfacing on County Road 800 West near its intersection with County Road 200 South including a time line, if any with respect to each portion of the project and its completion date.
- v. All signage, warnings, landmarks and/or other requirements as mandated by Marion County ordinance and the Manual on Uniform Traffic Control Devices as adopted by the State of Indiana for the subject roadway near its intersection with County Road 800 West and County Road 200 South in Marion County, Indiana on September 8, 1993.
- vi. All research, treatises, handbooks or other documentation concerning hazards created by the difference in height from the paved road surface to its adjacent shoulder (also known as shoulder drop-off)
- vii. All research, treaties, handbooks or other documentation concerning hazards regarding driver behavior when presented with a shoulder drop-off.
- viii. All standards, codes, policies and procedures that concern the resurfacing project for County Road 800 West near its intersection with County Road 200 South in Marion County, Indiana