Case No. 78701

In the Supreme Court of Nevada

MOTOR COACH INDUSTRIES, INC.,

Appellant,

vs.

KEON KHIABANI; ARIA KHIABANI, MINORS, by and through their Guardian MARIE-CLAUDE RIGAUD; SIAMAK BARIN, as Executor of the Estate of KAYVAN KHIABANI, M.D.; the Estate of KAYVAN KHIABANI; SIAMAK BARIN, as Executor of the Estate of KATAYOUN BARIN, DDS; and the Estate of KATAYOUN BARIN, DDS,

Respondents.

APPEAL
from the Eighth Judicial District Court, Clark County
The Honorable ADRIANA ESCOBAR, District Judge
District Court Case No. A-17-755977-C

APPELLANT'S APPENDIX
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picture of, the bus is -- looks like about 40 percent through the crosswalk. Is that fair?

A. I -- I really don't know. I just know that's about right where I saw him. I don't know about how much percentage.

Q. Okay. So about a third of the bus was through the crosswalk?

A. About three-quarters of the bus was past the zero line.

Q. Okay, great.

Well, would I be correct that since you were in the far right lane, the bicyclist had to be in the bike lane immediately before impact?

A. Had to what?

Q. Had to be in the bike lane immediately before impact?

A. No, sir. No, sir.

MR. STEPHAN: Objection; form. Foundation.

BY MR. KEMP:

Q. Why do you say "No, sir"?

A. Because as you see right here, he's not -- he's not in -- I just showed you exactly where I first saw him at, sir. And as you see, he's out of the bike lane.

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Q. Do you know how far -- how wide the right-hand lane is?

A. I don't -- I do not know.

Q. Do you know how wide the bus is?

A. Not offhand, sir, no.

Q. Do you know if it's even possible to give 3-feet clearance between the bus and this lane?

A. Yes, it is possible, yeah.

Q. Okay. You think at all times you gave him 3 feet of clearance?

MR. STEPHAN: Objection; form and foundation of the question.

THE WITNESS: He was not in -- he was not anywhere near me until right there, sir. So remember, I didn't -- he was not in the bike lane.

BY MR. KEMP:

Q. How do you know he was not anywhere near you until right there if you don't know where he was between the zero and the 300-foot mark?

A. When I say I don't know where he was, I'm saying he was not anywhere near the bus. He was not near the bus. He was not in the bike lane. He was not in my scanning area.

When I look in my mirrors, I can see the bike lane. When I'm looking in my mirror and I'm

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leaning in my mirror, I can see the bike lane.
He -- and when I'm scanning my bus and looking in my mirrors and -- he was not in the bike lane. That's what I mean by scanning, when I'm scanning, going like that (indicating).
So when I first saw him, just like I have it right there, I don't know how -- where -- how he came that way, but that's where I first made contact with that bicyclist and I -- I turned the steering wheel to avoid hitting him, and went over to where you saw the bus at -- was stationed at.
Q. When you were in the right -- you were in the far right lane, correct?
A. This lane right here, sir. Yes, sir.
Q. And the bike lane's to the right of you, right?
A. Correct.
Q. And he came from the right of you, right?
A. Correct.
Q. So he had to come out of the bike lane at some point, right?
A. No. He could have came from over here. He could have came from the corner. I don't know. He could have came anywhere.

But he was not in the bike lane as I am coming up here. As I'm coming up here, he was not in the bike lane, as I've stated.

Q. So he was not in the --

A. As you see the angle of the bike, that's exactly what -- when I made vision with him, that's how that bike was coming in, like that, into that front door corner area, as I stated, and that's when I turned the steering wheel and went like that (indicating).

I'm going straight. I'm not -- I'm not this way, I'm not that way (indicating). I am going straight. So I'm going straight, and if something's coming at you like that and you're in a bus, your first reaction is going to be to go to the left, and that's exactly what I did.

So I was not -- I was not turned this way. I wasn't turned that way. He was not beside me prior to me getting to that point of impact, as you guys call it. He was not beside me. I don't know which way he came from, to be honest with you. I don't know.

Q. Have you considered the possibility that he was in your blind spot coming up the bike lane during this time period?

A. Well, again, that is why I'm doing -- that's why I'm leaning into the mirror. I did not see this bicycle in my area. I did not see him.

And coming from that angle, how can he be -- how -- I would have seen him.

Q. Don't get all agitated. I'm not trying to --

A. I'm not agitated. I'm just trying to explain myself. I would have seen him as I'm leaning. At some point I would have seen that bicyclist.

Q. Here's my question. Have you considered the possibility that he was in a blind spot on the right side of the bus during all or part of this time?

A. I have, but he was not, because that's why I'm -- to avoid -- the purpose of the -- what did you just say you called it? The rock-and-roll?

The purpose of the rock-and-roll, or as I call it the sits-ups, is to eliminate the blind spot. So that's what I'm doing. I'm eliminating the blind spot by leaning and getting as much view of that mirror as I possible can.

And that gentleman was not -- he was -- especially right before that, he was not anywhere in that area.

Q. Well, he had to come from somewhere, right?

A. Again, and that's why I'm saying, look at the angle of the bike. Maybe -- I don't know, maybe he was over here somewhere. I don't know. But he was not near my bus where I had to -- you understand -- just like when he was back here at Charleston, I was aware of him. I saw him.

Q. Let's try it this way.

You agree with me that there is a blind spot?

A. Absolutely. That's why -- yes, sir.

Q. And so you can't say he was -- he was or he was not in the blind spot, because you didn't see him?

MR. STEPHAN: Objection; form. Foundation.

BY MR. KEMP:

Q. Is that correct?

A. I'm sorry? I can't say that?

Q. You can't say one way or the other whether he was in or outside of the blind spot because you didn't see him from the 300 to the zero mark? We've already established that?

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A. Again, when you -- a blind spot is not something that's -- if you're -- have you ever driven -- I can't ask questions.

But again, I -- I don't know any other way to explain it. But I'm eliminating as much of the blind spot as I possibly can by leaning into my mirrors.

So at some point, if this gentleman was in my -- especially from the 100 to the point of impact, if he was in -- anywhere in this bike lane, with me scanning and leaning into the mirror as I've been trained to do and as I've been doing since -- all of my career, I would have seen him. At some point I would have seen him.

Q. I'm going to show you the testimony of a number of witnesses, who all say he was in the bike lane prior to impact. Okay? I mean, you said he's not there. I'm going to show you the testimony of a couple of witnesses who say a little different version here.

But before I do that, would you agree with me that if you had some sort of sensor on the bus that had alerted you that he was near you, that you would have taken evasive action earlier?

MR. STEPHAN: Objection; form.

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THE WITNESS: I -- I would -- if something's going to alert me that I'm about to hit something before I hit it, or someone before, of course I'm going to do something.

But I don't know that that would have changed that situation, because of the maneuver that the gentleman made by just coming in as -- it was like this (indicating).

BY MR. KEMP:

Q. Okay.

A. It was -- it was -- it was a very -- that's --

Q. But if there had been some sort of warning light going off for whatever reason, you would have -- you would have heeded that?

MR. TERRY: Objection; form.

THE WITNESS: Again, I don't -- I don't know that.

BY MR. KEMP:

Q. My Mercedes has a proximity sensor. If there's a car to my right or an object to my right, there's a big red light that goes off in the mirror. You know? And there's a lot of cars where, if you do that, there's an audible warning.

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If something like that had happened and you'd become aware that he was in that spot, even if you didn't see him, would you have done something about it?

A. I would have did exactly what I just did.

MR. TERRY: Objection to form.

THE WITNESS: Which was take evasive action to move away from the bike.

BY MR. KEMP:

Q. So if you'd been given some sort of warning at the 50 or the hundred, you would have taken evasive action earlier?

MR. TERRY: Objection; form.

THE WITNESS: Yes.

BY MR. KEMP:

Q. And the same, if one of your passengers had said, Hey, you're getting close to a bicyclist, at the 50 or the 100, you would have taken evasive action earlier?

A. Of course.

MR. STEPHAN: Will, he doesn't have the microphone on. Can you make sure we're getting this?

MR. KEMP: Are you getting this?

THE VIDEOGRAPHER: Yes.

MR. KEMP: Do you want me to check on lunch?

MR. STEPHAN: It's 12:45. Whatever you want.

MR. KEMP: I'll check. Let's stay on the record.

No lunch yet.

Now, why don't we go through the depo clips real quick, Eric. Why don't we start with the top.

BY MR. KEMP:

Q. This is Erica Bradley. She was a passenger in the car behind you.

(Video played as follows:

"QUESTION: First question. Was there more than one lane available for traffic heading --

"ANSWER: South.

"QUESTION: -- south on Pavilion?

"ANSWER: Yes.

"QUESTION: And could either you or the bus have moved into the left lane if you wanted to?

"ANSWER: Yes.

"QUESTION: And do you believe it would have been reasonably safe for the bus to move into the left-hand lane?

"ANSWER: Yes.

"QUESTION: So based on my reading of the statute, would you agree with me that the bus driver in this case violated the statute?

"ANSWER: Yes.")

(Video stopped.)

BY MR. KEMP:

Q. Basically, you don't disagree with any of that, do you?

A. I'm sorry?

Q. You don't disagree with any of what she said?

A. I have no opinion on that. I don't really --

Q. She said there was a lane you could move into. You don't disagree with that?

A. Where is she, sir?

Q. She's in the car right behind you.

A. I do disagree with her, because she can't see -- she can't see around that bus, so she doesn't know what I -- she doesn't know what I can see around that bus. She's behind me. She can't see around that bus. That's impossible.

Q. Okay. As we sit here today, you don't know one way or the other whether there were cars either in front of you, the side of you, or behind you in the far left travel lane; is that correct?

A. I said I don't recall, sir, because this was how many months ago. I didn't say that they weren't; I said I don't recall.

Q. Okay. We'll show you the Red Rock video in a minute and see if we can get an answer to that.

MR. KEMP: All right, Eric, can I have the next one. This is Mrs. Bradley still. There's two, I thought. Or is that just a different type of clip?

MR. PEPPERMAN: There may only be one.

MR. KEMP: Okay. Let's go to the next one.

BY MR. KEMP:

Q. This is one of the motorcyclists that's kitty-corner from you.

(Video played.)

(Inaudible.)

MR. KEMP: Let's skip this one. This guy didn't understand much anyway. Go to the next one.

(Video played as follows:

"QUESTION: Okay. When you say 'his lane,' you mean the bicyclist was where?

"ANSWER: The bicycle lane there.

"QUESTION: The bicyclist was in the bike lane?

"THE WITNESS: The bicycle lane, yes.

"QUESTION: And the bus hit him when the bike was in the bicycle lane?

"ANSWER: The bicycle lane, yes.")

MR. KEMP: Stop, Eric.

(Video stopped.)

BY MR. KEMP:

Q. So you disagree with what the gardener just testified to? That's the gardener, by the way.

He said the bus hit the bicycle when the bike was in the bicycle lane. You disagree with that?

A. Yes, sir.

Q. In what lane -- you think the bike was in what lane when it hit the bus?

A. Exactly as that diagram is, sir.

Q. So you think the bicyclist was in the far right lane when he hit the bus?

A. When he hit the bus?

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Q. Yeah.

A. I don't know where he was when he hit the bus because I didn't see that.

Q. Okay. When you first saw him, you think he was already in your lane?

A. He was -- correct.

Q. Okay. So you disagree with what the gardener just said?

A. Yes, sir.

MR. KEMP: Let's have the next one, Eric.

(Video played as follows:

"QUESTION: When you say 'he did this,' what do you mean?

"ANSWER: That he was at fault, because he was like from here to there.

"QUESTION: The bus driver was at fault?

"ANSWER: Yes.

"QUESTION: And why do you think the bus driver was at fault?

"ANSWER: Because he -- and didn't turn to this side, he turned this side [inaudible], and the entrance is farther down. When he made a [inaudible] movement like this, the gentleman was fine, but he did this and when he hit it, it went backwards.")

(Taken down to the best of reporter's ability; may not be complete.)

MR. KEMP: Okay, Eric. Stop here.

(Video stopped.)

BY MR. KEMP:

Q. Okay. You just heard the gardener's testifying that he thought that the bus came into the bike lane and then went back out?

A. No, sir.

Q. You didn't hear that?

A. I did, and I --

Q. I know. I'm just asking if you heard his testimony.

A. Yes, sir.

Q. You disagree with that?

A. Yes, sir.

Q. And you heard his testimony that he thinks you were at fault, right?

A. I heard him.

Q. So you disagree with that?

A. Yes, sir.

MR. KEMP: Go ahead, Eric. Next one.

(Video played.)

"QUESTION: Let's back up a little bit.

"When you first saw the bicyclist, was he in the bike lane?

"ANSWER: Inside.

"QUESTION: And where was the bus at that time?

"ANSWER: Next to it.

"QUESTION: In the -- in the drive lane next to it?

"ANSWER: Yes.

"QUESTION: And then the bus started going into the bike lane?

"ANSWER: Into the bicycle lane."

(Video stopped.)

BY MR. KEMP:

Q. And you disagree with that?

A. Yes, sir.

MR. KEMP: Okay. Next one, Eric.

(Video played as follows:

"QUESTION: If there is more than one lane for proceeding in the same direction, move the vehicle to the lane to the immediate left if the lane is available and moving into the lane is reasonably safe.

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"Mr. Hubbard, didn't do that, correct?"
"ANSWER: Correct.")
THE WITNESS: Excuse me. I can't hear it.
MR. KEMP: Let's back it up and start over again.
(Video played as follows:
"QUESTION: If there is more than one lane for proceeding in the same direction, move the vehicle to the lane to the immediate left if the lane is available and moving into the lane is reasonably safe.
"Mr. Hubbard didn't do that, correct?
"ANSWER: Correct.
"QUESTION: And that was -- he was able to do that. You looked at the video. There was nothing preventing him from doing that?
"ANSWER: I saw no car in that one lane.")
(Video stopped.)
BY MR. KEMP:
Q. Okay. That's Mr. Plantz. He was one of the front passengers. And he said he saw no car

keeping you from going over in the left-hand lane.

So your testimony is you don't know one way or the other; is that right?

A. I don't recall whether there was cars over there.

MR. KEMP: Fair enough.

Another one, Eric.

(Video played.)

"QUESTION: Did you know in Nevada that it's illegal, it's against the law, to get within 3 feet of a cyclist if you're driving a vehicle?

"ANSWER: No, I did not know that.

"QUESTION: And that's the law, and I'll tell you it is Nevada Revised Statute 484B.270.

"It's your testimony that this bus was inside of 3 feet when Dr. Khiabani turned and you saw the look of shock on his face, correct?

"ANSWER: At that point, yes.")

(Video stopped.)

BY MR. KEMP:

Q. So you said you were never within 3 feet of the bicyclist; is that correct?

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MR. STEPHAN: Objection; form of the question. Foundation.

THE WITNESS: If you heard what he said, he said at -- at -- when -- when he saw the look on the man's face that I was. And as you see, that's what it is, right there.

BY MR. KEMP:

Q. Did you see the look of shock on Dr. Khiabani's face?

A. I'm sorry?

Q. Did you see the look of shock on Dr. Khiabani's face yourself?

A. I did not. I was trying to make my maneuver so that I can not make contact with this gentleman. So I did not see his face.

Q. Before you turned to the left, did you look to the left to see if there was another car there?

A. I did not. I was trying to not hit him.

Q. So you just turned left without looking into the left lane?

A. At that particular moment, second, that's exactly what I was doing, sir. I would have gladly traded that in for the result of this.

MR. KEMP: All right. Next one.

(Video played as follows:

"QUESTION: Did you know it was Nevada law that if there's two lanes, like there was in that southbound Pavilion Center, a vehicle driver has an obligation to get into -- when there's a bicyclist, the vehicle has an obligation to get into the far left-hand lane? Did you know that?

"ANSWER: Did not know that.

"QUESTION: Mr. Hubbard did not get into that far left-hand lane. Can we agree on that?

"THE WITNESS: Correct.")

(Video stopped.)

BY MR. KEMP:

Q. You don't disagree with anything he said there, right?

A. No.

MR. KEMP: All right. This last one.

(Video played.)

(Inaudible.)

MR. KEMP: Let's skip that one, too.

BY MR. KEMP:

Q. All right. Now, you said you saw the Red Rock video yesterday?

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A. Yes, sir.

Q. And in that video it appears that you're talking on the telephone?

A. Absolutely not.

Q. Not while you're operating the bus. After the accident.

A. Oh. Oh, okay.

Q. Okay?

A. Yes.

Q. After you became aware there was an accident, what did you do with the bus?

A. Well, I pulled it -- like I say, I made the maneuver, got over to that area over there in the left lane. And as I said, I saw in the mirror that someone was down. I got my phone, went to see what was going on. As I'm going to where the gentleman is, I dial 911, I'm calling 911. And that's what I did.

Q. Did you call 911?

A. Immediately.

Q. Did you talk to a 911 operator?

A. Absolutely.

Q. Okay. And you gave them your name?

A. Did I give them my name? I don't know if I -- I don't remember I gave them my name. I

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told them where I was at and what was happening and I was -- you know, I was out of it, as far as -- I don't remember if I said my name or not. I just know that I was like, "I'm at the Red Rock," and, you know, I said what was going on, "I need an ambulance here at Pavilion."

Q. But you're sure you called 911?

A. I'm absolutely positive I called 911.

Q. And the reason I ask is because we subpoenaed 911 and today there's been no indication that --

A. That was the very first call I made, sir.

Q. And you made another call after that?

A. Yes. To the control center.

Q. And the "control center" would refer to what?

A. That's my job. That's like the center of operation. That's where you call right after you call 911.

Q. And when you called the control center, who, if anyone, did you talk to?

A. Oh, Lord, I don't remember her name. I don't remember her name.

Q. And was that a call that lasted more

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than one or two minutes?

A. I don't know how long it lasted because she called me back several -- someone -- they called me back several times, so I don't recall how long the call lasted.

Q. Prior to the time you got back on the bus, who at your employer did you talk to, if anyone? And I'm talking the time period you parked the bus after you became aware of the accident and the time period you got back on the bus.

Did you get back on the bus to move it?

A. I spoke to the control center, 911 and the control center.

Q. But I'm just asking what the names of these people were you talked to.

A. I don't remember their names, sir. I was -- I was not thinking about names at that particular time. I don't know the name. But that's who I called, 911 and the call center.

Q. Okay.

MR. STEPHAN: His mic is down.

MR. KEMP: I don't think that was particularly critical testimony, but ...

MR. STEPHAN: But if you ask him a question, I didn't want it not to be covered.

BY MR. KEMP:

Q. **Okay. I'd like you to watch the Red Rock video with the point of view of whether there were cars immediately before you or immediately after you that would have prevented you from moving to the far left lane. Okay?**

MR. KEMP: All right, Eric.

BY MR. KEMP:

Q. **And I'll make you aware there's two buses in this video. There's a bus before yours, so ...**

(Video played.)

MR. KEMP: Okay, Eric, stop.

BY MR. KEMP:

Q. **Do you see any cars immediately before you?**

A. No, sir.

Q. **And no cars immediately after you?**

A. I don't know how many -- how much time went by, but no.

Q. **No reason you couldn't have moved over to the left-hand lane if you wanted to?**

A. No, I don't know how much time we went by, so I don't know if --

Q. **Well, it's enough time for the bus to**

travel from one side of the intersection to the other.

A. Okay.

Q. So, I mean, there's at least four or five bus lengths.

MR. KEMP: Keep going, Eric. I don't think a car comes.

THE WITNESS: Okay.

BY MR. KEMP:

Q. Okay? So you would agree with me that if you wanted to you could have gotten over into the left-hand lane at any time between the 300-foot to the zero mark?

A. Yes, I could have. But -- okay.

Q. All right. Now, I asked you earlier if you had seen any motorcyclists across the street. Did seeing those -- the picture now of the motorcyclists and the one running across the street refresh your recollection in any way, shape or form?

A. No.

MR. KEMP: Okay. Go ahead, Eric.

(Video played.)

MR. KEMP: Okay. Stop right here.

BY MR. KEMP:

Q. Do you see that white delivery truck

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there?

A. Yes.

Q. And did you have any interaction with the driver of that truck, that you can recall?

A. No, that I can recall.

Q. Do you know who the driver of that truck was?

A. No.

Q. Did you make any effort to find out who the driver of that truck was?

A. No.

Q. Same thing for the motorcyclists: Did you make any effort to find out who they were?

A. No, sir.

MR. KEMP: Okay. Go ahead.

(Video played.)

MR. KEMP: Stop. Stop.

BY MR. KEMP:

Q. Do you see how the motorcyclist and the driver in the white truck are administering aid of some sort to the doctor?

A. Yes, sir.

Q. Did you attempt to administer aid to the doctor at any point in time?

A. No, sir.

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Q. Why not?

A. Because somebody was already doing something, and I was calling 911. That was my main concern, was to get the paramedics there.

Q. Do you have any particular training with regards to first aid of any sort?

A. CPR.

Q. You have CPR training?

A. Yes.

Q. And when did you get that?

A. I have no idea, sir.

Q. And when you say "CPR," what does that mean? You're trained as a -- to administer CPR?

A. Right. I have been, yes.

Q. Did you get some sort of certification in regards to that point?

A. Yes.

Q. What kind of certification did you get?

A. CPR training.

Q. Was that here in Nevada or back in New York?

A. In New York.

Q. Was that as part of your employment with the New York Transit?

A. No.

Q. Do you remember approximately when you got that training?

A. I don't remember.

Q. Was that more than a one- or two-day class, or ...

A. I don't remember, sir.

MR. KEMP: All right. Go ahead.

(Video played.)

MR. KEMP: Stop.

BY MR. KEMP:

Q. Is that you walking into the picture, sir?

A. Yes.

MR. KEMP: Okay. Go ahead, Eric.

(Video played.)

MR. KEMP: Stop.

BY MR. KEMP:

Q. Can you tell -- could you tell whether you're on the phone at that time?

A. I am.

Q. You are on the phone at that time?

A. Yes, sir.

Q. Are you left-handed or right-handed?

A. I'm left-handed -- right-handed.

Q. And the phone is in which hand at that

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time?

A. It's probably in my right hand.

MR. KEMP: Okay. Go ahead, Eric.

(Video played.)

MR. KEMP: Stop.

BY MR. KEMP:

Q. Now you seem to be gesticulating. See how you moved your left arm there a second ago?

A. Yes, I do.

Q. Do you remember what you're saying?

A. I'm talking to the 911 operator. I'm just seeing this man on the ground. I'm talking to the 911 operator, telling them what's going on and where to come to and what's -- I -- I assume that's --

Q. You think at this point in time you're still talking to the 911 operator?

A. I don't know how much -- it was either the 911 or the call center. That's who I'm talking to.

Q. Do you know one way or the other whether it was 911 or the call center at this point in time?

A. I don't know, because I don't know how much time is elapsed on that.

MR. KEMP: For the record, we're at the

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10:35:06 mark.

Go ahead, Eric.

(Video played.)

MR. KEMP: Stop.

BY MR. KEMP:

Q. You're still on the phone?

A. Uh-huh.

Q. Given the length of the call, do you think it's more likely you were talking to the call center at this time as opposed to 911?

A. I don't know, sir.

MR. KEMP: Go ahead, Eric.

(Video played.)

MR. KEMP: Stop.

BY MR. KEMP:

Q. At this point in time did you realize this was a serious accident?

A. Absolutely. I realized it from the moment I saw him.

MR. KEMP: Okay. Go ahead.

(Video played.)

BY MR. KEMP:

Q. And again, you don't know any of these people, right?

A. I don't.

Q. You didn't exchange contact information with any --

A. Sorry?

Q. -- contact information with anybody?

A. No, sir.

(Video continues.)

BY MR. KEMP:

Q. Do you recall what you were doing at this point in time, when you were apparently back near the bus?

A. Probably -- who knows, man. I was -- I don't know. I was probably -- I don't know.

Q. And Mr. Hubbard, if you want to take a break at any time, I'm fine with that. I think we're almost through the video.

MR. KEMP: Okay. Stop.

BY MR. KEMP:

Q. See you're going back towards the scene?

A. Uh-huh.

MR. KEMP: Go ahead, Eric.

(Video played.)

BY MR. KEMP:

Q. Can you tell if you're still on the phone?

A. I am.

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Q. It appears to me you're on the phone with the left hand.

A. Yeah, but I'm right-handed.

Q. But sometimes you use the left hand to talk on the phone?

A. Man, sir, at that particular time, you have no idea what was -- I was going through. I don't know, left hand, right hand. I just know I wanted somebody there, and I wanted the ambulance to get there, and I was -- I kept asking, "Is he going to be all right? Is he going to be all right?" That's what I was doing.

Q. Okay. I think the ambulance is coming in right now.

A. No, the police was first.

Q. Oh, right.

(Video continues.)

BY MR. KEMP:

Q. Okay. You see yourself going back in the scene, right? Correct?

A. I'm sorry?

Q. You saw yourself coming back into the scene there, at about the 10:40:25 mark? Right? Do you see yourself in the video there?

A. I do.

MR. KEMP: Now stop.

BY MR. KEMP:

Q. It appears at this point in time you're having some sort of discussion with that gentleman in the red shirt. Do you see -- do you see -- I'm going to have you watch the interaction between the two of you from this point forward.

A. My hands are on my head there.

Q. See --

A. I'm seeing --

Q. See how the guy kind of pointed?

A. I'm pointing to say what happened.

Q. So did you discuss with him what had happened?

A. No, no, I pointed to my bus right up there. Now I'm telling the officer what happened. See, I'm telling him.

And you can see my hand moving. I did the same thing. Did you see --

THE WITNESS: I didn't even see that yesterday, Paul. I did the same thing I just showed that cop, man. Oh, God.

BY MR. KEMP:

Q. Like I said, if you want to take a break, Mr. Hubbard, at any point.

MR. KEMP: Stop it here for a second, Eric.

BY MR. KEMP:

Q. Do you remember getting into a conversation with the person in the red shirt?

A. No, sir.

Q. You don't remember what was said or by whom?

A. I don't.

Q. Or if there even was a conversation?

A. I don't remember. The only thing I remember asking is, "Is he going to be all right? Is he going to be all right?"

MR. KEMP: Okay. Go ahead, Eric.

(Video played.)

MR. KEMP: Okay. I think that's enough.

BY MR. KEMP:

Q. Now, why we started this viewing of the video is I asked you to look at the video and determine whether or not there were cars either immediately before you, side of you, or after you, that would have prevented you from moving into the left-hand lane.

Do you recall that question?

A. Yes.

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Q. And you said, after viewing the video, that there were no cars. Correct?

A. Correct.

Q. So you could have moved into the left-hand lane?

A. Yes.

Q. And now that I've read you the law, would you agree with me that you violated that particular statute?

MR. STEPHAN: Objection; form and foundation.

THE WITNESS: If that statute's -- yes, yes. Correct, yes.

MR. KEMP: This is probably a good place to break. Why don't we take a half-hour.

THE VIDEOGRAPHER: We're going off the record. The time is 1:11.

(A lunch recess is taken.)

THE VIDEOGRAPHER: We're back on the record. The time is 1:34.

BY MR. KEMP:

Q. Mr. Hubbard, these buses have adjustable seats, right?

A. Yes, sir.

Q. And do they have any, like, numbers, 1,

2, 3, 4, 5, as to how high you make them or how low you make them?

A. It's air. It's a thing that you pull. You pull to make it go down and you push it in to make it go up.

Q. How tall are you?

A. 5-8, 5-9.

Q. And I assume that you have drivers that are bigger or smaller than you at the shop?

A. Yes.

Q. Other bus drivers?

And is there a seat setting that is compatible to everybody, or does everybody just go in and kind of put it where they want it to?

A. No, you adjust it to what's good for you with your mirrors.

Q. And when you adjust it, can you describe for me how high you make it or whether it can move left or right, I don't know, forward or backward?

A. It can move up and down and it can move forward and backward.

Q. And on the up and down, is there a way you can describe for me how high you make it or don't make it?

A. I can't describe it without being in the

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bus, but -- yeah, I can't.

Q. Is there a typical point you typically set it at? In other words, when you -- you set it the same place every time you ride that bus?

A. Right. But it's just air. It's not a -- it's not a number or a -- you know, it's just --

Q. You just do it by feel?

A. Right. By feel and by your gas pedal and with the mirrors, and that's how you do it.

Q. And how about the up and back, how do you set that?

A. That's -- again, that's what I'm talking about with your gas pedal. You don't want to be sitting -- you don't want it way back here to where you're stretching your foot for the gas. It's all determined by the person's height.

Q. So, in general, you being 5-8 would be more forward than someone who's 6-foot-6, for example?

A. Right. Because I don't have long legs.

Q. Other than sitting you in the bus, is there any way we can determine -- and having you adjust the seat for us, is there any way we can determine where the seat was exactly at the time of

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the accident?
A. I don't know how I would do that.
Q. Yeah, we're doing a bus inspection Tuesday. Could you adjust it -- assuming you're around Tuesday, could you physically do it for us Tuesday maybe?
A. You mean me?
Q. Yeah. I don't know how else we could do it.
A. I'll be working Tuesday. I don't know.
Q. Are you scheduled for work Tuesday?
A. I believe I would be. You said just the 19th and the 20th; right?
Q. Well, this would be out at the bus yard. That's where you work; right?
A. Yes.
Q. Okay. All right. Well, we'll address that with your counsel at a later point.
Now, we've talked about you moving forward and backward and trying to avoid blind spots?
A. Yes.
Q. And that's referred to by some people as a rock-and-roll technique?
A. Yes.

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Q. Where did you first learn that?

A. When I first started driving my personal vehicle.

Q. Okay. Is that a formal thing that's taught to bus drivers?

A. I was taught that with my regular driver's license.

Q. Before you got your bus driver license?

A. Correct.

Q. And once you went through these bus training classes, either with New York City Transit or with Michelangelo/Silverado, did they also teach rock-and-roll technique at that time?

A. Yes, sir.

Q. Is there any difference in a rock-and-roll technique as you use it in a car and when you use it in a bus?

A. Well, with a bus it's used more often than with a car, because the bus you have a -- you know, it's bigger, so you definitely use it more.

Q. The bus is bigger and has more blind spots than a passenger vehicle?

A. I don't -- I don't know how -- I don't know about the blind spots. I just know the bus is bigger, so you're doing more leaning in so that you can get more vision in your mirror.

Q. Okay. And you said you adjust your mirrors. Is there -- would it be true that different drivers have the mirrors in different locations?

A. Correct.

Q. And you typically have yours in the same location?

A. Yes.

Q. Now, on the day of the accident, did you give an interview to the Metropolitan Police Department?

A. Yes.

Q. And was that a recorded interview?

A. Yes.

Q. They recorded you?

A. Yes.

Q. Okay. And do you remember the officer's name?

A. No, sir.

Q. Was it Salisbury, does that ring a bell?

A. Yes, that does.

Q. And so Officer Salisbury had some sort of tape recorder?

A. Yes.

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Q. Where was that interview taken at?

A. On the bus.

Q. And when you say "on the bus," you mean physically on your bus?

A. Yes.

Q. Okay. Now, as I understand it, the bus was parked to the side and some other bus came and completed the mission?

A. Correct.

Q. So you unloaded the -- did these people have luggage?

A. Yes, sir.

Q. So somehow or another the luggage went from your bus to another bus and they were taken to Red Rock?

A. Yes, sir.

Q. And then was it before or after that point in time that Detective Salisbury interviewed you?

A. I don't recall. I don't know exactly when.

Q. Okay. And so with regards to the interview that was recorded by Detective Salisbury, was it one interview or more than one interview?

A. It was only one interview.

Q. And have you seen a transcription of that since the time you gave it to the present time?

A. No.

Q. Have you heard it again since the time you gave it to the present time?

A. No.

Q. Have you had any communications with Detective Salisbury since the time you gave that interview to the present time?

A. No.

Q. Have you had any communications with anybody at Metro from the time you gave that interview to the present time?

A. No.

Q. Now, with regards to other interviews -- and again, don't tell me what you said to your counsel -- but did you give an interview to your counsel at some point?

A. Yes.

Q. And other than Detective Salisbury and your counsel, did you give any other interviews?

A. I mean, there was a chaplain, there was a grief counselor who came on the bus. I told him what happened.

Q. A chaplain?

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A. Like a grief counselor.

Q. At the time of the accident?

A. Correct.

Q. Do you know who he was employed by?

A. He was -- I don't know exactly. He was just a Nevada chaplain or grief counselor or whatever.

Q. Did you have any sort of debriefing when you went back to the bus yard?

A. Debriefing? I don't know what you mean by that.

Q. Did Mr. Bartlett or anyone else ask you, Well, what happened?

A. Oh, I'm sorry. I told Robert Garcia, as well, what happened, Robert Garcia, when he came to the scene.

Q. That was at the scene, though?

A. Yes.

Q. As I understand it, two people came from Michelangelo to the scene, Mr. Garcia and another person?

A. I think it was Don.

Q. And what's his last name?

A. I don't know.

Q. So you told Mr. Garcia in general what

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had happened?

A. Right.

Q. Did you tell Don, too?

A. I don't believe I -- he might have been standing there, but I was talking to Robert Garcia.

Q. Hadon I think his name is, H-a-d-o-n. Does that sound --

A. He was only there for a minute. He's not there.

Q. All right. After that point in time, did you give any other statements to anybody?

A. No.

Q. Sometimes insurance adjusters call you up, or insurance rep --

A. Oh, yeah. Yeah, yes. Yeah, I did.

Q. Who was that?

A. I don't know their names. I just know the night of they called.

Q. And you understood that to be someone employed by the insurance company?

A. Right.

Q. And do you know if that interview was recorded or not?

A. I don't know.

Q. And how is it you think that it was

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someone from the insurance company?
A. That's what they said, yeah.
Q. They identified themselves as representatives of the insurance company?
A. Right.
Q. Did you have any heads-up before the phone call came in that you would be getting a call from the insurance company?
A. Yes.
Q. And who gave you the heads-up?
A. I don't remember. Somebody.
Q. Was it Mr. Garcia or this other gentleman, Don?
A. I don't remember.
Q. So you talked to the insurance company the night of the accident; yes?
A. It was somewhere near the accident, yeah.
Q. And how long was that call?
A. I don't -- I don't know.
Q. Is that the only time you talked to the insurance company?
A. I think so, yeah.
Q. Did they send you any sort of statement to review and look at?

A. (Shakes head in the negative.)

Q. "No"?

A. No.

Q. Now, I mentioned earlier that the coroner's office took some pictures on the site. Did you talk to anyone at the coroner's office?

A. No.

Q. Now, you said that you saw the bike briefly coming towards you somewhere in the intersection. Do you recall that?

A. Yes.

Q. Did the bike appear to be wobbling?

A. I don't know. It was very quick. I just know that he was -- if I did not make that maneuver that I made, he was going to hit either the door area or somewhere in that area. So I don't know if he was wobbling or not.

Q. Okay. And by "wobbling," I'm talking about the bike kind of going from left to right.

A. I -- I don't know.

Q. You don't know one way or the other, okay.

Did the bicyclist have a helmet on?

A. I don't -- I don't recall.

Q. At the accident scene -- do you recall

if he had the helmet on at the accident scene?

A. I saw that someone had took it off. But I didn't see the helmet when -- again, I didn't see his face. I was just trying to avoid making contact with him.

Q. Okay. You're talking about the moment before impact?

A. Correct.

Q. Okay. After you had parked the bus on the other side of the street and walked back, did you see whether he had the helmet on?

A. I did not, no. I don't.

Q. You didn't take the helmet off?

A. No, sir.

Q. Did you observe anyone else take the helmet off?

A. I don't know. No, I didn't see anybody. I don't know.

Q. Now, without showing you the gardener's video, you saw that yesterday?

A. Yes.

Q. Was that substantially similar to what you saw on the site?

A. Yes.

MR. KEMP: I don't have any further

questions.
MR. CHRISTIANSEN: I have a few.
MR. KEMP: Oh, sorry, I do have further questions.
MR. CHRISTIANSEN: You do?
MR. KEMP: Yes, I do. Now I see my stack of stuff.
Can we mark this what was next in order and number it -- what are we on, 8? So let's make it 8A through however pages we've got.
(Exhibits 8A through 8H marked.)
BY MR. KEMP:
Q. Mr. Hubbard, I'm handing you what's been marked 8A through H, which is a series of photos taken from the Red Rock video that we looked at a second ago that are blown up and focused on a particular spot.
If you take a look at 8A, you see the bus and the palm trees, but you don't see any other object, right?
A. Yes, I see the bus.
Q. 8B, you see the bus, it appears like you can still see the palm trees, right?
A. Yes.
Q. Okay. 8C, if you take a look there, you

see what may or may not be either legs or palm tree fronds sticking out in this area. See this area (indicating)?

A. I -- it just looks blurry, sir.

Q. What?

A. It looks blurry.

Q. I'm not asking you to say one way or the other what that is. I'm just saying you do see that spot in 8C, right?

A. Yes.

Q. Okay. Great. Now, if we go to the next spot, 8D, do you see what appears to be two legs pointing directly to the bottom of the picture, and trunks?

A. I don't know what that is, sir.

Q. Okay. I ask you to take a look at the exact position of the legs in that picture. Do you see how they're -- they're basically parallel to each other? I'm assuming those to be legs.

A. I can't tell what that is, sir.

Q. Okay. But assuming that -- you do see the two white objects are parallel to each other in 8D?

A. Right.

Q. And do you see the upper left-hand

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portion that you don't see any evidence of an arm, correct?

A. Are you on D or E?

Q. I'm on D.

A. Yes.

Q. Now, if you look at E and you compare D with it, do you see that the legs have changed position and now we see an arm?

A. I -- I don't know. I don't know.

Q. Some of the -- and then if you take a look at --

A. It's really blurry.

Q. If you take a look at F, you'll see that the arm is in a little bit different position than it was before, right? I know it's blurry, but --

A. Right. I'm looking at it.

Q. Now, some of the witnesses have told us that after the accident they observed the doctor attempting to get up and rolled his shoulders. Did you observe anything similar?

A. No.

Q. At the time you were there, did you observe the doctor move his arms or legs or shoulders or any other body part?

A. (Shakes head in the negative.)

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Q. All right. When you approached the doctor, was he in the position that we see in Exhibit 8F?

MR. STEPHAN: Objection; foundation.

BY MR. KEMP:

Q. Assuming -- was the doctor's body in the same position as whatever the object is in -- let's use 8H -- in 8H, for purposes of this examination?

A. I don't know. I know -- I don't know, sir.

Q. Don't know one way or the other?

A. Because I can't -- I can't tell.

Q. So as we sit here today, you can't tell us one way or the other whether the doctor was moving his arms, legs or shoulders after the accident; is that correct?

A. No, sir, I can't.

Q. Now, when you went up to the doctor, was he making any sort of noise?

A. Yes. He was (indicating).

Q. Gurgling kind of sound?

A. Yes. (Indicating.)

Q. The same sound we see on the video? You heard the sound on the video, the gardener's video?

A. I didn't hear any sound, but I'm saying, when I first saw him he was (indicating), you know, like (indicating), and you could see the -- like he was breathing out bubbles.

Q. Did he appear to be in pain to you?

A. Absolutely.

MR. KEMP: I have no further questions.

MR. CHRISTIANSEN: Switch spots?

MR. KEMP: Yeah.

EXAMINATION

BY MR. CHRISTIANSEN:

Q. Good afternoon, Mr. Hubbard. My name is Pete Christiansen. I represent Dr. Katy Barin, who is the widow of the cyclist that was in the accident with you on April the 18th. Okay?

A. Yes.

Q. I also represent one of her sons.

Did you understand them to have two sons?

A. Just recently.

Q. And do you understand that we have a November trial in this case?

A. Yes.

Q. And do you know why we have a trial set so quickly?

A. (Nods head in the affirmative.)

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Yes.

Q. And is it your understanding that trial has been set because Dr. Barin, Katy, has Stage 4 colon cancer?

A. Yes.

Q. You have your hands over your mouth and it's a little hard to hear you, so if I just ask you is that a "yes" or is that a "no" --

A. Yes.

Q. -- it's not me being rude; it's just trying to get our record clear. Okay?

I want to understand the chronology.

We saw the video. After the wreck, okay, that's what I want to talk to you about. After the wreck, all right, you get out of the bus and you call 911 and then you call dispatch?

A. Yes.

Q. And you saw the length of the phone call, as you and Mr. Kemp were talking, in that video after the accident occurs, where it looks like you're going back and forth to the bus?

A. Yes.

Q. And for a good chunk of that time you're on the phone with dispatch; fair?

A. Right.

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Q. And who was it you spoke to at dispatch?
A. I don't know her name.
Q. And what, if anything, did dispatch tell you you were supposed to do?
A. I told -- what did they tell me I had to do?
Q. Yes, sir.
A. I just -- they didn't tell me to do anything. They just told me to -- they asked did I call 911. I said, yes, I did.
And I was mainly asking them to get Robert Garcia down here, and ...
Q. Was that it?
A. Yeah.
Q. And then about how long from that point in time until Mr. Garcia and Don, the last person -- the last name that you don't remember, how long until they arrived?
A. I don't know, sir. I don't have any sense of time for that particular moment.
Q. Let's use the interview you gave with the detective as a water mark. Okay?
Did the people from dispatch arrive before or after you gave Metro an interview?
A. I want to say after, after.

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Q. And if Detective -- Sergeant Salisbury doesn't get out there until hours after the events in question, after the actual accident, would you still think you talked to the people sent by dispatch after you talked to him?

A. Honestly, I don't know. I really don't know which happened first. I don't.

Q. Okay. Before -- go ahead.

A. No, because there were other officers there, too. So I don't know. I don't know.

Q. And did you tell all the police officers, from the patrol officers that arrived -- you saw in the video with Mr. Kemp like a little -- like an SUV pulled up with Metro markings; fair?

A. Right.

Q. And out of that gets a patrolman, a police officer?

A. Right.

Q. That's different than the detective you ultimately gave a statement to?

A. Correct.

Q. There were, I imagine, a number of first responders, police officers, we saw a fire truck pull up, all of which off and on you were talking to?

A. Not -- not the paramedics. I didn't -- I didn't get a chance -- I didn't say anything to them.

Q. Prior to talking to -- we'll just call it the detective who took the taped statement, because I'm not sure if it's Salisbury or Lourenco. Do you remember a Detective Lourenco?

A. No, I don't remember.

Q. So before you speak to a Metro officer/detective who recorded your statement, did you talk to anybody, other than dispatch, from your employer?

A. I talked to Robert Garcia.

Q. And what did Mr. Garcia tell you you were supposed to say in your interview?

MR. STEPHAN: Objection; form of the question.

THE WITNESS: What was I supposed to say in my interview?

BY MR. CHRISTIANSEN:

Q. Yeah. What, if anything, did Robert Garcia communicate to you about what you were supposed to say when you went to your interview?

A. Nothing. I don't -- nothing.

Q. And step back.

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In the first two -- or in the front row of your bus you told us there were two gentlemen who were seated there, right?

A. Right.

Q. You know those guys' names today to be Mr. Pears and Mr. Plantz?

A. Right.

Q. And do you know if both of them were deposed? Mr. Stephan and I and the rest of the lawyers were back in the Chicago area to take their depositions a month or so ago. Did you know that?

A. Yes.

Q. Was it communicated to you what those two gentlemen said relative to the facts and circumstances leading up to this incident?

A. No.

Q. You reviewed the police report, correct?

A. Yes.

Q. That was in the group --

A. Right.

Q. -- of papers that you looked at?

And in the police report you're referred to as Driver 2 or D-2, right?

A. I -- I don't have it -- I don't have it in front of me.

MR. CHRISTIANSEN: Do you have your copy of his police report?

MR. STEPHAN: I've got one. Do you want to use that?

MR. CHRISTIANSEN: Let's mark that as next in line, Ms. Court Reporter.

(Exhibit 9 marked.)

BY MR. CHRISTIANSEN:

Q. Those gentlemen seated to your right and a little bit behind you and then directly behind you, they would have had a clear view of that southbound Pavilion Center just like you did; fair?

A. Yes.

Q. I mean, it's not a foggy day on this morning in April, right? It's sunny and clear?

A. Correct.

Q. There's no obstructions preventing you from seeing what's in front of you or beside you or behind you, correct?

A. Correct.

Q. And there was nothing obstructing their viewpoints, correct?

MR. STEPHAN: Objection to foundation.

THE WITNESS: They didn't have the driver's viewpoint. I have a viewpoint and they

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have a viewpoint.

BY MR. CHRISTIANSEN:

Q. Okay. Well, both of those gentlemen testified that they see in front of the bus that bicycle the entire way until the collision, the entire way southbound on Pavilion Center. Did you know that?

MR. STEPHAN: Objection; foundation. Form.

THE WITNESS: No.

BY MR. CHRISTIANSEN:

Q. And you did not see the bicyclist after the 300-foot mark that you told for us, when you believe you passed him at the cutout to the municipal bus stop?

A. Correct.

Q. You don't see him for a full 300-plus feet, until he just appears in your lane, right? That's your testimony?

A. Yes.

Q. And both of those gentleman who were seated behind you testified that he's in front of you and they can see him the entire way southbound down Pavilion Center.

MR. STEPHAN: Objection; form.

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Foundation.
BY MR. CHRISTIANSEN:
Q. Are you aware of that?
A. Again, I don't know what they could see, but I know that as I'm scanning my mirrors and as I'm -- I'm in my mirrors and doing what I do, was trained to do, I did not see that bicyclist until I crossed the intersection.
Q. Right. You know as a holder of a CDL in the state of Nevada, and New York before that for a significant period of time, you have an obligation to keep a lookout when you're driving; fair?
A. Correct.
Q. In other words, you've got to know what's in front of you, right?
A. Right.
Q. You've got to know what's on your sides, right?
A. Right.
Q. You got to know when you're overtaking or passing persons or vehicles or pedestrians, all that thing -- all that stuff?
A. Yes.
Q. And so if the two passengers in your bus see a bicyclist in front of you the entire 300 feet

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down southbound Pavilion Center and you don't -- as you testified, right?

A. Correct.

Q. -- then you weren't maintaining a proper lookout --

MR. STEPHAN: Objection; form and foundation.

BY MR. CHRISTIANSEN:

Q. -- correct?

A. Again, they have a different view than I do, sir.

Q. Who has a better view?

A. Who has a better -- I have -- I have a view -- a driver's view. I don't know who has a better view. I don't know what their view is. I'm the operator of the bus and I'm responsible to -- like I -- like I've been stating, to look around the bus, and that's what I -- what I did.

Q. And I'm telling you both those gentlemen --

A. Again, I can't --

Q. Just listen to my question. Okay?

-- testified that from the front seats of your bus, they watched Dr. Khiabani ride his bike in front of the bus, up into the intersection.

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MR. STEPHAN: Objection.

BY MR. CHRISTIANSEN:

Q. Did you know that?

MR. STEPHAN: Objection; form and foundation.

THE WITNESS: I'm listening to what you're saying, sir.

BY MR. CHRISTIANSEN:

Q. Assuming their recollections are accurate, then you just missed him for that 300 yards, because you said you didn't see him, right?

A. I did not miss him.

Q. That's not what I asked you.

You told Mr. Kemp you didn't see Dr. Khiabani from the time you passed him at the municipal bus cutout at 300 feet north of the intersection until the second before the collision, right?

A. Correct.

Q. And both Mr. Pears and Mr. Plantz, who were seated in the front seats of your bus, testified that they watched Dr. Khiabani ride his bike in front of the bus the entire way until the collision.

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MR. STEPHAN: Objection; form and foundation.

BY MR. CHRISTIANSEN:

Q. Did you know that?

A. I'm listening to your telling me that, yeah.

Q. If they're right, then you weren't paying proper lookout, correct?

MR. STEPHAN: Objection; foundation.

THE WITNESS: No, that's not correct.

BY MR. CHRISTIANSEN:

Q. Well, with a bus driver with a CDL and a bicyclist in front of him, he should be able to see him for the 300 feet he's behind him; right?

A. That's correct.

Q. And you didn't see anybody, did you?

A. No, sir, I did not.

Q. So if he's there and you didn't see him, you weren't maintaining proper lookout, correct?

MR. STEPHAN: Objection; foundation.

THE WITNESS: Again, as I stated, I was in my mirrors and leaning into my mirrors. He was not beside me.

BY MR. CHRISTIANSEN:

Q. Was he in front of you?

A. Again, I don't know -- I don't know where he was until he -- until he came in from that -- like I said, from that angle into the -- onto the side of the door bus.

MR. CHRISTIANSEN: All right.

Well, Eric, can you hand me the bike, please.

BY MR. CHRISTIANSEN:

Q. I'm going to back this bus up to where you told -- why don't you put that bike where you passed it, right at the cutout as you told us, the 300-foot line.

A. It's not on here. I can't. It was back here (indicating).

Q. Okay. So before the 300-foot line you passed him?

A. Correct. Because the thing that's over here, sir.

Q. All right. I got you. It's further north is what you're saying?

A. Right.

Q. And so for the entire -- we've got the big blowup out here -- for the entire 300 feet, and even more than that because the cutout's more north, you don't see the bicyclist until it appears just

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south of the crosswalk?

A. Correct.

Q. Explain that to me. Where was that bike?

MR. STEPHAN: Objection; form.

THE WITNESS: I'm sorry?

BY MR. CHRISTIANSEN:

Q. Where was that bike, for the ten seconds you're driving down Pavilion Center?

A. He was not in my -- he was not in any perimeter of my bus or in the bus -- bike lane beside me.

Q. So --

A. So I don't know. I can't say where he was, sir.

Q. So if the bike was in the bike lane in front of the bus you would have seen him. Can we agree?

A. If the bike -- if that -- if he was, at some point during that -- yes, I would have seen him with the -- with the leaning in and looking in my mirrors, yes, I would have seen him.

Q. And you didn't see him; we're clear on that?

A. Yes, sir.

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Q. For at least 300 feet before the intersection, you don't see the bike?

A. Right, he was not in my -- he was not in the vicinity of my bus, correct.

Q. And you don't believe the bike transported, like somehow beamed into the point of collision, do you?

A. Again, I don't know where that bike was, sir.

Q. But if he was in front of you, you would have seen him?

A. Correct.

Q. And so can we agree he couldn't have been in front of you, because you would have seen him?

A. When you say "in front," this is in front (indicating).

Q. Right. If he's in the bike lane, where I've got the bike right now, and you're in the driver's seat of that bus where it is right now, could you see the doctor?

A. You're saying -- you're saying in the bike lane?

Q. Yeah.

A. Yes. Yes.

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Q. And you didn't ever see him in front of you for 300-plus feet, correct?

A. That's -- because I had already -- I had already passed him back here. I'm not going very fast.

Q. And that's the same -- from the moment you passed him at the municipal cutout until the second before the collision, you don't see the bicyclist anywhere in your purview in front of you, to the side of you, or in your mirrors, right?

A. I answered. No, sir.

Q. That's a correct statement, is it not?

A. He was not -- he was not in my area, correct.

Q. So it has to be one of two things. Either you missed him, you didn't see him, or he was in your blind spot, right?

MR. STEPHAN: Objection to foundation.

THE WITNESS: I don't know, sir.

BY MR. CHRISTIANSEN:

Q. What -- give me another plausible explanation for how a bike travels 4 or 500 feet next to a bus and you don't see him before the collision occurs?

A. It's possible he was over here

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(indicating). I don't know. But he was not in the bike lane. You see this whole -- we're not even -- you're not even mentioning this whole area here that he could have been in.

Q. Did you see him in the right-turn lane?

A. No, sir. No, sir, I did not, because, again, I'm focusing on -- this is what I'm focusing on. As I'm traveling, this -- of course I can't see in the back of me, but I'm talking about -- this is what I'm focusing on. This is what I'm focusing on as I'm traveling. That's what I'm focusing on. And you still have all of this that you're not discussing, and it's possible that that -- unfortunately, he could have been over there. I don't know.

But what I do know is he was not -- this is my area, man. I'm responsible for this, and this is --

Q. All right. Mr. Hubbard --

A. I'm explaining it to you, sir.

Q. Okay.

A. And this is where -- this is what I -- this is what I was making sure was nothing in there (indicating).

Q. Mr. Hubbard, I don't want you to guess.

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A. I'm not guessing.

Q. Isn't it true you never saw the bicycle in the right-hand turn lane, the lane that you're pointing to on South Pavilion Center? You never saw him there?

A. I -- I'm not looking over there. I'm not looking to there. I'm -- I'm telling you what I -- where I'm at.

Q. It's a yes-or-no question. Isn't it true you --

A. No, I did not. No, I did not see him -- you said in this lane here?

Q. Right.

A. In the car lane? No, I did not.

Q. And you never saw him in the bike lane, right?

A. No, sir.

Q. That's a correct statement, you never saw him in the bike lane?

A. Correct.

Q. Until the moment before the crash?

A. Right. But he wasn't in the bike lane. He was as I -- as I had it up there.

Q. I remember how you had it up there.

And there was nothing in your way or

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there was no like box trucks or anything in between you and the right-turn lane, right?

A. I don't remember. I don't know what was over there. I don't know.

Q. And so since you didn't see the bicyclist over there, you can't testify that that's where he was, correct?

A. As I said, I don't know where -- I don't know where he was, yeah.

Q. And again, back to Mr. Pears and Mr. Plantz. Both of them testified that you, as you're going southbound on Pavilion Center, cross into the bicycle lane, and then make some type of comment about, Oops, this isn't my turn, and then come back out of the bicycle lane.

A. No, sir, I never said that.

Q. Mr. Pears told the police that on the very day the incident happened. Were you aware of that?

A. No. No, I was not aware. I never said that. What I've said --

Q. Listen to my question.

Were you aware that Mr. Pears told the police you had mistakenly gotten into the turn lane too early and had to get back out of it?

A. No, I was not aware.

Q. **Were you aware he testified to that in his deposition a month or so ago?**

A. No, sir.

Q. **Were you aware Mr. Plantz gave the same testimony?**

A. No, sir.

Q. **You saw the gardener -- we'll refer to him, because I can't pronounce his last name -- he was standing where that fire hydrant is, according to his testimony. Do you remember he was the bald Hispanic man on the videos Mr. Kemp showed you? Do you remember him?**

A. Yes.

Q. **He says he sees you go into the bike and right-turn lane.**

So that's three different eyewitnesses, two of which are on your bus, that say you crossed the bike lane before coming back out of it into the southbound travel lane.

A. No, sir.

MR. STEPHAN: Objection; form and foundation.

BY MR. CHRISTIANSEN:

Q. **They're all wrong?**

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A. They're mistaken. I did not -- I had no reason to go over there. My turn is not there. My turn is the next turn.

Q. Any idea why a gardener and two guys on your bus, who've never met each other in life, would have -- would all three testify that your version of events is wrong and that you did, in fact, get into that right-turn lane?

MR. STEPHAN: Objection; form and foundation.

THE WITNESS: Again, the only thing I can say is they're mistaken. I had no reason to go over there.

BY MR. CHRISTIANSEN:

Q. When you get off the bus after the incident, are you saying things audibly?

A. I'm sorry. Can you --

Q. After the collision, when you get off of the bus, you're moving your hands about, you appear to be upset. Fair?

A. I'm totally distraught.

Q. What are you saying?

A. I don't remember exactly what I'm saying. I know I was asking, "Is he all right? Is he going to make it? Is he going to make it? Is he all right?"

Q. Look at page 2 of Exhibit 9, which is the police report, and look down to the third full paragraph for me, if you would.

A. You said page 2?

Q. Yeah, just turn to the second page. The third full paragraph, I'll read it to you.

"D-2" -- that's you, that's the driver -- "stated he was just traveling straight and saw Pedal Cyclist 1, so he moved over to the left to give pedal cyclist room, and pedal cyclist hit Vehicle 1, and Driver 2 stopped and called for medical."

Is that what you told the cops?

A. No, sir.

Q. So the cops --

A. This is -- this is --

Q. Hold on. I asked you a question. You answered it.

Is that what you told the cops, yes or no?

A. Not -- that's not exactly the words I used. I don't -- I don't even -- no, that's not exactly -- I guess they put that in their own words, but that's not exactly what I said.

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Q. Okay. So, so far we've got Mr. Pears being wrong about how he remembers you traveling; fair? You disagree with his testimony; is that right?

A. Correct.

Q. We've got Mr. Plantz, you disagree with his testimony, correct?

A. Correct.

Q. We've got the gardener who's just standing on the sidewalk blowing leaves, you disagree with his testimony, correct?

A. They're mistaken, that's correct.

Q. And now you're disagreeing with what you told the cops and what they put in your police report about what you said?

MR. STEPHAN: Objection; form and foundation.

THE WITNESS: Right. What I said to the --

BY MR. CHRISTIANSEN:

Q. Just answer the question "yes" or "no." You're disagreeing with what the cops put in the report, correct?

A. What he put in the report is not what I said, correct.

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Q. All right. So the cops got it wrong, too?

A. He misworded my statement, correct. Because that's not exactly what I said.

Q. Right. Because that's not what you've said today, is it? I mean, what's in the police report's not what you told Mr. Kemp for the last three hours?

A. Correct.

Q. I mean, you told Mr. Kemp you didn't see a bicycle for 300-plus feet, correct?

A. Correct.

Q. And this -- but the police report says you did see him, correct?

A. Correct.

Q. You real early on, and I think it might have been in response to Mr. Terry's questions, said that you learned in your training that you had to stay 3 feet away from a cyclist. Do you remember that?

A. Yes, sir.

Q. Tell me when you learned that. I want to know when in time you learned the actual distance, 3 feet, you were supposed to stay from a cyclist?

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A. That's -- that was -- I might have -- even in New York, it's -- I don't know if it's exactly 3, but you've got to give them room, correct.

Q. Hold on. My question is: Tell me when in time you learned the distance 3 feet. Because that's what you said very specifically --

A. That -- it may have been in one of the videos, or if not the video, Garcia may have talked about it in our training when we were doing the classroom training.

Q. See, that's the problem. See, we've already deposed the head of security that designs all the training, and he didn't know that the --

A. Head of security?

Q. The head of safety, I'm sorry, Mr. Bartlett. And he didn't know that the required distance was 3 feet.

So if he didn't know it, he couldn't teach it to somebody else, and he agreed with that.

MR. STEPHAN: Objection; form and foundation.

THE WITNESS: I -- I -- Mr. Bartlett is not who trained me and did my classes.

BY MR. CHRISTIANSEN:

Q. And at some point that bus -- because you know the bus hits and ultimately runs over the head of Dr. Khiabani, right?

MR. STEPHAN: Objection. Foundation.

BY MR. CHRISTIANSEN:

Q. You know that, don't you, as you sit here today?

A. Yes, sir. Yes.

Q. And you know he dies as a result --

A. Correct.

Q. -- correct?

So at some point you'll agree with me that the bus and the bike were closer than 3 feet to each other, right?

A. Again, as I stated, at -- up there we were closer than 3 feet. When he -- when he came over into -- into this area here, yes, we were closer than 3 feet.

Q. All right. And before you were closer than 3 feet, before that split second, as you've described it, that you see him turning towards your lane or into your lane, you'd never seen that bicycle until way back at the municipal cutout?

A. That's correct.

Q. And Mr. Kemp read you the statute that

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you were unaware of in Nevada that requires a bus driver to get into the far left lane if it's open. Do you remember that?

A. Yes.

Q. And in April you didn't know that that was the law?

A. I did not.

Q. And you -- you agree that you were able to do it, you could have done it that day, but you didn't?

MR. STEPHAN: Objection as to form and foundation.

THE WITNESS: Correct.

BY MR. CHRISTIANSEN:

Q. Same question about the horn. You were unaware that an audible warning was required under certain circumstances when overtaking a bicycle, back in April?

A. Correct, yes.

Q. Right. And had you been aware of both of them, I think you told Mr. Kemp you would have got over and honked your horn, if you would have known that was the law?

A. Correct.

Q. And the collision takes place -- I think

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it was H, picture H. And you had it somewhere like -- about like that (indicating)?

A. No, sir.

Q. Further out?

A. Yeah, I'm not even in that lane, sir. I'm in this lane.

Q. You're right. I got it wrong, thank you.

So I think you had it about -- I can't see the bike, but somehow like that (indicating). Fair?

A. Can I get up and put it where --

MR. STEPHAN: Microphone. Microphone.

BY MR. CHRISTIANSEN:

Q. It's all right. We all do it.

A. (Indicating.)

Q. You've got to get your microphone back on, Mr. Hubbard.

So you've placed the bus and the bike in the positions you were when you first visualized the bicycle?

A. Well, I have it a little crooked, but ...

Q. Unintentionally a little crooked, right? It was more like that (indicating)?

A. Yes, sir.

Q. And you've got the bike coming in at a -- not a -- straight into the lane, but at a -- somewhat of an angle?

A. Right, yes, sir.

Q. And if the bus is in (indicating) -- I just moved the bus into the lane further to the left, but kept it at the same space. Do you see that?

A. Yes, sir.

Q. If that bus is in that left lane, this collision never occurs, does it?

MR. STEPHAN: Objection; form and foundation.

BY MR. CHRISTIANSEN:

Q. Does it?

A. I hear what you're saying, sir.

Q. That's a true statement, correct?

A. It's possible.

Q. If the bus is in the left lane, as required by Nevada law, the collision doesn't occur; isn't that true?

A. Correct, sir.

MR. CHRISTIANSEN: I don't have anything else. Thank you, sir.

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MR. TOOMEY: No questions.

MR. STEPHAN: Can we take a two-minute break?

MR. CHRISTIANSEN: Sure.

THE VIDEOGRAPHER: Going off the record. The time is 2:30.

(A discussion is held off the record.)

THE VIDEOGRAPHER: Back on the record. The time is 2:31.

EXAMINATION

BY MR. TERRY:

Q. Mr. Hubbard, I have just a few questions for you, and I want to use this exhibit, which is Exhibit Number --

MR. KEMP: That's not an exhibit. It's just a demonstrative.

BY MR. TERRY:

Q. -- demonstrative exhibit, is a blowup of the road with markings on it that indicate 300 feet to zero feet at the intersection. Okay?

A. Yes.

Q. I'm going to take this bus and I'm going to put it here. Okay? The bicycle is here. I'm just going to put the bicycle here. Okay. And this is just so you and I can discuss the issue. All

right?

Now, it is my understanding that when you turned from Charleston onto Pavilion, you entered into the right-hand lane?

A. Yes, sir.

Q. And the bus -- or the bike was in the bike lane?

A. Yes.

Q. In front of you?

A. Yes, sir.

Q. And at some point you overtook the bike?

A. Passed the bike, yes.

Q. Passed the bike.

And as you're coming up on the bike and passing the bike, you are able to see the bike, visualize the bike?

A. Yes, sir.

Q. You can see it in front of you in the bike lane and you can see it as you overtake?

A. Yes, sir.

Q. And you are aware, or it is your opinion that you have a responsibility to maintain a lateral separation between you and the bike of 3 to 4 feet?

A. Yes, sir.

Q. And you do that?

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A. Correct.
Q. And then once you do that, you pass the bike and continue on your path?
A. Right.
Q. It is your testimony that that maneuver occurred on South Pavilion at the point where there is a cutout for the city bus?
A. Right.
Q. Which is more than 300 feet from the zero line?
A. Yes, sir.
Q. And it is not depicted on this aerial photograph?
A. No, sir.
Q. Now, once you pass the bike, as a trained bus driver, you still maintain forward vision, you look forward?
A. Yes, sir.
Q. And do you maintain vision to the sides of your vehicle?
A. Absolutely.
Q. Do you have a process or a pattern that you follow when you're doing this?
A. Well, you're doing -- you're doing left to right, and, you know, you're scanning, it's

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called scanning, and that's what you're doing, as you're driving down.

Q. As you're driving down, then, are you always scanning?

A. Yes. It's like a -- it's like -- it's like every three to five seconds or -- just scanning, you know (indicating).

Q. I'm going to move the bike -- or the bus down here, just so I can understand.

So when you're at that position and you are scanning, you are looking ahead and to your left and to your right?

A. Yes.

Q. And when you look to your left and to your right, you look into your mirrors?

A. Correct.

Q. And you look into your mirrors and they give you a view down the side of your bus?

A. Yes, sir.

Q. And you move within your seat so that you can see completely down the side of your bus?

A. So you get a -- right, a more better view. Yes, sir.

Q. When you do that maneuver, are there any blind spots along the side of your bus?

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A. Not to my knowledge. That's the whole idea. It takes away the blind spot.

Q. And as you're going down the road, South Pavilion, and you're doing that maneuver -- forward looking, left, right, moving backwards and forwards -- can you see or is it within your area of vision what is depicted here as the bike path? Can you see that?

A. Absolutely.

Q. As you go down, when you pass the bus [sic], until you visualize the bike again as it comes into your lane of travel, do you ever see the bike in the bike path?

A. No, sir.

MR. KEMP: Wait. You said "pass the bus."

MR. STEPHAN: Yeah, he misstated.

MR. TERRY: Where did I use the wrong term?

MR. KEMP: You said "pass the bus."

MR. STEPHAN: You said "pass the bus."

MR. KEMP: "When you pass the bus."

MR. TERRY: I'm sorry.

BY MR. TERRY:

Q. Okay. So after you pass the bike --

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forgive me, it was the tuna fish that this guy fed me that did that -- after you pass the bike then, and you proceed down South Pavilion, you never see the bike again in the bike lane until he's in front of you?

A. Until he's -- right. From that angle like I had up there.

Q. Based on your knowledge of how you drive the bus and do the scanning that you have described for us, if he had been in the bike path after the cutout for the city bus when you passed him, would you have seen him?

A. Yes, sir.

Q. When you saw him, was a portion of the bike in your lane of travel?

A. Absolutely. That's why I (indicating) -- that's why I did my (indicating) evasive movement, because otherwise he was going to -- as I -- as everyone saw, he was going to come right into the bus.

Q. Was then his front tire ahead of your bumper?

A. No. I would say that it was kind of at the door.

Q. At the door?

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A. Yes, sir.

MR. TERRY: Okay. All right. Thank you, sir. That's all I have.

MR. KEMP: I don't have anything more.

MR. STEPHAN: Nothing. Okay.

THE VIDEOGRAPHER: We're going off the record. The time is 2:36.

(The deposition concluded at 2:36 p.m.)

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CERTIFICATE OF DEPONENT

PAGE LINE CHANGE REASON

* * * * *

I, EDWARD HUBBARD, deponent herein, do hereby certify and declare the within and foregoing transcription to be my deposition in said action; that I have read, corrected and do hereby affix my signature to said deposition under penalty of perjury.

____
EDWARD HUBBARD, Deponent

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CERTIFICATE OF REPORTER

STATE OF NEVADA)
)SS:
COUNTY OF CLARK)

I, Karen L. Jones, a duly commissioned and licensed Court Reporter, Clark County, State of Nevada, do hereby certify: That I reported the taking of the deposition of the witness, EDWARD HUBBARD, commencing on Wednesday, September 20, 2017, at 10:01 a.m.

That prior to being examined, the witness was, by me, duly sworn to testify to the truth. That I thereafter transcribed my said shorthand notes into typewriting and that the typewritten transcript of said deposition is a complete, true and accurate transcription of said shorthand notes.

I further certify that I am not a relative or employee of an attorney or counsel of any of the parties, nor a relative or employee of an attorney or counsel involved in said action, nor a person financially interested in the action.

IN WITNESS HEREOF, I have hereunto set my hand, in my office, in the County of Clark, State of Nevada, this 24th day of September, 2017.

Karen L. Jones

KAREN L. JONES, CCR NO. 694

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EXHIBIT 5

EXHIBIT 5

DISTRICT COURT

COUNTY OF CLARK, NEVADA

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KEON KHIABANI and ARIA KHIABANI, minors by and through their natural mother KATAYOUN BARIN, et al., Plaintiffs, vs. MOTOR COACH INDUSTRIES, INC., a Delaware corporation; MICHELANGELO LEASING, INC., dba RYAN'S EXPRESS, an Arizona corporation, et al., Defendants.	)	Case No. A-17-755977-C Department No. XIV

VIDEOTAPED DEPOSITION OF
MARY WITHERELL
AUGUST 24, 2017
RENO, NEVADA

REPORTED BY: AMY JO TREVINO, CCR #825, CSR #5296

JOB NUMBER 411087

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ALSO PRESENT: Stewart Campbell, Videographer

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Q And you stood on the side of a road when a big bus or a big truck comes by --

A Yes, sir.

Q -- and there is an air displacement, right?

A Yes, sir.

Q What do you call that?

A Just air. I know to expect it. I don't really have a name for it.

Q Do you have an understanding that the faster the truck or bus goes the bigger the air blast is?

A Yes, sir.

Q And with regards to a bus going 30, 35, 40 miles an hour, what is your understanding of that air blast from that truck?

MR. ROBERTS: Objection, foundation.

MR. KEMP:

Q Or bus.

A Sir, I can't really answer that other than just by aerodynamics, if the bus is going, it's going to be larger.

Q Okay. Have you seen air blasts from buses or trucks caused bicyclists or pedestrians to wobble?

A I personally have not seen it.

Q Have you heard of that?

A Yes, sir.

Q And is that something you train the drivers that is a

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potential hazard that the air blast from the front of the bus could cause a bicyclist you are overtaking to wobble?

A Yes, sir.

Q I mean you recognize that as a potential hazard, right?

A Yes, sir, because you have a large vehicle going down the road, you know, that's why you allow as much space as you can and, you know, slow down and take all the precautions necessary.

Q And you knew that back in 1998 when you first started driving buses --

A Yes, sir.

Q -- that air blasts causes the bicycle to wobble a potential hazard, you knew that?

A Yes, sir.

Q Have you ever heard of a bus accident involving a bicycle?

A I'm sure there are some but me specifically a certain, no.

Q Now, with regards to the rear wheel suction we discussed earlier --

A Yes, sir.

Q -- are you aware of any safety devices that are used or could be used on buses to try to protect pedestrians or bicyclists in that circumstance?

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EXHIBIT 6

EXHIBIT 6

DISTRICT COURT

CLARK COUNTY, NEVADA

KEON KHIABANI and ARIA KHIABANI, minors by and through their natural mother, KATAYOUN BARIN; KATAYOUN BARIN, individually; KATAYOUN BARIN as Executrix of the Estate of Kayvan Khiabani, M.D. (Decedent), and the Estate of Kayvan Khiabani, M.D. (Decedent), Plaintiffs, vs. MOTOR COACH INDUSTRIES, INC., a Delaware corporation; MICHELANGELO LEASING, INC. d/b/a RYAN'S EXPRESS, an Arizona corporation; EDWARD HUBBARD, a Nevada resident; BELL SPORTS, INC. d/b/a GIRO SPORT DESIGN, a California corporation; SEVENPLUS BICYCLES, INC. d/b/a PRO CYCLERY, a Nevada corporation; DOES 1 through 20; and ROE CORPORATIONS 1 through 20, Defendants.	Case No. A-17-755977-C Dept. No. XIV

VIDEOTAPED DEPOSITION OF WILLIAM BARTLETT

LAS VEGAS, NEVADA

FRIDAY, SEPTEMBER 8, 2017

REPORTED BY: HOLLY LARSEN, CCR NO. 680, CA CSR 12170
JOB NO.: 416787

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VIDEOTAPED DEPOSITION OF WILLIAM BARTLETT, taken at 3800 Howard Hughes Parkway, 17th Floor, Las Vegas, Nevada, on Friday, September 8, 2017, at 11:06 a.m., before Holly Larsen, Certified Court Reporter, in and for the State of Nevada.

APPEARANCES:

For the Plaintiffs:

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APPEARANCES (Continued):

For Michelangelo Leasing, Inc., and Edward Hubbard:

SELMAN BREITMAN, LLP
BY: PAUL E. STEPHAN, ESQ.
BY: ERIC O. FREEMAN, ESQ.
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For SevenPlus Bicycles, Inc.:

MURCHISON & CUMMING, LLP
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Also Present:

DUSTIN KITTLESON, Videographer
Litigation Services
3770 Howard Hughes Parkway
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Las Vegas, Nevada 89169
702.314.7200

Q. Okay. When is the last time you drove a bus?

A. Last week.

Q. Okay. Last week prior to September 1st -- strike that.

Prior to September 1st, have you driven other buses?

A. I've driven buses throughout my career.

Q. During the year 2017?

A. Yes, sir.

Q. Okay. And that is for the current company you're with?

A. Arrow Stage Lines, yes, sir.

Q. Okay. Do they have a training requirement too for classroom training?

A. Yes, sir.

Q. Okay. So I assume they didn't train about this law I just read you either?

A. It's not in the training curriculum, no.

Q. Okay. So you have driven buses in 2017 at a time point where you were not aware that this was a legal requirement?

A. That's correct.

Q. Okay. All right. Now, earlier you talked about common sense or common practice or something?

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What was your phrase?

A. What we always recommend with our drivers is, if there is a bicycle traveling on the right side where the coach would pass it, that, if possible, they always give the lane of travel to the bike and move over if they can.

Q. So if someone didn't do that, that would be a violation of what you trained them to do?

A. Yes.

Q. And would you consider that to be -- well, strike that.

What is the reason for that?

A. To avoid any collision.

Q. Okay. It's recognized that bicycles can hit pebbles and wobble and whatever?

A. It's possible.

Q. I mean, you recognize that as a potential hazard?

A. It is possible.

Q. Okay. My question though is you recognize that as a potential hazard?

A. It's possible for that to happen.

Q. Okay. And that's why you want to move over to the far left lane?

A. To be safe, yes, sir.

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10/18/2018 2:52 PM
Steven D. Grierson
CLERK OF THE COURT

DISTRICT COURT, CIVIL DIVISION

CLARK COUNTY, NEVADA

* * * *

KATAYOUN BARIN, Plaintiff, vs. MOTOR COACH INDUSTRIES, INC., Defendant.	)	Case No. A-17-755977-C Dept. XIV

TRANSCRIBER'S TRANSCRIPT
OF
NOTICE OF HEARING ON DEFENDANT SEVENPLUS BICYCLES, INC. MOTION FOR DETERMINATION OF GOOD FAITH SETTLEMENT

BEFORE THE HONORABLE ADRIANA ESCOBAR

DISTRICT JUDGE

Taken on Thursday, December 7. 2017

At 9:42 a.m.

APPEARANCES:

For the Plaintiff: ERIC PEPPERMAN, ESQ.

For the Defendant: (Motorcoach) MARISA RODRIGUEZ, ESQ.

For the Defendant: (SevenPlus) CRISLOVE EGELEKE, ESQ.

Transcribed by: Maureen Schorn

LAS VEGAS, NEVADA. THURSDAY, DECEMBER 7, 2017, 9:42 A.M.

* * * *

THE MARSHAL: Case No. A-17-755977.

MS. RODRIGUEZ: Good morning, Your Honor. Marisa Rodriguez on behalf of Motor Coach Industries.

THE COURT: Good morning.

MR. PEPPERMAN: Good morning, Your Honor. Eric Pepperman for Plaintiffs.

MS. EGELEKE: Good morning, Your Honor. Crislove Egeleke on behalf of SevenPlus.

THE COURT: Good morning. I have not received an objection to this good faith settlement; is that correct?

MS. EGELEKE: That's correct.

THE COURT: Okay. But I do have to pursuant to Dockters, I need to make sure that there can be a finding of a good faith settlement, so I need to review the five elements with you and make a record, okay.

So, essentially, the first one, the amount paid in settlement is 10,000, okay. That seems in my mind to be reasonable given SevenPlus's involvement.

The allocation of the settlement proceeds among Plaintiffs, it appears that there are no third party Plaintiffs here, and it would be going straight to the

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Plaintiffs; is that correct?

MS. EGELEKE: Correct, Your Honor.

MR. PEPPERMAN: That's correct, Your Honor.

THE COURT: That's fine. With respect to No. 3, the insurance policy limits of settlement Defendants, I see that there's been a copy provided to the Plaintiffs. I read that somewhere in here.

But just a general information on that, I think that's something that needs to be discussed.

MR. PEPPERMAN: Your Honor, I can probably comment on that.

THE COURT: Sure.

MR. PEPPERMAN: It's a nominal settlement amount related to a nominal Defendant. SevenPlus's insurance policy I think is significantly more than what they're settling for.

I think what the case law says is, the insurance policy can be important and it can also be not important in a situation like this where you have a nominal settlement amount.

So from the plaintiff's point of view, the amount of insurance available isn't really a strong factor in our determination of accepting the settlement amount. It was more based on the role of the Defendant, the amount paid that was fair.

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THE COURT: Right.

MR. PEPPERMAN: Regardless of the additional insurance coverage that exists.

THE COURT: Right. But in your mind as the Plaintiff, and does anyone have any objections to the insurance coverage, since I have to hit the five elements?

MR. PEPPERMAN: No. We have no objection to that.

THE COURT: Very good. All right. Then we have the financial condition of the settlement Defendants. That's something I think it referred to the insurance and didn't discuss that, but I'd like just the information necessary on that.

MR. PEPPERMAN: From the Plaintiff's point of view, we think the settlement amount is fair and in good faith in light of the Defendant's financial condition.

They could certainly afford to pay more if the situation called for it, but given their role in the case and their financial condition, we feel it's a good faith settlement.

THE COURT: Okay. Do you have any --

MS. EGELEKE: We have no position, Your Honor.

THE COURT: Okay, very good. Then I don't

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believe there's any collusion, fraud or tortious conduct aimed to injure the interests of nonsettling parties. That doesn't -- I don't see anything there.

MR. PEPPERMAN: The settlement negotiations were arms length, Your Honor.

THE COURT: Okay, very good. All right. Then I believe that we've met these factors and I'm going to approve -- I find this is a good faith settlement.

MR. PEPPERMAN: Thank you.

THE COURT: So would you like to prepare the order?

MS. GELEKE. Certainly, Your Honor. We can have that prepared and submitted to the Court.

THE COURT: Thank you, very good. And make sure both counsel, the other parties have a chance to look at it as to form and content.

And please make sure that you include the factors and send it to us in Word, please. Thank you.

MS. EGELEKE: Thank you, Your Honor.

THE COURT: Have a great day.

MR. PEPPERMAN: Thank you, Your Honor.

THE COURT: Happy holidays.

ATTEST: Full, true and accurate transcript of proceedings.

Maureen Schorn
MAUREEN SCHORN, CCR NO. 496, RPR

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Attorneys for Defendant Motor Coach Industries, Inc.

DISTRICT COURT

CLARK COUNTY, NEVADA

KEON KHIABANI and ARIA KHIABANI, minors by and through their Guardian, MARIE-CLAUDE RIGAUD; SIAMAK BARIN, as Executor of the Estate of Kayvan Khiabani, M.D. (Decedent); the Estate of Kayvan Khiabani, M.D. (Decedent); SIAMAK BARIN, as Executor of the Estate of Katayoun Barin, DDS (Decedent); and the Estate of Katayoun Barin, DDS (Decedent);

Plaintiffs,

v.

MOTOR COACH INDUSTRIES, INC., a Delaware corporation; MICHELANGELO LEASING INC. d/b/a RYAN'S EXPRESS, an Arizona corporation; EDWARD HUBBARD, a Nevada resident; BELL SPORTS, INC. d/b/a GIRO SPORT DESIGN, a Delaware corporation; SEVENPLUS BICYCLES, INC. d/v/a PRO CYCLERY, a Nevada corporation, DOES 1 through 20; and ROE CORPORATIONS 1 through 20,

Defendants.

Case No.: A-17-755977-C

Dept. No.: XIV

DEFENDANT'S MOTION IN LIMINE NO. 17 TO EXCLUDE CLAIM OF LOST INCOME, INCLUDING THE AUGUST 28 EXPERT REPORT OF LARRY STOKES

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Defendant Motor Coach Industries, Inc. ("MCI"), by and through its attorneys of record, hereby requests that the Court preclude Plaintiffs from claiming, arguing or presenting evidence that they are entitled to recover Dr. Khiabani's "lost income," including evidence set forth in the August 28, 2017 report of Larry Stokes, Ph.D.

This Motion is made and based upon the following Memorandum of Points and Authorities, the pleadings and papers on file herein, and any argument presented at the time of hearing on this matter.

DATED this 8th day of December, 2017.

/s/ D. Lee Roberts, Jr.
D. Lee Roberts, Jr., Esq.
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NOTICE OF MOTION

PLEASE TAKE NOTICE that **DEFENDANT'S MOTION IN LIMINE NO. 17 TO EXCLUDE CLAIM OF LOST INCOME, INCLUDING THE AUGUST 28 EXPERT REPORT OF LARRY STOKES** will come on for hearing in the above-entitled Court on the 30 day of January ~~2017~~ 2018, at 9:30 a.m./~~p.m.~~ before Dept. XIV of the above-entitled Court.

DATED this 8th day of December, 2017.

/s/ D. Lee Roberts, Jr.
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MEMORANDUM OF POINTS AND AUTHORITIES

Introduction

The Supreme Court of Nevada has expressly held that an estate is not entitled to recover damages for lost income or economic opportunity. Although N.R.S. 41.085 allows heirs to recover damages for "loss of probable support", Dr. Stokes offers no opinion as to the loss of probable support of the heirs. Plaintiffs should be precluded from offering irrelevant and prejudicial evidence of damages that are not recoverable as a matter of law.

Factual Background

Dr. Kayvan Khiabani suffered fatal injuries when he collided with a motor coach on April 18, 2017. His surviving wife Katayoun Barin, and his minor sons Keon and Aria Khiabani, aged 14 and 16, brought this action seeking damages allowed under the wrongful death statute, NRS 41.085. As the Court knows, Dr. Barin passed away on October 12, 2017, and the Plaintiffs have filed a Second Amended Complaint. The only remaining heirs are the surviving minor children. They have filed a Second Amended Complaint, and continue to seek damages for wrongful death pursuant to NRS 41.085.

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On August 28, 2017, while Dr. Barin was still alive, Plaintiffs disclosed a report from economist Larry Stokes. The Stokes report in question is attached as Exhibit "1". In this report, Dr. Stokes gives the following opinions:

> At your request, I have estimated the present value of the loss of earnings, income and fringe benefits resulting from the death of Dr. Kayvan Khiabani.
>
> * * *
>
> To summarize, the present value of the loss of earnings, income and fringe benefits resulting from the death of Dr. Khiabani totals $15,262,417.

In a wrongful death action under Nevada law, the estate is not entitled to recover for loss of future income and/or economic opportunity. Although the heirs are entitled to recover loss of probable support, Dr. Stokes offers no opinion on the allowable claim of lost support.

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Argument

In general, all evidence presented by Plaintiffs must meet the threshold requirement of relevance. NRS 48.205(2) provides that "[e]vidence that is not relevant is not admissible." Relevant evidence is defined by NRS 48.015 as:

> [e]vidence having a tendency to make the existence of any fact that is of consequence to the determination of the action more or less probable than it would without the evidence.

In addition, NRS 48.035 provides:

> 1. Although relevant, evidence is not admissible if its probative value is substantially outweighed by the danger of unfair prejudice, of confusion of the issues or of misleading the jury.
>
> 2. Although relevant, evidence may be excluded if its probative value is substantially outweighed by considerations of undue delay, waste of time or needless presentation of cumulative evidence.

The determination of whether the prejudicial impact of evidence outweighs its probative value is left to the sound discretion of the trial court. *Anderson v. State*, 92 Nev. 21, 544 P.2d 1200 (1975). Arguments which unfairly prejudice a party must be excluded. *Givens v. State*, 99 Nev. 50, 657 P.2d 97 (1983).

In Nevada, wrongful death actions are governed by statute, having no roots in the common law. *Wells, Inc. v. Shoemake*, 64 Nev. 57, 66, 177 P.2d 451, 456 (1947). Under N.R.S. 41.085, "both the decedent's heirs and representatives can maintain a cause of action for wrongful death" *Alsenz v. Clark County Sch. Dist.*, 109 nev 1062, 864 P.2d 285 (1993). "[T]he [C]ourt or jury may award each [heir] pecuniary damages for his grief or sorrow, loss of probable support, companionship, society, comfort and consortium, and damages for pain, suffering or disfigurement of the decedent." N.R.S. 41.085(4). Additionally, the damages recoverable by the personal representatives of a decedent on behalf of her estate include:

> **(a)** Any special damages, such as medical expenses, which the decedent incurred or sustained before his death, and funeral expenses; and
>
> **(b)** Any penalties, including, but not limited to, exemplary or punitive damages, that the decedent would have recovered if he had lived, but do

> not include damages for pain, suffering or disfigurement of the decedent. N.R.S. 41.085(5)

As the common law provides no wrongful death action, Nevada's statutory remedy is exclusive; furthermore, the types of damages listed therein are exclusive." *Pitman v. Thorndike*, 762 F. Supp. 870, 875 (D. Nev. 1991). Damages not expressly provided by the statute cannot be recovered. The Supreme Court of Nevada has held that the estate is not entitled to recover damages for lost income or economic opportunity. Instead, N.R.S. 41.085, allows heirs to prove damages for "loss of probable support".

> The reasonable interpretation of NRS 41.085(4) and (5) concludes that the estate's recovery cannot include lost economic opportunities of the decedent or punitive damages. Nothing in either subsection indicates otherwise. Moreover, subsection four states that the heirs have a right to recover for "loss of probable support." This element of damages translates into, and is often measured by, the decedent's lost economic opportunity. Surely the estate could not recover the same type of damage under subsection five. This would amount to double recovery, an unreasonable result.

Alsenz v. Clark County Sch. Dist., 109 Nev. 1062, 864 P.2d 285 (1993).

It would be understandable for Plaintiffs to assert that Dr. Khiabani's wife would have presumptively received as support Dr. Khiabani's entire income less his personal consumption. Proof of lost income in this circumstance would be relevant enough to outweigh prejudice. The same presumption cannot be said for minor children only two year and four years, respectively, from becoming adults. Certainly, it is no common or probable for adult children to receive the majority of their parents' income as support. Dr. Stokes has offered no opinion on loss of probable support of the minor children or how much support, if any, would have likely continued after the children became adults. His only opinion is on the unallowable claim of lost income. Presenting the jury with a claim of "lost income" would be unduly prejudicial and confusing.

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Conclusion

For the forgoing reasons, Defendants respectfully request that any and all evidence related to the claims of loss of future income be excluded.

DATED this 8th day of December, 2017.

<u>/s/ D. Lee Roberts, Jr.</u>
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Attorneys for Defendant
Motor Coach Industries, Inc.

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CERTIFICATE OF SERVICE

I hereby certify that on the 8th day of December, 2017, a true and correct copy of the foregoing **DEFENDANT'S MOTION IN LIMINE NO. 17 TO EXCLUDE CLAIM OF LOST INCOME, INCLUDING THE AUGUST 28 EXPERT REPORT OF LARRY STOKES** was electronically filed and served on counsel through the Court's electronic service system pursuant to Administrative Order 14-2 and N.E.F.C.R. 9, via the electronic mail addresses noted below, unless service by another method is stated or noted:

Will Kemp, Esq. Eric Pepperman, Esq. KEMP, JONES & COULTHARD, LLP 3800 Howard Hughes Pkwy., 17th Floor Las Vegas, NV 89169 e.pepperman@kempjones.com ***Attorneys for Plaintiffs***	Peter S. Christiansen, Esq. Kendelee L. Works, Esq. CHRISTIANSEN LAW OFFICES 810 S. Casino Center Blvd. Las Vegas, NV 89101 pete@christiansenlaw.com kworks@christiansenlaw.com ***Attorneys for Plaintiffs***
Keith Gibson, Esq. James C. Ughetta, Esq. LITTLETON JOYCE UGHETTA PARK & KELLY LLP The Centre at Purchase 4 Manhattanville Rd., Suite 202 Purchase, NY 10577 Keith.Gibson@LittletonJoyce.com James.Ughetta@LittletonJoyce.com ***Attorneys for Defendant Bell Sports, Inc. d/b/a Giro Sport Design***	C. Scott Toomey, Esq. LITTLETON JOYCE UGHETTA PARK & KELLY LLP 201 King of Prussia Rd., Suite 220 Radnor, PA 19087 Scott.toomey@littletonjoyce.com ***Attorney for Defendant Bell Sports, Inc. d/b/a Giro Sport Design***
Michael E. Stoberski, Esq. Joslyn Shapiro, Esq. OLSON CANNON GORMLEY ANGULO & STOBERSKI 9950 W. Cheyenne Ave. Las Vegas, NV 89129 mstoberski@ocgas.com jshapiro@ocgas.com ***Attorneys for Defendant Bell Sports, Inc. d/b/a Giro Sport Design***	Eric O. Freeman, Esq. SELMAN BREITMAN LLP 3993 Howard Hughes Pkwy., Suite 200 Las Vegas, NV 89169 efreeman@selmanlaw.com ***Attorney for Defendants Michelangelo Leasing Inc. d/b/a Ryan's Express and Edward Hubbard***

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Michael J. Nunez, Esq. MURCHISON & CUMMING, LLP 350 S. Rampart Blvd., Suite 320 Las Vegas, NV 89145 mnunez@murchisonlaw.com ***Attorney for Defendant SevenPlus Bicycles, Inc. d/b/a Pro Cyclery***	Paul E. Stephan, Esq. Jerry C. Popovich, Esq. William J. Mall, Esq. SELMAN BREITMAN LLP 6 Hutton Centre Dr., Suite 1100 Santa Ana, CA 92707 pstephan@selmanlaw.com jpopovich@selmanlaw.com wmall@selmanlaw.com ***Attorney for Defendants Michelangelo Leasing Inc. d/b/a Ryan's Express and Edward Hubbard***

An Employee of WEINBERG, WHEELER, HUDGINS, GUNN & DIAL, LLC

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EXHIBIT 1

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EXHIBIT 1

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Business Economics Taxes Accounting

August 28, 2017

Will Kemp
Kemp, Jones & Coulthard
3800 Howard Hughes Parkway, 17th Floor
Las Vegas, NV 89169

Larry D. Stokes, Ph.D.
Business & Economic Analysis

Bonnie Coombs-Stokes
MBA, CPA
Accounting & Taxes

Re: Kayvan Khiabani

Dear Mr. Kemp:

At your request, I have estimated the present value of the loss of earnings, income and fringe benefits resulting from the death of Dr. Kayvan Khiabani. I have also calculated the present value of the loss of his household services. The data, information and techniques used to arrive at my conclusions are shown in the accompanying report and details of my annual calculations are contained in the two table pages at the end of the report.

To summarize, the present value of the loss of earnings, income and fringe benefits resulting from the death of Dr. Khiabani totals $15,262,417. The present value of the loss of his household services totals $53,673. My conclusions are based on data and information that were available to me as of August 28, 2017, and are subject to change should additional information subsequently become available that would alter my conclusions.

Thank you for allowing me to be of service to you in the Khiabani matter. Please feel free to call me if you have any questions.

Sincerely,

[signature]

Larry D. Stokes, Ph.D.

Beta Business Consulting, LLC
[illegible] North 114th Street, Suite 103, Scottsdale, Arizona [illegible]
Tel (480) 551-[illegible] Fax (480) 551-[illegible]
email [illegible]@gmail.com

EXHIBIT KS 9
STOKES

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AN ANALYSIS OF ECONOMIC LOSS

Kayvan Khiabani — August 28, 2017

PERSONAL INFORMATION

Sex: Male.
Race or Ethnic Group: White.
Date of Birth: September 7, 1965
Date of Death: April 18, 2017
Age at Date of Death: 51 Years
Marital Status: Married, Katayoun (Katy) Barin, Age 48
Area of Residence: Las Vegas, Nevada.
Number of Children In Household: Two children

Name	Birth Date	Current Age
Aria Khiabani	2/2/2001	16
Keon Khiabani	5/8/2003	14

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Educational History:

Mr. Khiabani attended Vanier College in Montreal, Canada. He then attended McGill University where he received his medical education, completing it in 2000.

Employment History:

University of Reno; Las Vegas, Nevada.
Dates of Employment: October, 2002 to April 18, 2017.
Occupation: Professor of Surgery.
Rate of Pay: $995,000 per year.

Documents Utilized in Preparing this Report:

Data sources used in this analysis are cited throughout the report. In addition to these sources, the following information was used in the preparation of this analysis:

A Personal History Questionnaire completed by Katy Barin dated August 10, 2017.

Internal Revenue Service Form W-2 for Kayvan Khiabani for the 2011 to 2016 time period.

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Earnings History:

Year	Source:	Kayvan's Earnings
2011	Income Tax Information	$835,235
2012	" " "	837,589
2013	" " "	964,965
2014	" " "	978,651
2015	" " "	985,106
2016	" " "	990,503

LOSS OF EARNINGS, INCOME AND FRINGE BENEFITS:

The estimation of the loss of earnings, income and fringe benefits begins with the establishment of an occupational category and a beginning dollar value or earnings base. Since earnings grow over time, growth rates of earnings are calculated and applied to the earnings base.

Real earnings are calculated over the normal worklife expectancy. Earnings are adjusted by factors in the age-earnings profile. Employers' contributions for certain fringe benefits are included in the analysis. At the end of the worklife expectancy, an adjustment is used to reduce employment based income to retirement income levels. The reduced income levels are calculated to the end of the normal life expectancy. Discount rates are calculated and used to adjust all estimates to present value.

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Earnings Bases and Past Growth Rates of Earnings:

Dr. Khiabani's earnings are based on his 2016 annual earnings of $990,503. From 2016 to 2017, earnings are grown on an annual basis using employment cost index (ECI) data for wages and salaries of state and local government workers, not seasonally adjusted, fourth quarter. ECI data for 2017 is estimated using the growth rate for the prior year. Data are for workers in management, professional and related occupations. Details are summarized in the table at the top of the next page.

The data source is the U.S. Department of Labor Bureau of Labor Statistics, "Employment Cost Index."
URL: http://data.bls.gov/PDQ/outside.jsp?survey=ci

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Past Growth Rates of Earnings:

Year	ECI	ECI Growth	Annual Earnings
	State and local government workers in management, professional and related occupations		
2016	123.4		**$990,503**
2017	125.7	1.90%	1,009,315

Growth Rates of Prices and Earnings, Projected Real Growth:

Real rates of growth are used to estimate future earnings levels in this analysis. Real growth rates of earnings are calculated by subtracting the average compound historical growth rate of prices from the average compound historical growth rate of earnings.

In this analysis, the time period over which earnings and price data were collected begins in 2002 and ends in 2016. Annual data are used to calculate historical and projected real rates of growth.

Average annual earnings data for growth rate calculations are for male, year-round, full-time doctors.

The source for annual earnings data is the U.S. Bureau of the Census, "Current Population Survey." Data used are for all races.
URL (2002): http://www.census.gov/hhes/www/cpstables/macro/032003/perinc/new06_037.htm
URL (2015): http://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pinc/pinc-06.2015.html

Earnings for 2015 are adjusted to 2016 levels by using Employment Cost Index data which are cited above.

Consumer Price Index data for 2002 and 2016 are from the U.S. Department of Labor. Data are the U.S. city average for all urban consumers, all items, current series. https://data.bls.gov/pdq/querytool.jsp?survey=cu

Details of the data and the calculated growth rates are shown in the table at the top of the next page.

Growth Rates of Prices and Earnings, Projected Real Growth:

	--------Years-------		Historical	Projected
	2002	2016	Growth	Real Growth
Average Annual Earnings	$174,826	$234,623	2.12%	0.04%
Consumer Price Index	179.9	240.0	2.08%	NA

Age-Earnings Profile:

In a typical working career, a young worker earns less than the average wage for a given occupation. In mid-career, an experienced worker earns higher than average wages. Later in a career, earnings often tend to diminish somewhat from mid-career levels. The way a worker's earnings vary through a working career is called an age-earnings profile.

The age-earnings profile is affected by a worker's age, sex and level of educational attainment. In this analysis, adjustments to average earnings because of factors in the age-earnings profile vary from 97.8% to 100.4%.

Earnings data for the age-earnings profile are averages calculated from 2002 to 2015 data. Data are from the U.S. Bureau of the Census, "Current Population Survey," Table P-32. Data for all races are used.
URL: http://www.census.gov/data/tables/time-series/demo/income-poverty/historical-income-people.html

Worklife Expectancy:

At the time of his death, Mr. Khiabani was 51 years of age. Given his level of educational attainment, the normal worklife expectancy is 18.0 years through 2035.3. At that time, Mr. Khiabani would be 69 years old.

The data source for worklife expectancy is Gary R. Skoog and James E. Ciecka and Kurt V. Krueger: "The Markov Process Model of Labor Force Activity; Extended Tables of Central Tendency, Shape, Percentile Points, and Bootstrap Standard Errors." Journal of Forensic Economics 22(2), 2011, pp.165-229. Values are rounded to one decimal point.

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Life Expectancy:

At the time of his death, Mr. Khiabani had a normal life expectancy of 29.0 years through the year 2046.3. Life expectancy data are from Arias E, Heron M, Xu JQ. United States life tables, 2013. National vital statistics reports; vol 66 no 3. Hyattsville, MD: National Center for Health Statistics. 2017.
URL: https://www.cdc.gov/nchs/data/nvsr/nvsr66/nvsr66_03.pdf

Income Adjustment at End of Worklife:

At the end of the worklife expectancy, an adjustment is used to reduce employment based income to retirement income levels. In this analysis, income levels are reduced by 61.8% from the end of the worklife expectancy to the end of the normal life expectancy. No real growth is assumed in this income.

Data on consumer income by age of respondent are from the U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey, 2014 - 2015."
URL: http://www.bls.gov/cex/

Fringe Benefits:

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Fringe benefits that are provided by employers are often not paid to workers in the the form of direct money payments. They do, however, have economic value and contribute to a worker's well-being. Employers' contributions for health benefits and one-half of Social Security and Medicare are included in this analysis. Fringe benefits are included only through 2021, the year in which the youngest child in the household becomes age 18.

Data for Social Security and Medicare contributions are from the Social Security Administration. Health and retirement benefit data are from the U.S. Department of Labor Bureau of Labor Statistics, "Employer Cost for Employee Compensation"
URL: http://data.bls.gov/cgi-bin/dsrv?cm

Social Security Benefit:

Contributions for Social Security and Medicare are identical for all employers and equal 6.20% and 1.45% of earnings respectively.

Health Benefit:

An average contribution for state and local government workers in management, professional and related occupations of $12,359 per year was used in this analysis.

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Fringe Benefit Growth Rates:

No real growth is assumed in employers' contributions for Social Security, Medicare and retirement benefits.

Real rates of growth are used to estimate future health benefit contributions. The real growth rate is calculated by subtracting the average compound historical growth rate of prices from the average compound historical growth rate of the cost of fringe benefits. Details are shown in the table below.

Health Benefit Growth Rates:

	--------Years-------		Historical	Projected
	2006	2016	Growth	Real Growth
Health Benefits	103.1	131.8	2.48%	0.73%
Consumer Price Index	201.6	240.0	1.76%	NA

Price Index data for 2006 and 2016 are from the U.S. Department of Labor. https://data.bls.gov/pdq/querytool.jsp?survey=cu

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Personal Consumption Allowance:

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Personal consumption expenditures are outlays that would have been made for the purchase of goods and services that would have benefited the deceased person. These outlays include such items as food, clothing, medical care, entertainment and other personal services. Expenditures on gifts and contributions are also included even though these expenditures would not have directly benefited the deceased person. Finally, outlays for insurance, pensions and social security are included

Items that are not included in personal consumption are housing expenditures and the net outlay for vehicles. These items are considered public goods that are essentially indivisible within the household. Expenditures on these items also tend to give rise to asset accumulation within the estate.

Katy Barin is extremely ill and is not expected to survive very long into the future. In this analysis, Katy is included in the household through the 2018 calendar year for purposes of calculating the personal consumption allowance.

Personal consumption expenditures are subtracted from the earnings, income and fringe benefits of the deceased to arrive at the economic loss. The personal consumption allowance that is subtracted in this analysis is calculated by multiplying a personal consumption percentage times direct household earnings.

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Personal consumption expenditures, as a percentage of income, decrease as income increases and as the number of persons in a household increase. Consumption percentages are generally different in each year of the analysis. They range from a low of 8.2% to a high of 34.2% in this analysis.

Data on consumer income before taxes, household size and expenditures are from the U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey, Cross-Tabulated Tables 2014 - 2015."
URL: http://www.bls.gov/cex/tables.htm

VALUE OF HOUSEHOLD SERVICES:

Household services such as household work inside and outside of the home, caring for and helping household members, shopping and transportation related to household members have considerable value to a household. However, family members who do such work are not typically paid for their efforts.

Household services performed by family members enhances the value of family assets and the quality of life the family enjoys. A loss of household work resulting from the injury or death of a family member is a component of economic loss that is addressed in this analysis.

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Household services are calculated through 2021, the year in which Keon Khiabani reaches age 18. Katy Barin is included through the 2018 calendar year.

Average Hours Per Year Devoted to Household Work:

Since most family members do not record the amount of time they allocate toward various types of household work, data from the American Time Use Survey are used to estimate the time spent on household work. The time spent on this work varies based on employment, race, number and age of members of the household and the level of educational attainment.

The data source for household work data is the U.S. Department of Labor Bureau of Labor Statistics, "American Time Use Survey", 2013 and 2014.
URL: http://www.bls.gov/tus/datafiles_2013.htm
URL: http://www.bls.gov/tus/datafiles_2014.htm

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Dollar Value of Household Services:

A wage rate from the competitive labor market is utilized to value household services. In this analysis, a 2016 wage rate of $13.71 per hour was used. This wage is the average wage for workers in Food Preparation and Serving Related Occupations, Building and Grounds Cleaning and Maintenance Occupations, and Personal Care and Service Occupations in the Las Vegas-Henderson-Paradise, Nevada area.

The data source is the U.S. Department of Labor Bureau of Labor Statistics. URL: https://www.bls.gov/oes/current/oes_29820.htm#35-0000

Growth Rate of the Dollar Value of Time per Hour:

Real rates of growth in household services are used in estimating future hourly dollar values. The real rate of growth is the difference between the historical growth in the cost of household operations and inflation in general. Details are shown in the table below. Index numbers for 2002 and 2016 are from the U.S. Department of Labor. Data are the U.S. city average for all urban consumers, all items, current series. https://data.bls.gov/pdq/querytool.jsp?survey=cu

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Growth Rate of the Dollar Value of Time per Hour:

	--------Years-------		Historical	Projected
	2002	2016	Growth	Real Growth
Household Operations	119.0	171.6	2.65%	0.57%
Consumer Price Index	179.9	240.0	2.08%	NA

Personal Production Allowance:

The personal production allowance is an estimate of the value of household services that would have been produced by the deceased person for his or her own personal benefit. The personal production allowance is subtracted from the value of household services to arrive at the loss of the value of household services.

The personal production allowance that is subtracted is calculated by multiplying a personal production percentage times the value of household services. The personal production percentages varies according to the sex of the deceased person and other characteristics of the household. In this analysis, personal production percentages range from a low of 18.0% to a high of 22.5%.

Personal production allowances are calculated from data in the U.S. Department of Labor Bureau of Labor Statistics, "American Time Use Survey", cited above.

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PRESENT VALUE DISCOUNT RATE:

Economic losses that occur in the future must be discounted to present value. The present value technique recognizes the fact that money currently available can be invested, and interest can be earned on that investment. A present value amount is, therefore, less than the sum of future losses. The technique insures that both the principal amount and the interest earned over time will be exhausted at the end of the time period of the analysis.

A real discount rate is used in this analysis. In this technique, inflation is deducted from nominal interest rates to arrive at a real discount rate.

Economic losses that occur in the past are also adjusted to present value. Past values are brought to present value by adjusting for decreases in the buying power of the dollar over time. Annual changes in the Consumer Price Index are used for this adjustment.

The nominal present value discount rate is based on an average of historical and recent yield rates on 3-month and 1, 5, and 10-year Treasury constant maturity issues. The average annual yield rate on these low-risk securities from 2002 through 2015 was 2.24%. The above securities had an annual yield averaging 1.32% in 2016. Averaging the historical and recent yield rates results in a composit yield rate of 1.78%.

The average of the year to year inflation rates from 2002 through 2015 was 2.11%. In 2016, the inflation rate was 0.32%. Averaging the historical and recent inflation rates results in a composit inflation rate of 1.22%. Subtracting the composit inflation rate from the composit yield rate results in a real discount rate of 0.57%

The data source for yield or interest rate information is the Federal Reserve.
URL: https://www.federalreserve.gov/datadownload/Build.aspx?rel=H15

Inflation or Consumer Price Index data are from the U.S. Department of Labor. Data are the U.S. city average for all urban consumers, all items, current series.
https://data.bls.gov/pdq/querytool.jsp?survey=cu

CONCLUSIONS:

Present Value of Earnings, Income and Fringe Benefits:	$21,112,263	
Present Value of Personal Consumption:	($5,849,846)	
Present Value of the Loss of Earnings, Income and Fringe Benefits:		$15,262,417
Present Value of Household Services:	$67,319	
Present Value of Personal Production:	($13,646)	
Present Value of the Loss of Household Services:		$53,673
Present Value of the Total Economic Loss:		$15,316,090

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PRESENT VALUE OF EARNINGS, INCOME AND FRINGE BENEFITS   Kayvan Khiabani

Year	Earnings and Income	Fringe Benefits	Total Earnings, Income and Fringe Benefits	Personal Consumption Allowance	Loss of Earnings, Income and Fringe Benefits
2017	708,076	17,540	725,616	(58,199)	662,417
2018	1,007,811	16,629	1,024,440	(82,829)	941,611
2019	1,003,739	16,649	1,020,388	(164,058)	856,330
2020	999,327	16,669	1,015,997	(163,330)	852,667
2021	994,582	16,689	1,011,271	(162,550)	848,721
2022	989,508		989,508	(161,718)	827,790
2023	984,110		984,110	(320,780)	663,330
2024	978,395		978,395	(318,909)	659,486
2025	972,367		972,367	(316,949)	655,418
2026	966,032		966,032	(314,892)	651,140
2027	959,394		959,394	(312,740)	646,654
2028	952,460		952,460	(310,495)	641,965
2029	945,233		945,233	(308,157)	637,076
2030	937,719		937,719	(305,729)	631,990
2031	929,923		929,923	(303,211)	626,712
2032	921,839		921,839	(300,597)	621,242
2033	913,504		913,504	(297,916)	615,588
2034	904,890		904,890	(295,141)	609,749
2035	514,656		514,656	(171,684)	342,972
2036	343,803		343,803	(117,604)	226,199
2037	341,864		341,864	(116,940)	224,924
2038	339,935		339,935	(116,280)	223,655
2039	338,017		338,017	(115,624)	222,393
2040	336,110		336,110	(114,972)	221,138
2041	334,213		334,213	(114,323)	219,890
2042	332,328		332,328	(113,678)	218,650
2043	330,453		330,453	(113,037)	217,416
2044	328,588		328,588	(112,399)	216,189
2045	326,734		326,734	(111,765)	214,969
2046	97,467		97,467	(33,340)	64,127
Totals	$21,033,086	$79,177	$21,112,263	($5,849,846)	$15,262,417

PRESENT VALUE OF HOUSEHOLD WORK: Kayvan Khiabani

Year	Present Value of Household Work	Present Value of Personal Production Allowance	Present Value of the Loss of Household Work
2017	13,202	(2,370)	10,832
2018	18,778	(3,386)	15,392
2019	11,886	(2,635)	9,251
2020	11,783	(2,630)	9,153
2021	11,670	(2,624)	9,045
Totals:	$67,319	($13,646)	$53,673

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DISTRICT COURT

COUNTY OF CLARK, NEVADA

KEON KHIABANI and ARIA KHIABANI, minors, by and through their Guardian, MARIE-CLAUDE RIGAUD; SIAMAK BARIN, as Executor of the Estate of Kayvan Khiabani, M.D. (Decedent), the Estate of Kayvan Khiabani, M.D. (Decedent); SIAMAK BARIN, as Executor of the Estate of Katayoun Barin, DDS (Decedent); and the Estate of Katayoun Barin, DDS (Decedent); Plaintiffs, vs. MOTOR COACH INDUSTRIES, INC., a Delaware corporation; MICHELANGELO LEASING INC. d/b/a RYAN'S EXPRESS, an Arizona corporation; EDWARD HUBBARD, a Nevada resident; BELL SPORTS, INC. d/b/a GIRO SPORT DESIGN, a California corporation; SEVENPLUS BICYCLES, INC. d/b/a Pro Cyclery, a Nevada corporation; DOES 1 through 20; and ROE CORPORATIONS 1 through 20. Defendants.	Case No. A-17-755977-C Dept. No. XIV **PLAINTIFFS' JOINT OPPOSITION TO MCI MOTION FOR SUMMARY JUDGMENT ON ALL CLAIMS ALLEGING A PRODUCT DEFECT AND TO MCI MOTION FOR SUMMARY JUDGMENT ON PUNITIVE DAMAGES**

NOW APPEAR Plaintiffs, by and through counsel of record, and hereby oppose the Motion For Summary Judgment On All Claims Alleging A Product Defect (hereinafter "MSJ Product

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Defect") and the Motion For Summary Judgment On Punitive Damages (hereinafter "MSJ Punitive") by this joint opposition.[1] This opposition is made and based on the points and authorities, testimony and other evidence cited herein and all arguments raised at time of hearing of this matter.

I. OVERVIEW

MCI is and has for decades been the largest bus manufacturer in North America and makes thousands of buses each year. (Ex. 1; Couch Dep., 114:3-5) Unlike makers of cars, large trucks or high speed trains and even other bus makers (including MCI's parent company New Flyer), MCI refuses to adopt widely recognized design improvements such as aerodynamic streamlining, proximity sensors or barrier guards. Instead, MCI has built basically the same blunt shaped bus for decades. MCI itself characterizes the J4500 as a "boxy" bus in MSJ Product Defect, 19:1. MCI does not even provide rudimentary safety features such as passenger seat belts as standard equipment (although passenger seatbelts have been placed in all US cars for the last 50 years).[2] Other critical safety features such as streamlining, proximity sensors or barrier guards are anathema to MCI.

The appalling reason that MCI deliberately omits multiple salutory safety features on MCI buses is that MCI greedily strives to build the "boxy" J4500 bus as cheaply as possible -- a classic case of profits over safety. The fundamental issue for the jury is whether strict liability demands that a bus manufacturer use readily available safety technology (just as car makers and all other product manufacturers must) or whether bus manufacturers are immune simply because many of them chose to keep making dangerous buses.[3]

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[1] Plaintiffs are allowed 35 pages for each opposition or 70 total pages. This **combined** opposition is only 47 pages long.

[2] The J series bus had seat belts as a standard feature for the driver but did not provide seat belts for passengers. (Ex. 1; Couch Dep., 31:9-10)

[3] Volvo makes a bus in Europe that has right front and side proximity sensors -- demonstrating both that this is a practical safety feature and that it can be easily installed on a bus. See September 27, 2016, Autocar First For Car News and Reviews, 2017 Volvo buses to gain pedestrian and cyclist detection tech, Collision detection systems could save lives in densely populated areas. (Ex. 2)

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II. STATEMENT OF FACTS

A. There Have Been Thousands Of Bus Accidents With Pedestrians And Bikes -- Not "3 Accidents" As MCI Falsely Asserts

There were 7,154 **pedalcyclist** fatalities in traffic crashes in the U.S. from 2006 to 2015. (Ex. 3; NHTSA Traffic Safety Facts) The most deaths occurred in 2015; 818 bike deaths. Id. 5 of the 2015 fatalities were caused by buses. (Ex. 3; NHTSA Traffic Safety Facts, Table 5) Nevada had 10 **pedalcyclist** fatalities in 2015 caused by buses or cars (Ex. 3; NHTSA Traffic Safety Facts, Table 6). Sadly, the number of pedalcyclists killed every year is increasing. (Ex. 3, NHTSA Overview; "[i]n 2015 there were 818 pedalcyclists killed in motor vehicle traffic crashes in the United States, an increase [of 12.2 percent] from 729 in 2014.

With full knowledge that bike and bus collisions constitute an ongoing hazard, MCI brazenly argues to the Court that its misconduct is somehow minimized because there have supposedly been only 3 prior **MCI** bus accidents. (OSJ Punitive., 4:19-22) First, a manufacturer is precluded from offering evidence of prior lawsuits (or the lack thereof). Beattie v. Thomas, 99 Nev. 579, 668 P.2d 268, 272 (1983) ("Even if the absence of prior lawsuits concerning a particular product remotely tends to indicate that no substantial defect exists, the prejudicial value and confusing nature of such evidence would seem to outweigh considerably its probative value.")

Second, MCI's incredibly disingenuous factual claim is based on testimony from one MCI engineer who was not involved in either the legal department or risk management that he personally heard of only 3 pedestrian accidents. This "proof" of lack of prior accidents is incompetent on its face. The true danger is highlighted by the NHTSA data: **7,154 bicycle traffic deaths in the last 10 years.**

B. MCI Had Actual Or Constructive Knowledge From Multiple Scientific Papers Of Potential Bus Airblasts And Suction And Actual Knowledge Of Bus Airblasts From The 1985 Cooper Paper And From MCI's 1993 Wind Tunnel Testing

In 1964, the bullet train was unveiled in Japan at the Olympic games in Tokyo. Since then, conscience makers of cars, trucks and high speed trains have labored to make their relative means of transport as aerodynamically streamlined as possible. The principal measurement of aerodynamic

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efficiency is called the "drag coefficient", which quantifies the drag or resistance of an object in a fluid environment such as air or water. In general, a blunt object with a flat front will have a higher drag coefficient when passing through a fluid environment than an object with an angular or rounded front because the angular or rounded front allows the fluid to more easily pass by the object. It is for this reason that the prows of speed boats are angular instead of flat like the prows of barges.

In 1993, MCI hired one of the leading aerodynamic engineers in the world (i.e., Dr. Cooper) and commissioned extensive testing of different shapes for the front of MCI buses that would reduce the drag coefficient. Despite this comprehensive 1993 wind tunnel testing that found optimal bus fronts (i.e., safer alternative designs) that would allow MCI buses to cut through the wind like a knife, MCI continued to make "boxy" buses that instead cause massive air displacement with flat fronts. The continued use of the flat front in the J4500 bus was one of the proximate causes of the accident in this case because the resulting 35 mph side air blast generated by a J4500 traveling 25 mph caused Dr. Khiabani's bike to wobble and turn left into the bus.

1. Dr. Kato Documented That Passing Buses Subject Bicycles To Airblasts Followed By A Suction Towards The Bus In A Landmark 1981 Society Of Automotive Engineers Article

Over 36 years ago, Dr. Kato published his 1981 article entitled "Aerodynamic Effects to a Bicycle Caused by a Passing Vehicle" in the Society of Automotive Engineers. The abstract states:

> There are many **reasons why a bicycle is caused to wobble by a passing vehicle**, for example, human engineering factors, riding techniques, the conditions of the road, **aerodynamic effects**, etc.
>
> In this report, **aerodynamic effects to a bicycle by a passing vehicle have been investigated** experimentally and theoretically.

(Ex. 4; Kato, Aerodynamic Effects to a Bicycle Caused by a Passing Vehicle, SAE (1981))

Figure 2 of the paper shows a bus side by side with a bicycle. In general, Dr. Kato put a 1/6 size model of a blunt object shaped like a bus in a wind tunnel and measured the amount of air blast it produced passing a bicycle and exactly when and where the air blast struck the bicycle.

The key finding of Dr. Kato was that the passing bus first caused an outward airblast from bus to bicycle followed by a strong pulling tug when the bus is even with the vehicle that "tends to pull the bicycle toward the vehicle":

> The first peak of force Fy occurs just as the front of the vehicle is even with the rear wheel of the bicycle and the negative value indicates that the force is in a direction away from the vehicle. The second peak occurs when the vehicle is approximately even with front of the bicycle, and the positive value tends to pull the bicycle toward the vehicle.

The three primary conclusions by Dr. Kato were as follows:

> 1. The force acting on stationary body (bicycle) in a direction away from the moving body (vehicle) occurs for the first time as the passing begins.
>
> 2. The force which pulls the stationary body (bicycle) toward the moving body (vehicle) is at a maximum when the two bodies come closest.
>
> 3. The maximum pulling force increases markedly with the decreasing of the distance between the two bodies (bicycle and vehicle).

In layman's terms, Dr. Kato documented that when a bus first passes a bike an airblast causes the bike to "wobble by a passing vehicle" and then when the bus and bike are even with one another there is a "force which pulls the stationary body (bicycle) toward the moving body (vehicle) . . . ." In light of this seminal paper that was published in the Society of Automotive Engineers journal, MCI's claim that MCI was supposedly not aware that a passing bus would cause an "air blast" to an adjacent bike followed by a "suction" effect is meritless. (MSJ Punitive, 4:3-4) MCI's professed ignorance is particularly unbelievable where the Kato paper is 36 years old, where it was published in the world's leading automotive engineering journal, and where it was actually produced by an MCI expert in this case. (Granat Dep., Ex. 10)

2. Dr. Cooper Reported In 1985 That Rounding The Front Corners Of Buses Would Greatly Reduce Drag Coefficiency (And Reduce Air Blasts) And MCI Hired Cooper To Test Alternative Front Bus Designs

In 1985, Dr. Cooper published another important paper (also in the Society of Automobile Engineers journal) that explained that rounding the front corners of buses would greatly reduce their drag coefficient (make them more aerodynamic). K.R. Cooper, The Effect of Front-Edge Rounding and Rear-Edge Shaping on the Aerodynamic Drag of Bluff Vehicles in Ground Proximity. (Ex. 5) First, Cooper determined the best possible rounded front (radii) to achieve the lowest possible drag coefficient:

> The major application of the data presented in Figures 11 to 14 is to the determination of the optimum edge radius required for minimum drag. As before, the optimum is the value of radius that reduces the drag to the lowest level through fully-attached,

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leading-edge flow.

(Ex. 5; 1985 Cooper, p. 17) Second, Cooper reported that rounding the corners produced a "much greater" aerodynamic improvement for buses than trucks and that the reduction in drag coefficiency was basically "constant" with the reduction in edge flow (i.e., air blasts):

> As mentioned previously, **the drag-reducing potential of edge rounding is much greater for a simple body like a bus** or van than it is for more complex vehicles like truck bodies or trailers. In the former case [bus], the edge rounding must cause a significant change in the pressure distribution over the whole front face when the radius reaches the optimum value. **Fully-attached edge flow occurs and the consequent large drag drop to nearly constant values at greater radii is found**.

(Ex. 5; 1985 Cooper, p. 20) (Bold added) The significance of the 1985 Cooper paper is that MCI was explicitly informed that a very simple design change like rounding the front corners of buses could drastically reduce drag coefficiency and air blasts. While MCI feigns ignorance of all things aerodynamic in the MSJ motions, the 1985 Cooper paper was found in MCI's files. (MCI 39571-78) Furthermore, several years after publication of the 1985 Cooper paper, MCI hired Dr. Cooper to perform extensive wind tunnel tests on alternative bus shapes to determine the optimum bus shape to reduce drag coefficiency (and reduce airblasts).

Dr. Cooper did a "Wind Tunnel Investigation Of The Aerodynamic Characteristics Of Buses" for MCI in 1993. (Ex. 6; MCI 39853-950) The MCI CJ3 bus was the focus of the testing and the report concluded that a CJ3 bus with a "Smooth" front and a standard rear was more aerodynamically efficient (i.e., a .376 drag coefficient) than a CJ3 bus with a standard front (i.e., a .584 drag coefficient). The Smooth CJ3 was "[a] modified CJ3 front with larger edge radii and flush glass." (Ex. 6; MCI039869) Out of 25 different types of alternative bus fronts and configurations tested, simply changing the CJ3 bus to a "Smooth" front resulted in the best drag coefficient when the front only was changed. (Ex. 6; MCI039854)

The best drag coefficient (.299) was achieved when MCI modified both the front (Proposal 1) and "beveled" the rear of the bus. (Ex. 6; MCI039855) To quote the report, "[t]he wind tunnel measurements demonstrated that the best combination, consistent of the new rear plus the Proposal 1 front, produced a reduction in wind-averaged drag coefficient of 41.5% compared to the standard CJ3 configuration." (Ex. 6; MCI039858) **The bottom line is that MCI created an alternative**

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front bus design in 1993 that simply rounded the front and back and resulted in a dramatic increase in aerodynamic efficiency -- and a dramatic decrease in the dangerous airblasts.

MCI's 1993 Generic Wind Tunnel testing explicitly recognized that one extreme danger from the existing poor drag coefficient was **"aerodynamic side force . . . [that] provide[s] a disturbance that deflects a bus from its path in the presence of side winds or passing vehicles."** (Ex. 6; MCI039859) Despite actual knowledge of the side force hazzard posed by its existing front bus design chronicled in MCI's 1993 wind tunnel test report, MCI never informed either its sales team or customers of the extreme side force hazzard (i.e., air blasts).

Despite having actual knowledge of the tremendous aerodynamic advantages of the smoother bus front, MCI did **not** incorporate this superior alternative design in the 2007 J4500 involved in this case; a bus made 14 years **after** the 1993 wind tunnel tests. The unfortunate consequence is that the subject J4500 had much greater air displacement (i.e., air blasts) than would have been the case if MCI had simply designed the J4500 with the smooth front that was a standout performer in the 1993 wind tunnel testing. This constitutes knowingly defective design.

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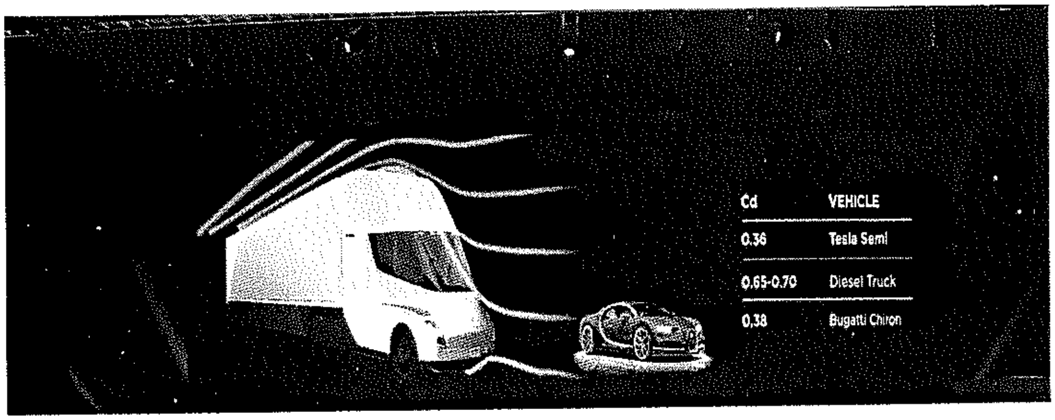
3. The Dramatic Difference In The Poor Drag Co-Efficient Of The Standard MCI Bus Front (.59) Is Highlighted By Both The Much Lower Drag Coefficient That MCI Could Have Achieved (.299) And Recent Drag Coefficients Announced By Other Manufacturers

As stated above, the standard CJ3 bus that MCI made had a drag coefficient of .584 and MCI could have halved this to .299 by simply rounding the front and beveling the rear. (Ex. 6; MCI039855) To give the Court some perspective, Tesla recently announced to great fan fare that Tesla has developed a new electric semi-truck (pictured below) that has a low drag coefficient of .36 -- better than the .38 drag coefficiency of the Bugatti Chiron sports car. (Ex. 7; November 16, 2017 Teslarati entitled Tesla Semi Unveiled: 500+ mile range, **Bugatti-beating aero**, 2019 production; "In addition, the Tesla Semi has a .36 drag coefficient, compared to the standard of .65-.70 [of other large trucks]. Musk compared it to a Bugatti, noting that the [Tesla] semi]truck beats the supercar's .38 drag coefficient.")

The following drawing was released by Tesla:



If MCI had simply used Dr. Cooper's 1993 alternative front bus design on the J4500 bus, MCI could have handily beaten both the new Tesla truck and had its own "Bugatti-beating aero" with a low .299 drag coefficiency.

Turning to buses, a Setra bus made by Mercedes has a .33 drag coefficient:

> Q. I'm going to hand you a document that's dated July 2012 with regards to the Setra. And specifically the document says on page four that they have done aerodynamic styling to lower fuel consumption. And it says that they have achieved a drag coefficient of .33. Do you see that statement?
> A. I see that.

(Ex. 8; Lamothe Dep., 69:21 to 70:3) MCI can not deny knowledge of this Setra safety feature because MCI is the US distributor for the Setra bus (although Setra is made by Mercedes). Setra even pointed out that it achieved this aerodynamic breakthrough by rounding the edges as Dr. Cooper advised MCI to do: "The engineers designed the front of the Comfort Class [Setra] 500 with larger radii for the roof slope.")

MCI engineers admitted that they knew that rounding the front corners and the roof was an easy way to streamline the bus. (Ex. 8; Lamothe Dep., 71:5-8; "Q. So in addition to making the right-hand corners more rounded, you can also make the -- the roof slope more rounded; is that correct, in theory: A. In theory.") Amazingly, MCI did not give any consideration to rounding the sharp front edges of the "boxy" J4500. (Ex. 8; Lamothe Dep., 71:21-25; "Q. Was any consideration given when you designed the J4500 to design it with a larger radii for the roof slope? A. Not that I'm aware of.")

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As the examples of the bullet train, the Tesla electric truck, the Setra 500 bus and the safer alternative rounded bus fronts that MCI developed and tested in wind tunnels in 1993 all prove, it would have been relatively easy for MCI to streamline the J4500 bus. But MCI did not even consider doing so. MCI engineers have conceded that the J4500 could have been made with this safer alternative design. (Ex. 8; Lamothe Dep., 72:22; "I guess it would be possible.") MCI engineers have also admitted that there is no practical reason not to make an aerodynamically sound bus. (Ex. 8; Lamothe Dep., 74:6-10; "Q. Can you give me any practical reason as we sit here today why MCI couldn't make a J4500 with a larger radii for the roof slope? A. No.") This is a classic case of perpetuating a known design defect that resulted in the death of Dr. Khiabani.

C. MCI Engineers Knew That Airblasts Discharge From Bus Fronts But MCI Hid This Danger From MCI Salesmen And Customers

1. MCI Engineers Knew That MCI Buses Generate Airblasts That Could Affect Bicyclists

While the MCI engineers were obviously not world class aerodynamic engineers like Dr. Kato or Dr. Cooper (the prime reason that MCI hired Dr. Cooper to perform bus wind tunnel tests), virtually every MCI engineer deposed in the litigation knew that the relatively sharp corners in "boxy" MCI buses like the J4500 produced more airblast than a bus made with rounded corners would produce. Bryan Couch was the lead designer for the J4500. Couch said that one of the reasons to reduce drag coefficiency would be to reduce the air displacement that a pedestrian or a bicyclist would experience from a passing bus:

> Q. Now, you said that the two reasons that you attempted to improve the drag coefficiency were fuel and dust, right?
> A. Yeah, uh-huh.
> **Q. Was one of the reasons to attempt to reduce air displacement that a bystander or bicycle would see?**
> **A. Well, that would be the effect.**

(Ex. 1; Couch Dep., 52:24 to 53:6) (Bold added) In some instances, e.g., a bus traveling 55 mph, Couch conceded that the airblast could physically push a bicyclist away from the bus. (Ex. 1; Couch Dep., 63:23 to 64:9) The mechanism that disrupts the bicyclist is "air coming from the front of the bus.") (Ex. 1; Couch Dep., 65:9-10)

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2. MCI Parts Experts, Salespersons, Customers And Bus Drivers Did Not Know Of Or Expect Airblasts

Pablo Fierros was the head of MCI's parts division from 1997 to 2000 when the J4500 came on the market. Fierros was unaware of the air blast risk:

Q. Okay. Now, do you have an understanding one way or the other whether or not a bus such as the J4500 creates an air blast or air displacement at its right front when it's traveling?
A. I have no idea.

(Ex. 9; Fierros Dep., 29:15-19)

David Dorr has been the primary MCI bus salesman on the west coast for almost 20 years and was the salesperson that actually sold the J4500 bus involved in this accident. Dorr not only did not know of or expect airblasts, Dorr acknowledged that no warning whatsoever was provided regarding airblasts to the purchaser (Mr. Haggerty):

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Q. What is your understanding, if you have an understanding, as to whether or not when a 2007 vintage J4500 is traveling 35 to 40 miles per hour, what is your understanding as to whether or not it causes air blasts or air displacements from the bus?
A. I don't know.
Q. Okay. You don't know one way or the other whether it would case air blasts or air displacement?
A. No, I don't.

(Ex. 10; Dorr Dep., 26:4-13)

Q. Since you don't know whether or not a J4500 will cause air blasts from the front, I assume you've never discussed that point with a customer?
A. No.
Q. I'm correct, you've never discussed that point with a customer?
A. I've never discussed that, no.

(Ex. 10; Dorr Dep., 27:9-15)

Q. Would I be correct that you did not have any communications with Mr. Haggerty [the person that bought the J4500 involved in this case] during any one of these 50 bus sales about the potential for air blasts, if any, from the J4500?
A. Yes, you're correct.

(Ex. 10; Dorr Dep., 51:22 to 52:1)

Christopher Groepler was the General Manager of the tour company at the time of the accident. Groepler also did not know of or expect airblasts:

Q. Okay. And broadening the question out, do you know one way or the other whether or not if a J4500 moves about 35 or 40 miles an hour that there's any sort of

disturbance of the air in the front of the bus?
A. No.

(Ex. 11; Groepler Dep., 19:7-11)

William Bartlett was the Safety Director of the tour company at the time of the accident. Bartlett also did not know of or expect airblasts:

Q. But, as we sit here today, you don't know one way or the other whether or not a bus will create air turbulence or air blast that's going 30, 35 miles an hour?
A. I don't know. I've never tested it myself.

(Ex. 12; Bartlett Dep., 139:7-13)

Edward Hubbard drove the bus that struck Dr. Khiabani. Hubbard also did not know of or expect airblasts:

Q. If a J4500 is moving forward at 30, 35 miles an hour, is it your understanding that there are no air blasts, some air blasts, air blasts on some occasions?
A. I don't -- I don't know, sir.
Q. Don't know one way or the other?
A. No, sir.

(Ex. 13; Hubbard Dep., 76:23 to 77:4)

Completely cementing the failure to warn claim against MCI regarding its concealment of the known bus airblast hazard, bus driver Hubbard also expressly confirmed that Hubbard would have taken different actions if MCI had alerted him of the airblast risk:

Q. Assuming today you got a bulletin from the manufacturer of the bus that said, Our bus creates a 10-foot air blast on the front, would you taken that into account when you were driving the bus tomorrow, the next day, on?
A. Yes, sir.
Q. And the reason you would take it into account is because why?
A. Because the bus manufacturer's telling me that it -- or --
Q. That it's a potential safety hazard; is that right?
A. Yeah.
Q. That's the reason you would take it into account, right?
A. I'm sorry.
Q. Right? That's the reason you would take it into account?
A. Because if that was part of my training, yeah. If that's what they told me, right.

(Ex. 13; Hubbard Dep., 80:19 to 81:16)

Q. So if you knew that there were either air blasts or suction in the rear tires, you would -- you would take that into account in how you drive the bus?
A. Yes.

(Ex. 13; Hubbard Dep., 83:19-24) Based upon the fact that the MCI parts head, the MCI salesman,

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the GM of the bus company, the safety director for the bus company and the bus driver in this case all professed to be completely ignorant of the airblast hazard and did not expect it, MCI is flat out wrong in its claim that there is "no evidence that an ordinary purchaser or driver or a motor coach, or even a passenger, pedestrian, cyclist, or motorist would find some alleged gusts from a passing motor coach to constitute an unexpected danger." (MSJ Product, 6:1-3) While MCI bus designers like Couch knew of the air blast danger to bicyclists, customers and drivers were left in the dark.

D. If Just 5 Pounds Of Wind Pressure Is Generated At The Bike's Tire By A J4500 Bus Then 10 Pounds Of Force Is Generated At The Bike's Right Handlebar

1. Witnesses Testified That Airblasts From The Front Of The Bus Caused The Bike To Wobble

MCI pretends that there are no "facts" regarding why the bike wobbled when passed by the MCI J4500 bus. (MSJ Punitive, 6 n. 6; calling the cause of the wobble "speculation"). MCI completely ignores the testimony of the car driver directly behind the bus; Erika Bradley, who unequivocally stated that she believed that an airblast potentially caused the bike to wobble:

> Q. As we sit here today, do you know what made the bicyclist swerve?
> A. I don't know.
> Q. Could it have been windblast from the front of the bus?
> A. It's possible.
>
> . . . .
>
> Q. So the two operating theories are either a windblast or perhaps the bicyclist was physically impaired?[4]

---

[4] There is no evidence whatsoever that Dr. Khiabani was physically impaired at the time of the accident. The coroner tested electrolytes and found that he was not dehydrated. MCI's experts concede that they have no evidence that Dr. Khiabani was physically impaired, do not have opinions that he was impaired and do not have evidence for any other cause of the wobble of the bike. (Rucoba, 60:1-6; "Q. But as we sit here today, you know of no evidence to support the other six causes [(1) mechanical, (2) weather, (3) roadway conditions, (4) physical impairment, (5) training of bike rider or (6) bike rider error] -- and I can read them to you again -- for the wobble and you disagree with the windblast. Is that correct? A. Yes, that's correct.") Absent any evidence supporting an alternative cause. MCI can not argue physical impairment nor any cause for the wobble other than airblast to the jury. See Williams v. The Eighth Judicial District, 127 Nev. 518, 262 P.2d 360, 369 (2011) ("Although we recognize a lower standard for rebuttal expert testimony regarding medical causation, **any alternative causation theories proffered by a defense expert to controvert the plaintiff's theory of cause are still subject to certain threshold requirements, namely that medical experts testifying as to cause must avoid speculation**.")

A. Correct.
Q. Okay. Anything besides that?
A. Not that I could think of.
Q. Okay. And as we sit here today, which makes more sense to you now?
A. **After discussing the wind drafts, that could make sense.**

(Ex. 14; Bradley Dep., pp. 43-44) (Bold added) Bradley also viewed a video of another bicycle accident caused by an airblast from a passing truck and stated that this was "substantially similar" to what occurred in this case. (Ex. 14; Bradley Dep., p. 57:18-25, 58:1-9) There is no contradictory testimony from any other witness to the accident.

Even MCI experts admit that Bradley's testimony directly supports airblasts being the cause of the wobble. (Ex. 15; Rucoba Dep., 59:10-18; "And, again, with regard to wobble, I don't know how many times I've had to say this, but it's -- there is no physical evidence that I can rely upon. **It's purely based on testimony. That's all we have to go with.**") (Bold added) As set forth in footnote 3, MCI can offer no cause other than airblast to the jury for the wobble because MCI experts concede that there is no evidence supporting any other cause.

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2. Experts Have Established That A J4500 Bus Traveling 25 MPH Generates 10 Pounds Of Side Force

There can be no disagreement that a bus generates strong side winds as Dr. Kato documented in 1981. (Ex. 4; Kato, "Aerodynamic Effects to a Bicycle Caused by a Passing Vehicle", SAE Journal ("1. The force acting on stationary body (bicycle) in a direction away from the moving body (vehicle) occurs for the first time as the passing begins.") There will be debate at trial about the precise amount of side force (airblast) generated.

Dr. Briedenthal is an aerodynamics engineer and testified that the bus would generate a 10 lb side force to bicyclists. (Ex. 16; Briedenthal Report; "I estimate that the magnitude of the oscillating lateral force on the cyclist is again approximately 10 lbs.") Alex LaRiviere is a bicycle expert and conducted independent testing that confirmed the impact of a side force to bicycle stability. (Ex. 17; LaRiviere Supplemental Report, ____)

MCI neglected to hire an aerodynamics engineer as an expert. To this day, MCI and its experts claim to be oblivious of the exact drag coefficient of the J4500 (despite selling tens of

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thousands of J4500 buses)[5]. Likewise, MCI experts have no opinion on the force that Dr. Khiabani would have encountered at the handlebar. (Ex. 18; Carhart Dep. 70-71)

3. Just 5 Pounds Of Side Force At The Bike Tire Causes A Destabilizing 10 Pounds Of Force At The Right Handlebar Because The Steering Column Functions As A Lever

Although Dr. Briedenthal determined that there was actually 10 pounds of side force on the bike tire when the bus passed, Plaintiffs will use the lesser amount of 5 pounds to discuss the concept of leverage. A lever amplifies an input force to provide a greater output force, which is said to provide leverage. While MCI experts cavalierly claim that the side force from the airblast at the tire is "insignificant", none of them considered that there was a multiplier effect caused by the steering column acting as a lever. (Ex. 18; Carhart Dep., 70:24-25, 71:1-8)

Bicycle Expert Alex LaRiviere documented that there is a doubling of the force at the inside of the right handlebar from the force at the tire. (Ex. 17; LaRiviere Supplemental Report; "5 pounds of lateral force was measured on the side of the tire" and produced "10 pounds of force at 4 inches from the center of the stem [4 inches from the center of the handlebar].) Hence, the actual bike destabilization caused by the airblast was far more severe than admitted by MCI experts -- especially given that Dr. Khiabani reportedly had only one hand on the right handlebar when the bus passed. No MCI expert has disputed that halving the airblast through sound aerodynamic design would have greatly reduced the extreme force that Dr. Khiabani confronted at the handlebar.

E. MCI Knew That Its Buses Had A Right Side Blind Spot

MCI witnesses initially denied that there was any right side blind spot. (Ex. 8; Lamothe Dep., 50:3-4; "A. I don't believe there is lack of visibility on the right-hand side."; Ex. 1; Couch Dep., 127:11-12; "A. As I said, we didn't have a blind spot problem.") Now, MCI embraces this dangerous product defect and proclaims that "People Expect Vehicles May Have Blind Spots." (MSJ Product Defect, 19:12) MCI was forced to flip-flop on this key point because the MCI PMK confessed that the J4500 did in fact have a right side blind spot and also because defense experts

[5] Plaintiffs' Third Set of Interrogatories No. 1 asked "State the drag coefficient for the subject bus." On December 20, 2017, MCI answered "The drag coefficient is not known."

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testing the bus documented a dangerous four foot right side blind spot (Ex. 19; Krauss Dep., 76:2-4). Regardless, the multiple concessions in the MSJ Product Defect Motion that there is a blind spot constitute a binding admission that there is a right side blind spot on the bus.

1. The MCI PMK Admitted That The J4500 Has A Right Side Blind Spot

Virgil Hoogestraat was produced as the MCI PMK on right side blind spots. Hoogestraat confirmed that the J4500 has a dangerous right side blind spot:

> Q. Let's go to a real J4500.
> A. Let's go real world.
> Q. Okay.
> A. If that's all right. And, yeah, it will -- it is a blind spot. Although because the driver is quite a ways away from it, the angle is very narrow for the right-hand A pillar. But an A pillar in all vehicles creates somewhat of a blind spot.

(Ex. 20; Hoogestraat Dep., 52:2-9) This testimony guts MCI's claim that "MCI never became aware of any alleged blind spot issues on the subject coach until this lawsuit." (MSJ Punitive, 11:20-21)

2. Bus Drivers Testified That The J4500 Had A Right Side Blind Spot That MCI Could Have Eliminated With Different Mirrors

Bus drivers testified that older MCI buses had more blind spots than newer MCI buses:

> Q. Mr. Kemp talked to you about visibility. Did you ever feel that you couldn't see enough in order to drive safely and avoid pedestrians and bicyclists and other motor vehicles?
> A. The older MCI, I know the mirrors you had more blind spots than the newer MCIs. But every bus you still, you can't just sit there, you got to move your head.

(Ex. 21; Witherell Dep., 50:11-16) Bus drivers also testified that MCI could have eliminated the right side blind spots with European mirrors that competitor buses (such as the Mercedes Setra) were using but that MCI failed to do so:

> Q. And so just to make sure this is real clear on the record, in your personal opinion the [Mercedes] Setra, with the overhead mirrors has less right side blind spots than a J-4500; is that correct?
> A. In my personal opinion, yes, sir.
> Q. So if the only factor was right side visibility, you would prefer a Setra over a J-4500?
> A. Personally, yes, sir.

(Ex. 21; Witherell Dep., 60:2-10) This testimony in and of itself proves MCI's conscious disregard of known safety features to eliminate blind spots (i.e., overhead mirrors).

Bus drivers specifically stated that the right side blind spot on the J-4500 would be a "bigger

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problem" if the bus was overtaking a bicycle on its right side:

> Q. Now, with regards to the right side blind spot of a J-4500, would I be correct that the closer you get to the bicycle when you are overtaking it, the more of a problem the blind spot becomes?
> A. As you are overtaking there will be a spot where you are really going to have to adjust and look, yes.
> Q. So the closer you get, the more of a problem the blind spot potentially becomes on a J-4500, is that correct?
> A. Well, it's any bus, sir, it's not just the J-4500.
> Q. But the closer you get to that bicycle, the more of a problem the blind spot becomes in terms of visibility, right?
> A. Well, you have got to pay more attention.
> Q. Because the -- it becomes a bigger problem in terms of visibility, correct?
> A. Correct.

(Ex. 21; Witherell Dep., 65:19 to 66:20) This "bigger problem" for right blind spots while overtaking a bicycle was the exact accident scenario in this case.

3. There Were No Computer Modeling Line Of Sight Studies Done On The J Series Buses And MCI Has No Record Of Doing Such Line Of Sight Studies On The Predecessor E Series Of Buses

MCI claims that the right side blind spots on the J4500 are supposedly "safe" because MCI did line of sight studies on the J series buses. (MSJ Punitive, 11:19-20; "Line of sight testing was performed on MCI coaches before MCI put them on the market . . . .") The truth of the matter is that no line of sight testing was done on the J4500 or the J series buses in general and MCI can not even confirm that line of sight testing was done on the predecessor E series of buses.

Line of sight studies are done by "a computer model that we'd look and we'd locate the eye in the driver's seat. And from that eye, get the view that the driver would see.") (Ex. 20; Hoogestraat Dep., 48:12-17). The MCI PMK on the subject of "design or engineering for right-side visibility" expressly conceded that MCI failed to do any line of sight studies on the J4500:

> Q. So you think there was computer modeling [line of sight studies] done for the E series and the J series.
> A. **It was not done for the J series**. I think it was done for the E series because that would be common practice.

(Ex. 20; Hoogestraat Dep., 49:11-15) (Bold added) However, MCI can not even produce records for the line of sight studies that were purportedly done on the E series bus. (Ex. 20; Hoogestraat Dep., 49:23-25; "Q. And you said you don't think the computer modeling exists as we sit here today? A. I have found no records of it.") In fact, when pressed, the MCI PMK could not even swear that MCI

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did in fact do any line of sight studies for the E series. (Ex. 20; Hoogestraat Dep., 61:13-19; "Q. So when you said they were done, you think -- you don't know for an actual fact that they were done. You think they may have been done. Is that fair to say? A. I cannot tell you that they were done because I have found no records of them because we don't keep records of study.") Given this complete lack of evidence, MCI's claim that it did the requisite line of sight studies on the J series is baseless.

Plaintiff expert Josh Cohen did perform computer model line of sight studies on the actual J4500 involved in this case. As would be expected given what occurred, the J4500 has severe right side blind spots -- especially at the height level and location where the bus would approach the bicycle. This explains why the bus driver in this case (Hubbard) admits that he did not see the bicycle at all during the last 400 feet of the approach by the bus to the intersection.

4. MCI Did Nothing To Eliminate The Right Side Blind Spots On The J4500

Brad Lamothe was one of the principal designers for the J4500. Lamothe admitted point blank that MCI failed to do anything whatsoever to mitigate the known right side blind spot problem:

> Q. My question was what design actions, if any, were taken to eliminate or modify right-side blind spots?
> A. None that I was directly involved with, so I don't know.
> Q. Do you know if anything was done?
> A. I don't know.

(Ex. 8; Lamothe Dep., 55:13-22) Bryan Coach, head J4500 designer, similarly could not identify anything done to correct the right side blind spot problem. (Ex. 1; Couch Dep., 128:4 to 129:5)

In addition to the foregoing admissions of ineptitude from the MCI design team, it would have been impossible for MCI to adequately re-configure a J4500 to eliminate blind spots without performing computer modeling line of sight studies that first determined exactly where the blind spots were present. As set forth elsewhere, MCI failed to perform this rudimentary study on the J4500 despite MCI's admission that line of sight studies are "commonly accepted best practice" to "do a competent job of design engineering . . . ." (Ex. 8; Lamothe Dep., 59:18-25)

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F. Side Proximity Sensors Were Commercially Feasible In 2007

1. Dozens Of Cars Had Blind Spot Detectors In 2007

A J4500 is a 22 **ton** bus that is over 40 foot long. As MCI now admits, there is a right side blind spot on the J4500 that would preclude the bus driver from viewing a bicyclist on his right side A passenger car weighs far less than a J4500, is much more mobile and has minimal blind spots. Despite the massive bus being much more of a hazard to pedestrians and bicycles, numerous passenger cars had blind spot detectors in 2007 whereas MCI refused to place this simple safety device on the J4500. (Ex. 22; June 4, 2007 press release describing the 2008 Volvo 580 with "[t]he Blind Spot Information System (BLIS) is [sic] another high-tech option."):

2. Scientific Papers Document That Five Types Of Blind Spot Detection Systems Were Available For Buses In 2005

A 200**5** paper by Fanping Bu (a Ford automotive engineer) entitled "Pedestrian Detection in Transit Bus Application: Sensing Technologies and Safety Solutions" discusses 5 different potential sensing systems that could be employed to detect pedestrians or a "pedestrian with bicycle" adjacent to buses, including the Vorad system. (Ex. 23) In fact, the authors tested the Vorad system on a New Flyer 40 foot bus (New Flyer is the parent company of MCI). The Vorad system was an off-the-shelf "Eaton VORAD EVT-300 radar" unit. The authors simply bought the VORAD system from Eaton and mounted it on the bumper of a New Flyer bus. (Ex. 23, 103; "Fig. 5 shows the system configuration of a testing system we installed on a New Flyer CNG 40 footer bus. The antenna assembly of Eaton VORAD VT-300 Doppler radar is installed behind the bumper.")

According to Eaton, the "EVT-300 Collision Warning System (CWS) was introduced by Eaton VORAD in 1994." Eaton states:

> The VORAD system (Vehicle On-board RADar) uses a patented monopulse radar design to warn drivers of potential hazards in the road ahead such as stopped or slow-moving vehicles. **The system also provides side blind-spot warning.**

(Ex. 23) (Bold added) The 200**5** Fanping Bu paper concludes that the Vorad system was effective at detecting moving objects at "a relatively long distance detection range over 120 meters" where the object "is moving relative to the radar" such as a moving bicycle. (Ex. 23, p. 104).

3. Blind Spot System Vendors Advertised Their Wares In Advertisements From 2005 to 2007

In September 2005, Eaton published the following announcement in trade journals:

> Eaton VORAD Technologies, a subsidiary of Eaton Corp., is partnering with Preco Electronics of Boise, Idaho, to offer **a stand-alone side-object-detection system**. This side sensor will be added to Eaton's current VORAD safety product line, It's a compact, cost-effective, radar-based object-detection system for trucks, **buses**, and RVs.

(Ex. 24; Today's Trucking, Sept. 2, 2005 Edition). (Bold added) Eaton announced sales of the side-object-detection system to large trucking fleets in August 2005. (Ex. 24; HDT Truckinginfo, August 12, 2005; "Eaton Corp. has announced that C & C Trucking Inc., of Duncan, S.C. has specified the Eaton VORAD EVT-300 collision warning system on its recent purchase of 75 International 9400 tractors to be delivered in 2005 and 2006." and "C & C Trucking CEO Charlie Tapp said the biggest reason his company decided to install the VORAD system -- including Forward Collision Warning, SmartCruise Adaptive Cruise Control **and the BlindSpotter side sensor** - was to increase safety. Tapp said he was particularly interested in VORAD's early warning detection feature.") (Bold added)

Where the VORAD system was advertised in 2005 as a side-object-detection system for "buses" and was installed in hundreds of trucks in 2005, it can not be disputed that the Vorad side-object-detection system was both commercially viable and commercially available in 2005 -- two years before the J4500 bus in this case was made. Given that the J4500 bus in this case sold for approximately $400,000 in 2007 and the VORAD system could be purchased in 2007 for several hundred dollars, there is no argument that cost was the reason that MCI decided to sell unsafe buses.

In addition to the Eaton VORAD system, numerous other vendors were pitching safety devices to bus companies to overcome side blind spots in 2007. In the August 2007 journal of Bus and Motorcoach Industry, the following ad appears for the Voyager system; self described as "the #1 Name in Bus Safety":

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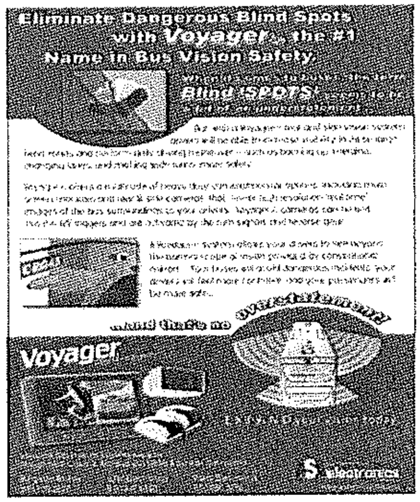

(Ex. 25) The Voyager ad states that it would "Eliminate Dangerous Blind Spots." (Ex. 25)

Any one of the commercially available alternate systems (Vorad or Voyager) proves that MCI had blind spot detection options. Finally, there is evidence that other bus manufacturers (the Mercedes Setra) used side proximity sensors long before the J4500 bus in this case was made in 2007. (Ex. 1; Couch Dep., 101:7-11; "Q. Okay. But Mercedes apparently found in 2005, the year before, a proximity sensor that at least Mercedes considered reliable enough to use in its buses, right? A. In Europe.") Where MCI is a distributor for the Mercedes Setra, its claim that it was ignorant of the safety features on the bus that MCI actually distributes has no merit.

4. MCI's Experts Admit That They Demand Cars With Proximity Sensors To Protect Their Families

Virtually every expert in this case (and also the defense lawyers) drives a personal car that is equipped with a side proximity sensor. A good example is defense expert Rucoba, who testified that he paid extra to get an optional side blind-spot warning system:

> Q. Okay. Did that come with the car or did you order that as an option?
> A. I ordered that as an option.
> Q. And why did you think a blind-spot warning system in your wife's Kia would be a good option?
> A. Well, my wife's not a very good driver. I thought this would be an assistance to helping her drive better.
>
> . . . .
>
> Q. Okay. So even a good driver like you can be assisted by a blind-spot warning system. Correct?
> A. Sure.

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(Ex. 15; Rucoba Dep., 75:4-23) The bottom line is that MCI's attorneys and experts all protect themselves and their families with side proximity sensors but hypocritically argue that MCI was justified in not using this ubiquitous safety device in the MCI J4500 because MCI supposedly was "unaware of such proximity sensors being commercially available and technologically appropriate for the subject coach in 2007." (MSJ Product Defect, 6:9-11)

5. Bus Drivers Testified That Buses Should Have Proximity Sensors Because Of Right Side Blind Spots

The dagger to MCI's central claim that there is no "evidence" that bus drivers (the "users") have an expectation for proximity sensors comes from the former safety director of the bus company- - who testified that buses should have proximity sensors because of the right side blind spot problem:

> A. . . . [my] [p]ersonal opinion, should, you know, maybe they be on buses, yes, but I can't speak other than that personal opinion.
> Q. Okay. And the reason you have that personal opinion is, as you already said, the right side is the quote, worst spot for blind spots, right?
> A. Correct. Yes, sir.
> Q. And that's based on your years as a bus driver and a bus safety analyst, it's your opinion that the right side of the bus is the worst spot for blind spots, correct?
> A. Correct, and also just as a CDL driver.
> Q. And by worst spot, do you mean less visibility on the right side than any other area?
> A. You have more blind spots on the right side than you do on the left.
> **Q. So if you are going to put -- it you were going to put a proximity sensor on one side or the other, it should be on the right side certainly in your opinion?**
> **A. In my opinion, yes, sir.**

(Ex. 21; Witherell Dep., 57:7 to 58:1) (Bold added) None of the almost a dozen bus drivers deposed in the case believe that proximity sensors should **not** be put on buses.

6. A Side Proximity Warning System Is Different Than A Side Proximity Sensor Automatic Braking System

Another MCI defense to the glaring ommission of a side proximity sensor is that MCI supposedly could not put blind-spot sensors in because MCI had to couple them with automatic braking and the Bendix brake company did not "offer" this type of a collision avoidance system to MCI until 2012. But MCI can not make up its own more complex safer alternative design. Plaintiffs have the burden of proving a safer alternative was feasible and Plaintiffs propose the alternative design -- not Defendant. See Ford Motor Company v. Trejo, 133 Nev.Adv. Opin. 68

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(Sept. 27, 2017) ("Therefore, a plaintiff may choose to support their case with evidence 'that **a safer alternative design was feasible at the time of manufacture**. However, any alternative design must be commercially **feasible**.'") (Bold added) Plaintiffs herein are proposing simple blind-spot proximity sensors -- not blind-spot proximity sensors and, in addition, automatic braking triggered by the sensors. MCI should not be allowed to wield its current collision avoidance system, i.e., a proximity sensor warning system with automatic braking also triggered by a proximity sensor system, as a straw man to knock down.

7. MCI's Professed Ignorance Regarding Proximity Sensors Has No Merit

Despite (1) scientific papers published in 2005 wherein scientists actually mounted an off-the-shelf VORAD system to a 40 foot New Flyer bus, (2) the multiple announcements by Eaton of sales in 2005 of the VORAD system; (3) Eaton advertising the VORAD system for "buses" in 2005 in the leading bus trade journal (4) Voyager advertising spot its blind detection system in 2007 in the leading bus trade journal; and (5) Mercedes making a Setra bus in 2005 with proximity sensors, MCI claims that MCI "was unaware of such proximity sensors being commercially available and technologically appropriate for the subject coach in 2007." (MSJ Product Defect, 6:9-11) First, MCI's knowledge of proximity sensors is not a required element to prove the strict liability claim based upon proximity sensors because the only showing that Plaintiffs must make is that proximity sensors were "commercially viable" -- not that MCI **knew** that they were commercially available.

Second, the ridiculous claim that the largest bus maker in North America was not aware of side proximity sensors that were featured in dozens of passenger cars and widely advertised for buses is directly rebutted by testimony from the MCI PMK on proximity sensors. Hoogestraat testified that he knew that off-the-shelf proximity sensors like the VORAD system were in fact available to put on the J-4500:

> Q. Okay. And do you know whether there's an aftermarket kit for proximity sensors that would serve as some sort of warning of side detection?
> A. I'm sure there is. There's a lot of kits for various things out there.

(Ex. 20; Hoogestraat Dep., 80:9-13) This ends the analysis on commercial feasibility because Hoogestraat was produced as a PMK witness on proximity sensors. Damningly, MCI never even explored this simple but effective safety option. (Ex. 20; Hoogestraat Dep., 79:24 to 80:2)

The third reason that MCI's claim of ignorance regarding blind spot proximity sensors is folly is that MCI only cites the Hoogestraat testimony at 69:14-70:16 for this claim. (MSJ Product Defect, 6:11) Hoogestraat is there discussing a more advanced proximity sensor system (i.e., the Bendix Wingman system) that is additionally a "collision mitigation" system that would provide side proximity warnings and, in additional, also provide for automatic braking. Hoogestraat himself admitted that there were much simpler (and cheaper) after-market blind-spot proximity sensors available that did not involve automatic braking but conceded that MCI failed to explore the cheaper and simpler alternative:

> Q. Okay. was there any consideration to using a proximity sensor that did not include brake involvement prior to 2014?
> A. Not that I'm aware of.
> Q. And are you aware that there are retrofit kits on the market for proximity sensors that will purportedly give you some sort of warning of side collisions?
> A. There's a lot of aftermarket kits for various things out there.
> Q. Okay. And do you know whether there's an aftermarket kit for proximity sensors that would serve as some sort of warning of side detection?
> A. I'm sure there is. There's a lot of kits for various things out there.
>
> . . . .
>
> Q. Okay. Before we get to that, let's talk about the off-market kits that we were talking about. Did MCI investigate whether or not to use any of those?
> A. Not that I was involved in.

(Ex. 20; Hoogestraat Dep., 79:24 to 80:22) As discussed in the preceding section, a simple blind-spot proximity sensor without automatic braking is the proposed safer alternative design in this case -- not a more elaborate system that incorporates the additional feature of automatic braking.

8. The Bus Driver Unequivocally Testified That A Blind-Spot Proximity Sensor Warning Would Have Been Heeded And Prevented The Accident

The bus driver did not see the bicyclist at any time for the last 400 feet before the collision at the intersection. (Ex. 13; Hubbard Dep., 200:12-16; "Q. And you did not see the bicyclist after the 300-foot mark [before the intersection] that you told for us [sic], when you believe you passed him at the cutout to the municipal bus stop? A. Correct.") But the bus driver would have taken evasive action if given a proximity sensor warning which would have allowed him to move left sooner and

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prevented the entire accident since the right rear tire barely ran over Dr. Khiabani's head:

> Q. My Mercedes has a proximity sensor. If there's a car to my right or an object to my right, there's a big red light that goes off in the mirror. You know? And there's a lot of cars where, if you do that, there's an audible warning. If something like that had happened and you'd become aware that he was in that spot, even if you didn't see him, would you have done something about it?
> A. I would have did exactly what I just did. Which was take evasive action to move away from the bike.
> **Q. So if you'd been given some sort of warning at the 50 or the hundred [foot mark before the intersection], you would have taken evasive action earlier?**
> **A. Yes.**

(Ex. 13; Hubbard Dep., 149:21 to 150:15) (Bold added) No one, including defense experts, has testified that a proximity sensor would not have allowed sufficient warning to prevent the accident.

G. MCI's Parent Company (New Flyer) And Other Bus Makers Have Placed Tens of Thousands Of S-1 Gards On "Transit" Buses

Last year, New Flyer (a large bus manufacturer) purchased MCI to create the world's largest bus maker. Brad Ellis, a former New Flyer engineer, testified that New Flyer put S-1 Gards on buses in the New Flyer factory. (Ex. 26; Ellis Dep., 18:12-15) The President of the S-1 Gard company confirmed that S-1 Gards have now been placed on over 50,000 buses around the world. (Ex. 27; Barron Dep., 34:12; "In the world, over 50,000 . . . .") Notable customers include Disney World. (Ex. 27; Barron Dep., 82:3-6)

The S-1 Gard President further explained why S-1 Gards should be standard equipment on all buses:

> Q. Do you believe that the S-1 Gard should be standard equipment on all buses?
> A. In the U.S. or --
> Q. Yes.
> A. In the U.S., yes.
> Q. Based on your experience in the industry, do you believe that the safety benefits of an S-1 Gard outweigh the cost to equip the buses --
> A. Absolutely, absolutely.

(Ex. 27; Barron Dep., 107:17 to 108:1)

New Flyer engineer Ellis even wrote a letter dated September 2008 that endorsed the S-1 Gard for coaches (like the J4500 "coach" in this case):

> Ken: By way of this letter, New Flyer Engineering maintains the position that the installation of the S-1 Gard in New Flyer facilities does not compromise the integrity of the chassis or suspension of the **coach** on which it is installed, nor it it expected to impact the functionality or integrity of other systems in the **coach**.

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(Ex. 26; Ellis Dep., 13:3-22) This was the "formal position at New Flyer engineering . . . ." (Ex. 26; Ellis Dep., 14:14-25). Hence, the design engineers working for MCI's parent (New Flyer) endorsed the S-1 Gard in writing in 2008, New Flyer installed the S-1 Gard on buses at its factory and New Flyer engineers have testified that the S-1 Gard is a "good safety feature for buses in general":

> Q. All right. And when you viewed the [S-1 Gard] video, did you see how the S-1 Gard pushed the bicyclist away from the tire?
> A. Yes, pushed the person, the physical person. Instead of being driven over, it bumped them out of the way.
> Q. And how would you describe that?
> A. It is a mechanical barrier between the tire and the individual.
> **Q. And that's a safety feature; correct?**
> **A. Yes.**
> **Q. And would that be a good safety feature for buses in general?**
> **A. Again, it is my personal opinion; I would say yes.**

(Ex. 26; Ellis Dep., 28:6-20) (Bold added) The devastating consequences of an engineer for MCI's parent company (New Flyer) proclaiming that the S-1 Gard is a "good safety feature for buses in general" can not be overstated. Yet MCI now disingenuously argues to the Court that MCI did not even know about this "good safety feature." Poppycock!

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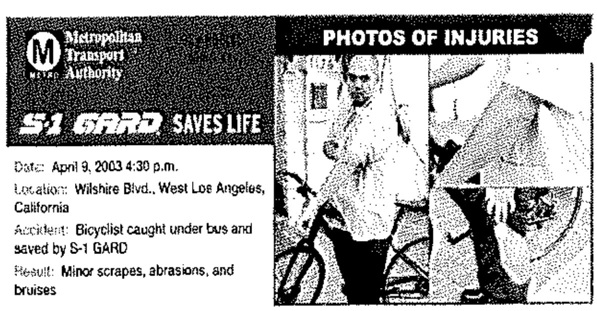
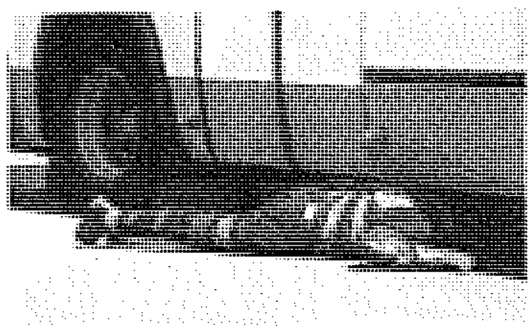
H. MCI Rejected A Direct Offer For S-1 Gards "At No Cost" And Additionally Rejected Solicitations At Trade Shows

The "S-1 Gard" is a barrier device designed to be installed before the rear tires to move persons falling under the bus out of the way. A picture from the S-1 Gard literature depicts a bicyclist falling under a bus:



(Ex. 28) This S-1 Gard literature was reviewed in 1998 by MCI personnel -- ten years before the subject bus was made in this case. (Ex. 9; Fierros Dep., 33:19-23; "Q. Okay. But you saw some flier similar to Exhibit 3 that related to the S-1 Gard. Is that correct? A. Yeah, I think somebody handed to me something like that, yes."; p. 35, lines 19-24; conceding he probably went to November 1998 trade show in Indianapolis)

S-1 Gard even made a video that depicts a bicyclist falling under a bus directly in front of the rear tires and being saved by the S-1 Gard:



The fact that the supplier of the S-1 Gard safety barrier released a video in 1998 that depicted the exact accident scenario in this case decisively demonstrates that bus and bicycle accidents are foreseeable.

1. MCI Refused To Put S-1 Gards On "At No Cost"

While MCI misinforms the Court that it did not even know about the S-1 Gards (MSJ Punitive, 20:21-23), the S-1 Gard President testified that he personally met with MCI and offered them S-1 Gards "at no cost" to try to jump-start the market for this then new safety device:

> Q. Do you believe that you have offered -- that you met with representatives or subsidiaries of Motor Coach Industries and offered to sell the S-1 Gard to the manufacturer?
> A. No sell. At that time, I believe I was going to do -- because safety, it's hard to sell. I wanted to let them – **give them parts at no cost to get them on the buses, so it** would become industry-mandated for the motor coach industry, because nobody puts money out. The companies aren't going to just write you a check. So **the plan was** with Chris Ferrone and I was **to offer them the parts at no cost**, my red -- and that once their user started using it, you know, they'd put it on and get it jump-started, then they would be the main distributor. We would give them the rights to that, I believe.
>
> . . . .
>
> Q. And MCI or its subsidiary rejected that offer?
> A. Yes.
> Q. They didn't even want to try them out for free?
> A. I gave them evaluation parts. Yeah, I'd say no.

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(Ex. 27; Barron Dep., 108:13 to 110:4) Not only did MCI consciously disregard this known safety feature, MCI refused to put S-1 Gards on "at no cost." This disgusting corporate malfeasance has now caused thousands of injuries and deaths that could have been avoided if MCI had simply helped the S-1 Gards become "industry-mandated for the motor coach industry" -- the salutory safety proposal that MCI rejected.[6]

2. MCI Also Knew About S-1 Gards From Trade Show Meetings And Trade Journals

The head of MCI's parts division admitted getting S-1 Gard literature at trade shows:

> Q. Okay. But you saw some flier similar to Exhibit 3 that related to the S-1 Gard. Is that correct?
> A. Yeah, I think somebody handed to me something like that, yes.

(Ex. 9; Fierros Dep., 19-23) The S-1 Gard was also heavily promoted in bus trade journals.

III. ARGUMENT

A. MCI Has Not Challenged The Failure To Warn Claim In Either Summary Judgment Motion

Plaintiffs have brought five different strict liability theories against MCI. First, Plaintiffs contend that MCI failed to warn of the air blast hazard. Second, Plaintiffs contend that the J4500 bus was defectively designed for any one of four different reasons: (1) MCI did not aerodynamically streamline it by using alternative rounded bus fronts; -- allowing significant right side airblasts and suction during travel; (2) the J4500 has right side blind spots; (3) it was not equipped with blind-spot proximity sensors; or (4) it did not have a barrier protecting humans from exposure to the rear tires (such as an S-1 Gard).

Nevada law imposes exacting requirements for a warning to be **adequate**:

> We therefore embrace the rule of law stated in the Pavlides instruction offered by appellants below, and hold that Nevada trial courts should advise juries that warnings in the context of products liability claims must be (1) designed to reasonably catch the consumer's attention, (2) that the language be comprehensible and give a fair indication of the specific risks attendant to use of the product, and (3) that warnings be of sufficient intensity justified by the magnitude of the risk.

---

[6] The fact that MCI has gotten "religion" after this accident and now says that MCI is finally going to seriously evaluate the S-1 Gard is no defense where MCI should have done so two decades ago. (Ex. 1; Couch Dep., 139:10-20; stating that because of this lawsuit MCI should finally consider using the S-1 Gard)

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Lewis v. Sea Ray Boats, Inc.,119 Nev. 245, 65 P.3d 245, 247, (Nev. 2003).

MCI has not challenged the strict liability failure to warn theory in either one of its two summary judgment motions. Most likely, this is because the MCI salesman admitted that MCI failed to give any warning whatsoever of the airblast risk. Where it is uncontested that MCI did not provide an airblast warning and where the bus driver testified that he would have heeded such a warning from MCI, the failure to warn claim can not be reasonably challenged.

B. Virtually All Jurisdictions Hold That Bystanders Injured By A Defective Product Can Bring Strict Liability Claims

MCIs first fallacious argument is that only the "user" of the product can bring a product liability claim as opposed to a bystander injured by the defective product. (MSJ Product Defect, 9:3 to 10:12) The seminal case holding that bystanders can recover where defective motor vehicles cause them injury is Codling v. Paglia, 32 N.Y.2d 330, 335 (N.Y.Ct.App. 1973) ("We hold today the manufacturer of a defective product may be held liable to an innocent bystander, without proof of negligence, for damages sustained in consequence of the defect.") Virtually every jurisdiction that has expressly considered this issue has also applied strict liability to bystanders.

California - "[T]he doctrine of strict liability may not be restricted on a theory of privity of contract. Since the doctrine applies even where the manufacturer has attempted to limit liability, they further make it clear that the doctrine may not be limited on the theory that no representation of safety is made to the bystander." Elmore v. Am. Motors Corp., 70 Cal. 2d 578, 586, 451 P.2d 84, 88 (1969). "If anything, bystanders should be entitled to greater protection than the consumer or user where injury to bystanders from the defect is reasonably foreseeable. Consumers and users, at least, have the opportunity to inspect for defects and to limit their purchases to articles manufactured by reputable manufacturers and sold by reputable retailers, where as the bystander ordinarily has no such opportunities. In short, the bystander is in greater need of protection from defective products which are dangerous, and if any distinction should be made between bystanders and users, it should be made, contrary to the position of defendants, to extend greater liability in favor of the bystanders." Id., 70 Cal. 2d at 586, 451 P.2d at 89.

Arizona - "[T]he doctrine of strict tort liability against the manufacturer and retailer should be available to the bystander as well as to the user or consumer." Caruth v. Mariani, 11 Ariz. App. 188, 189, 463 P.2d 83, 84 (1970).

Colorado - "[W]e hold that, in a products liability case, privity of contract is not a prerequisite to recovery under the strict liability theory." Bradford v. Bendix-Westinghouse Auto. Air Brake Co., 33 Colo. App. 99, 108, 517 P.2d 406, 411-12 (1973).

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Connecticut

- "The likelihood of injury from [the use of a defective automobile] exists not merely for the passengers therein but for the pedestrian upon the highway. The public policy which protects the user and consumer should also protect the innocent bystander." Mitchell v. Miller, 26 Conn. Supp. 142, 150, 214 A.2d 694, 699 (Super. Ct. 1965).

Florida

- "I find no precedent for the proposition that these plaintiffs must be limited to a negligence action, and would also reject the novel principle that the warranty remedy extends only to those using the product in question." Toombs v. Fort Pierce Gas Co., 208 So. 2d 615, 618 (Fla. 1968).

Indiana

- "There is nothing inherent in the status of bystander that requires the denial of the right to sue the manufacturer in strict liability. It would be unjust to deny plaintiff a recovery because of the purely fortuitous circumstance that he was standing by rather than using. The zone of liability is commensurate with the zone of foreseeable risk." Sills v. Massey-Ferguson, Inc., 296 F. Supp. 776, 782 (N.D. Ind. 1969) citing to RESTATEMENT (SECOND) OF TORTS, Explanatory Notes § 402A, comment o at 356 (1965).

Michigan

- "[T]he manufacturer is best able to control dangers arising from defects of manufacture, I would say definitely that [multiple cases] have put an end in Michigan to the defense of no privity, certainly so far as concerns an innocent bystander injured as this plaintiff pleads, and that a person thus injured should have a right of action against the manufacturer on the theory of breach of warranty as well as upon the theory of negligence. Some quibbler may allege that this is liability without fault. It is not. As made clear above, a plaintiff relying upon the rule must prove a defect attributable to the manufacturer and causal connection between that defect and the injury or damage of which he complains. When able to do that, then and only then may he recover against the manufacturer of the defective product." Piercefield v. Remington Arms Co., 375 Mich. 85, 98-99, 133 N.W.2d 129, 134-35 (1965).

New Jersey

- "An automobile manufacturer, producing millions of vehicles a year, offers them for sale to the public ultimately for daily use on the countless thoroughfares of this nation. It is, therefore, well within the realm of foreseeability that a pedestrian or other traveler lawfully upon the road will be injured due to a defect in a vehicle that in some way inhibits or forecloses its control by the driver. This, then, is our holding today, a response to the simple and compelling case presented for determination. Thus, strict liability in tort, insofar as it applies to bystanders, provides a legal remedy where legal responsibility is properly placed." Lamendola v. Mizell, 115 N.J. Super. 514, 524, 280 A.2d 241, 246 (Law. Div. 1971).

Even MCI concedes that "it is true that many jurisdictions have extended the right to bystanders to pursue claims in strict liability for injuries caused by defects." (MSJ Product Defect, 10:2-3) The Nevada Supreme Court just issued Trejo, wherein it espoused a progressive view of strict liability by a 6 to 1 vote. There is no reason to believe that the Trejo Court would transmute to reactionary jurists and retreat to privity requirements to eliminate bystander product liability suits.

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C. The "Consumer Expectations Test" Is Applicable -- Not The "Bus Driver Expectations Test" Concocted By MCI

1. The Consumer Expectations Test Is Applicable – Especially Where The Claimed Defects Are Simple And Easily Understood By Jurors

The test for an "unreasonably dangerous" or "defective" product was set forth in Ginnis v. Mapes Hotel Corporation, 86 Nev. 408, 413, 470 P.2d 135, 138 (Nev. 1970):

> [I]t failed to perform in the manner reasonably to be expected in light of its nature and intended function and was more dangerous than would be contemplated by the ordinary user having the ordinary knowledge available in the community.

See also Stackiewicz v. Nissan Motor Corp., 100 Nev. 443, 448, 686 P.2d 925, 928 (Nev. 1984) (citing this test with approval). This is all that Plaintiffs must prove to prevail. Plaintiffs need not prove a specific defect in the subject bus. As Stackiewicz held, Plaintiffs do not even have to offer expert testimony of defect.

The consumer expectations test was just reaffirmed by the Nevada Supreme Court in Ford Motor Company v. Trejo, 133 Nev.Adv. Opin. 68 (Sept. 27, 2017) ("Under the consumer expectation test, a plaintiff must demonstrate that a product 'failed to perform in the manner reasonably to be expected in light of its nature and intended function and was more dangerous than would be contemplated by the ordinary user having the ordinary knowledge available in the community.'") [hereinafter Trejo] While giving lip service to the consumer expectation test, MCI immediately attempts to pervert it into the "bus driver expectation" test. (MSJ Product Defect, 16:12; "The Only Relevant Expectations are Those of People who Buy and Driver Motor Coaches"; 16:19; "Motor Coach Purchasers and Drivers are a Sophisticated Community with Specialized Knowledge of a Coach's Dangers.")

In support, MCI does not cite any Nevada Supreme Court decision. Instead, MCI relies predominantly on an Oregon case; Ewen v. McLean Trucking Co., 300 Or. 24, 706 P.2d 929 (Ore. Sup. Ct. 1985) In that case, the Court reviewed a special jury instruction that added a second sentence -- bolded below-- that defined pedestrians as "users":

> Unreasonably dangerous in this context means dangerous to an extent beyond that which would be contemplated by the ordinary purchaser of this type of product in the community. **Purchaser and users is [sic] anyone who may reasonably be expected to be affected by the product, such as a pedestrian.**

The Ewen Court held that adding the second sentence to the stock consumer expectations jury instruction was error:

> The crux of defendant's objection, rather, is that the last sentence of the instruction extended the "consumer contemplation" test of Comment i to include the expectations of anyone who might reasonably be expected to be affected by the product, "including a pedestrian."
>
> We conclude that the statement is too broad. The word "consumer" as used in Comment i, does not include everyone who might be affected by the product.

Plaintiffs herein have already proposed only that the standard consumer expectations jury instruction be given:

PROPOSED PL 6

> A product is unreasonably dangerous is it failed to perform in the manner reasonably to be expected in light of its nature and intended function, and was more dangerous than contemplated by the ordinary user having the ordinary knowledge available in the community.
>
> Source: Product Liability Instruction 7PL.7 (verbatim).

Plaintiffs have **not** proposed the additional sentence discussed in Ewen. Hence, at best, MCI's argument is premature until the parties resolve jury instructions.

Assuming arguendo that there is some reason to delve deeper in this issue now, Plaintiffs observe that even the Oregon courts have held after Ewen that product defects that are relatively simply do not require additional proof such as that demanded by MCI because the "consumer expectations about how a product should perform under specific conditions will be within the realm of jurors' common experience." See McCathern v. Toyota Motor Corp., 23 P.3d 320 (Ore. Sup. Ct. 2001). As the McCathern Court explained:

> As noted in Heaton, in some cases, consumer expectations about how a product should perform under specific conditions will be within the realm of jurors' common experience. However, some design-defect cases involve products or circumstances that are "not so common * * * that the average person would know from personal experience what to expect. When a jury is "unequipped, either by general background or by facts supplied in the record, to decide whether [a product] failed to perform as safely as an ordinary consumer would have expected," this court has recognized that additional evidence about the ordinary consumer's expectations is necessary. That additional evidence may consist of evidence that the magnitude of the product's risk outweighs its utility, which often is demonstrated by proving that a safer alternative was both practicable and feasible.

McCathern, 23 P.3d at 331 (citations omitted)

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Any suggestion that the bus safety alternatives involved in this case are some sort of exotic contraptions that can not be understood by jurors has no merit for three reasons. This case involves a motor vehicle accident. The average juror drives a motor vehicle. Likewise, the average juror has a realm of common experience regarding blind spots and proximity sensors (which are widely used on passenger cars) from their own driving experience. Similarly, the concept of barrier protection like the S-1 Gard is widely understood. For example, in Robinson v. G.G.C. Inc., 107 Nev. 135, 808 P.2d 522, 523 (1991), there was no dispute that the average juror understood the concept of a removable protective barrier guard that was a proposed safety feature for the box crushing machine that caused an injury to a grocery boxboy.

Second, as set forth below, there will be testimony from multiple bus drivers that they expected MCI to design a safe bus. (Ex. 21; Witherell Dep., 37:24 to 38:1; Q. Did you expect that MCI would design its buses in a reasonably safe manner? A. Yes.") Many bus drivers testified that proximity sensors should have been put on the bus. (Ex. 21; Witherell Dep., 38:19-23; Q. Do you think a proximity sensor based on your experience with buses would be a good safety feature for a bus? A. My opinion, my personal opinion, yeah, it would be a good idea.")

Third, for each of the product issues involved, there is a safer alternative which had either been developed by MCI (rounded bus fronts) or was both commercially feasible and commercially available. MCI itself had developed a more streamlined bus front in 1993 that would have halved the airblasts. A variety of off-the-shelf side proximity sensors were available in 2007 when the bus was made. The S-1 Gard was not only available in 1998 but was offered to MCI at cost to promote its widespread use. There is no valid argument that the products or circumstances of this case are too extraordinary for the average juror to understand.

2. Plaintiffs Have Testimony From Multiple Bus Drivers And Operators

MCI wrongfully asserts that there is "no evidence" from bus drivers. (MSJ Product Defect, 6:5-3) Plaintiffs have deposed nearly a dozen bus drivers or bus operators: (1) Edward Hubbard (the bus driver at the time of the accident); (2) Mary Witherall (former bus company safety director); (3) Jeffrey Justice (former bus company safety director); (4) William Barlett (bus company safety

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director at the time of accident); (5) David Dorr (MCI salesman); (6) Christopher Groepler (bus company GM at time of accident); (7) Brad Ellis; and (8) Bryan Coach (MCI design engineer and holder of bus driver license). Six of these persons have Commercial Driver's licenses and drove the J4500. Their testimony is cited herein sertiatim.

3. Expert Testimony Regarding "Consumer Expectations" Is Not Required

MCI argues without legal authority that "expert testimony is necessary, not because the consumer-expectations test always requires it, but because the consumers and users of a motor coach whose expectations are relevant to identifying a product defect are themselves a group with expertise." (MCI Product Defect, 17:18-20) The Nevada Supreme Court has expressly held that expert testimony is not required in a defective product case. See Stackiewicz v. Nissan Motor Corp., 100 Nev. 443, 450, 686 P.2d 925, 930 (Nev. 1984) If expert testimony was required, Plaintiffs have actually provided such testimony through their warnings expert. (Ex. 29; Cunitz Report)

Dr. Cunitz explained in detail why MCI is liable for failure to warn and expressly observed that users did not know of or expect the risk and that they should be warned:

> **IV. Opinions and Conclusions**
>
> a. The J4500 Motor Coach Industries bus at foreseeable speeds represents a known or knowable threat to bicyclists being passed in close proximity. Based on the report of Robert E. Breidenthal, the lateral forces created by the movement of the bus through air are substantial and rapidly changing in direction from outward to inward as the bus passes. Breidenthal concludes that such forces increase with the square of the speed.
>
> b. As a Human Factors Professional, it is my opinion that such forces would be surprising and so rapidly changing that even skilled bicyclists would be challenged beyond human capabilities and response times to adapt to being strongly pushed sideways away from the bus and almost instantly later being pulled in the opposite direction towards the side and then rear wheels of the bus.
>
> c. The Danger created represents a combination of Hazard and Risk. Specifically, the Hazard is the air blast forces first pushing away from and then rapidly reversing towards the side of the bus. The faster the bus moves through the area, the greater the forces generated. The Risk is related to a bicyclist's proximity to the moving bus. Risk is lessened the further the passing bus is from the bicyclist. At some distance, the Risk disappears. So, simply, the faster the bus moves, the greater the Hazard. The closer it is to a bicyclist, the greater the Risk. A fast and close bus is Dangerous as it threatens the stability of the bicyclist and, if the bicyclist falls, poses an additional threat of running over the fallen bicyclist with its rear wheels.

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d. Since, it is clear from the Breidenthal report that the Danger can be mitigated if substantial clearances are maintained while passing a bicyclist. A bus's distance and speed with respect to a bicyclists being passed by the bus is controlled primarily by the knowledge, training and thus the behavior of the bus driver.

e. It is my opinion, within a reasonable degree of scientific certainty, that if safe passing speeds and clearance distances are to be maintained, the bus driver must be adequately warned and trained. Since the danger is not obvious, appropriate warnings and training materials must be provided by the manufacturer to bus purchasers and operators who then can pass the information on to their drivers.

f. The driver, ultimately, must have this information and must know how to pass safely.

g. In the present case, as the sales manager for the manufacturer, the general manager and safety director of the operator, and the driver of the bus were unaware of the nature and extent of the Danger, the Hazard should have been Identified by the manufacturer, the Risk evaluated, and warnings issued.

h. Within a reasonable degree of scientific certainty in my field of Human Factors, it is my opinion that the failure of Motor Coach Industries, Inc. to warn of the Hazard and the means to reduce Risk, created an unreasonable Danger on the highways where it is foreseeable that buses will be passing bicyclists such as Dr. Khiabani.

i. This Danger was, in my opinion, a substantial cause of his injuries and death. **Had adequate warnings and training materials been provided by the manufacturer, the bus driver, Mr. Hubbard, has testified that he would have given bicycles greater clearance during passing maneuvers and Dr. Khiabani would not have been exposed to the oncoming Danger.**

As noted earlier, bus driver Hubbard explicitly said that he would have heeded an airblast warning from MCI.

D. There Is Ample Evidence Creating An Issue Of Fact On The Consumer Expectation Tests For All Of The Safety Features Advocated By Plaintiffs

As for bus "user" testimony demanded by MCI (i.e., that of bus drivers), Plaintiffs have cited the testimony of numerous bus drivers regarding the key product defects and proposed safety alternatives in this case, e.g., bus drivers Dorr, Bartlett and Hubbard regarding airblasts, bus driver Witherell regarding right side blind spots and proximity sensors and bus driver Brad Ellis regarding S-1 Gards. First, Bus drivers have testified that they expected MCI to make a safe bus. (Ex. 21; Witherell Dep., 37:24 to 38:1; "Q. Did you expect that MCI would design its buses in a reasonably safe manner? A. Yes.") Starting with airblasts, MCI engineers all knew of the airblasts created by the J4500. (Ex. 1; Couch Dep., 52:4 to 53:6; "Q. Was one of the reasons to attempt to reduce air

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displacement that a bystander or bicycle would see? A. Well, that would be the effect.") However, the key MCI salesperson, the bus purchaser and the user of the bus were not aware of this risk. (See Section II C above).

MCI did nothing to reduce the airblast danger. (Ex. 8; Lamothe Dep., 47:3-13; "Q. Did MCI make any effort in designing the J4500 to reduce the aerodynamic drag by modifying the shape of the front of the coach? A. I have no knowledge of that. Q. So as far as you know, that was no effort made in that regard? A. To my knowledge, no.") Astoundingly, MCI did not even give any thought to rounding the sharp front edges of the "boxy" J4500. (Ex. 8; Lamothe Dep., 71:21-25; "Q. Was any consideration given when you designed the 4500 to design it with a larger radii for the roof slope? A. Not that I'm aware of.") The result was the same "boxy" bus with consequent air blasts.

Other bus manufacturers have made sleek buses with drastically lower drag coefficients, e.g., the .33 drag coefficient of the Setra 500. (Ex. 8; Lamothe Dep., 69:21 to 70:3) Truck and train manufacturers have also made streamlined transportation devices. MCI did extensive testing to find the best alternative front shape to streamline its buses in 1993 but failed to use these safer alternative front shapes when it built the J4500.

Eyewitness Erika Bradley testified that she saw Dr. Khiabani's bike wobble and that it was consistent with an airblast coming from the bus. Bradley also viewed a video of another bike being disrupted by an airblast from a truck and described this as "substantially similar" to what she observed. MCI experts concede both that this witness testimony supports air blast causation and that MCI has no evidence to support another cause for the wobbling bike. Halving the airblast by sound aerodynamic design would have reduced the side force that disrupted Dr. Khiabani.

Turning to blind spots, the bus driver testified that he followed Dr. Khiabani down the street for 400 feet without seeing him. MCI now admits and the MCI PMK confirms that there was a right side blind spot on the J4500. (See Section II D above) MCI engineers concede that MCI did nothing to correct the blind spot problem. (Ex. 8; Lamothe Dep., 55:13-22; "Q. My question was what design actions, if any, were taken to eliminate or modify right-side blind spots? A. None that I was directly involved with, so I don't know. Q. Do you know if anything was done? A. I don't

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know.") Bus drivers have testified that, for this reason, proximity sensors would be essential safety devices. (Ex. 21; Witherell Dep., 57:7 to 58:1; "Q. So if you are going to put -- if you were going to put a proximity sensor on one side or the other, it should be on the right side certainly in your opinion? A. In my opinion, yes, sir.")

MCI could easily have equipped the J4500 bus with off-the-shelf blind spot detectors from Eaton that came onto the market in 2005 and that Eaton advertised for "buses" in 2007. Instead, MCI did not even consider using these simple but effective side warning sensors. (Ex. 20; Hoogestraat Dep., 79:24 to 80:22; "Q. Okay. Before we get to that, let's talk about the off-market kits that we were talking about. Did MCI investigate whether or not to use any of those? A. Not that I was involved in.") The bus driver in this case said that he would have taken evasive action earlier if there had been a proximity sensor warning. (Ex. 13; Hubbard Dep., 149:21 to 150:15; "Q. So if you'd been given some sort of warning at the 50 or the hundred, you would have taken evasive action earlier? A. Yes.")

Focusing on barrier guards, MCI knew that many buses have protective guards to prevent human contact with rear tires. (Ex. 20; Hoogestraat Dep. 106:5 to 107:15; "Q. Yeah, the tires [of the J4500] are exposed. And in the transit bus with spats, the tires are not exposed; right? A. Yeah, part of the tire is not exposed.") MCI concedes having the expertise it internally design and build these simple barriers. (Ex. 1; Couch Dep., 137:3-16) Yet MCI "did not look at something like that." (Ex. 1; Couch Dep., 137:3-16)

With regards to one specific type of protective guard; the S-1 Gard, it was offered to MCI "at no cost to get them on the buses" but MCI refused to even try S-1 Gards. (Ex. 27; Barron Dep., 107-08) The S-1 Gard was promoted at trade shows, heavily promoted in trade journals and even had its own website in the early 2000s. This resulted in the S-1 Gard being placed on 50,000 buses to date. While the head of MCI's parts division admits being offered the S-1 Gard and admits seeing S-1 Gard literature, MCI disingenuously suggests that MCI was not aware of this protective barrier. The testimony of both Barron and Fierros (directly supervised by the MCI CEO) disproves this claim. All of the foregoing evidence creates an issue of fact under the consumer expectations test.

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E. The Nevada Supreme Court Recently Re-Affirmed That Commercial "Feasibility" And Not "Availability" Was The Test For Alternative Design In A Products Case

At the outset, it must be emphasized that Plaintiffs are not even required to provide any proof whatsoever that there was an alternative design to prevail under the consumer expectations test. See Ford Motor Company v. Trejo, 133 Nev.Adv. Opin. 68 (Sept. 27, 2017) ("In this, we note that while **proof of an alternative design is not required**, in most cases, evidence of an alternative design is the most expedient method for a plaintiff to prove that the product at issue was unreasonably dangerous.") Plaintiffs must only proof that the product was more dangerous than a reasonable consumer would expect.

If alternative designs are offered to prove that the product at issue was unreasonable dangerous, the alternative design must only be "feasible" as opposed to being both "feasible" and "commercially available." In Ford Motor Company v. Trejo, 133 Nev.Adv. Opin. 68 (Sept. 27, 2017), the Court held that:

> In the context of proving that a product was defective under the consumer-expectation test, this court has concluded that '[a]lternative design is one factor for the jury to consider when evaluating whether a product is unreasonably dangerous.' Therefore, a plaintiff may choose to support their case with evidence 'that **a safer alternative design was feasible at the time of manufacture**. However, any alternative design must be commercially **feasible**.

(Bold added) Hence, whether or not there actually was a proximity sensor **for buses** on the market and being sold by a Third Party (such as the VORAD system), Plaintiff can just prove that proximity sensors were "feasible" for buses to fully support the product claim.

Admittedly, one way to proof feasiblity is to prove that an alternative design was in fact commercially available. Ford Motor Company v. Trejo, 133 Nev.Adv. Opin. 68 (Sept. 27, 2017) ("[W]hen commercial feasibility is in dispute, the court must permit the plaintiff to impeach the defense expert with evidence of alternative design.") Applying these principles, there is overwhelming evidence that there were feasible alternative designs for the bus front, for proximity sensors and for barrier protection.

F. MCI Had Actual Knowledge Of The Airblast Risk

MCI's only argument in the MSJ Punitive is that MCI was not aware of the airblast risk,

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MCI was not aware of the right side blind spots, MCI did not know that proximity sensors were available and "MCI Had Not Heard of the S-1 Gard Prior to 2007." (MSJ Punitive, pp. 6-9) As MCI concedes in a footnote, "[t]he only issue is whether MCI had **knowledge** of the alleged defects and then acted with conscious disregard for the public's safety." (MSJ Punitive, n. 1) (Bold by MCI). Although somewhat discussed above, Plaintiffs repeat and elaborate the key evidence proving that MCI knew of the various alternative designs involved in this case.

Starting with knowledge of the airblast risk, MCI asserts that MCI was not "aware that the Design of the Motor Coach it Sold Could Create an 'Air Blast' or 'Suction'" (OSJ Punitive, 6:2-3). This claim is shredded by the explicit conclusion of the 1993 Wind Tunnel testing commissioned by MCI determining that one consequence of a poor drag coefficient would be **"aerodynamic side force . . . [that] provide[s] a disturbance that deflects a bus from its path in the presence of side winds or passing vehicles."** (Ex. 6; MCI039859) Where this conclusion that a poor drag coefficient would create an "aerodynamic side force" was made in the context of MCI's wind tunnel testing on multiple front bus shapes that produced varying drag coefficients, it is axiomatic that MCI knew that varying the design of the front of MCI buses could mitigate the "aerodynamic side force", i.e., greatly lessen the air blast. Despite this pointed knowledge of the exact design flaw in the bus that was a substantial factor in causing Dr. Khiabani's bike to wobble, MCI did not use one of the safer alternative fronts tested in 1993 to streamline the bus.

Consistent with the conclusion of the 1993 Wind Tunnel testing, virtually every MCI engineer that was deposed confessed to knowing that the relatively flat bus front of the J4500 (which MCI calls "boxy") would cause left and right side air displacement, i.e., air blasts. Bryan Couch was the Vice President of Design Engineering and Product Planning in 2009 and the top person in the MCI Design Engineering Dept. (Ex. 1; Couch Dep., 122:17; 124:11) Couch conceded that a bus moving 25 miles per hour would displace air:

> Q. Do you have an understanding that a rectangular object moving through air will displace air?
> A. A rectangular object will, yeah.
> Q. Okay. And what do you call that?
> A. What do I call what, sir?
> Q. The air displacement. Let's make it a little more specific. Do you have an

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understanding that if a bus is moving, say, 25 miles per hour, it will displace -- the front of the bus will displace air?
A. A coach will displace air, yeah.
Q. And what do you call that?
A. It could be part of drag.

(Ex. 1; Couch Dep., 33:17-25; 34:1-5) Using a 55 mph bus as an example, Couch also conceded knowing that the wind displacement would initially push the bike rider:

Q. All right. You said that the air blast will make the bicyclist and the bus move away. Can you tell me what mechanism you think that will occur by?
A. It would be the air coming from the front of the bus.

(Ex. 1; Couch Dep., 65:3-10) Couch also conceded MCI attempted to reduce the air displacement for the E series buses (the J series is the J4500 involved in this case). Such reduction was desirable to improve the drag coefficient and to "reduce air displacement that a bystander or bicycle would see":

Q. Now, you said that the two reasons that you attempted to improve the drag coefficiency were fuel and dust, right?
A. Yeah, un-huh.
Q. Was one of the reason to attempt to reduce air displacement that a bystander or bicycle would see?
A. Well, that would be the effect.

(Ex. 1; Couch Dep., 52:24-25; 53:1-6) The Couch testimony alone ends any debate as to whether MCI knew that there was air displacement coming from the front of the MCI buses and also knew that such air displacement could be greatly reduced by improving the drag coefficiency, i.e., streamlining the front of the bus.

Brad Lamothe was another MCI design engineer that worked on the J4500. Lamothe also admitted knowing that simply rounding the corners on the bus (the safer alternative design) would eliminate air blasts but dismissed this as an inconsequential "safety factor":

Q. But you do understand in general that the more you round the corner like a bullet train, for example, the better aerodynamics you'll have? You do understand that?
A. Uh-huh.
Q. Yes?
A. And the higher the speed, the more of a factor that would be.
Q. Great. Whose job was it to make sure that the aerodynamics design of the J4500 was reasonably safe, in your term?
A. Well, I don't know that aerodynamics is a -- is a safety factor. The shape of the front of the coach, I'm not aware that they would be a safety factor.
Q. So as far as you know, when the J4500 was designed, no one looked at aerodynamics as a safety factor as far as you know?

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A. Not to my knowledge.

(Ex. 8; Lamothe Dep., 36:4-23) Astoundingly, despite creating and testing the smoother alternative bus fronts in 1993, MCI did not even try to improve the aerodynamics of the J4500. (Ex. 8; Lamothe Dep., 47:3-13; "Q. So as far as you know, there was no effort made in that regard? A. To my knowledge, no.") Because MCI neglected this key element of safe design, MCI made the J4500 into a "boxy" bus that failed to incorporate any of the greatly improved bus shapes designed and tested in the 1993 wind tunnel testing. Based upon the foregoing testimony, the Court should **not** hold as a matter of law that MCI lacked knowledge of the air blast risk and should deny the summary judgment request to dismiss the punitive claim based upon this false premise.

G. MCI Had Actual Knowledge Of The Blind Spot Risk

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The schizophrenic dichotomy in the two summary judgment motions regarding MCI's knowledge of blind spots in and of itself creates an issue of fact requiring denial of both motions. First, MCI argues vociferously that "Plaintiffs do not dispute, moreover, **the inevitability of blind spots. . . . Blind spots are also a necessary consequence** of a coach's structural components, alteration or elimination of which can make the coach less safe.") (MSJ Product Defect, 6:12-15) (Bold added) Contradicting itself that blind spots are "inevitable" and a "necessary consequence" of buses, MCI flip flops and argues that "Plaintiffs Lack Evidence that MCI Acted with Conscious Disregard by Selling a Coach with Blind Spots" and that "Plaintiffs have no evidence of a blind spot on the coach prior to the April 18, 2017 accident." (MSJ Punitive, 19:11-14) As set forth above, where the MCI PMK on blind spots admitted point blank that the J4500 has a right side blind spot, the presence of this dangerous condition can not be debated.

If blind spots are "inevitable" and a "necessary consequence" to a bus, MCI (the largest bus manufacturer in North America) certainly knew that its buses had blind spots. Indeed, MCI experts conceded at deposition that **the J4500 bus has a startling large four foot right side blind spot** (and this is using MCI's constrictive definition of a blind spot that counts seeing even 1 inch of the bicyclist as not a blind spot). (Ex. 19; Krauss Dep., 76:2-4; "A. You lose the visibility of the bicyclist completely for about 40 inches.")

Plaintiffs experts have documented that the blind spots are much more extensive than the four feet conceded by MCI but the significant point is that MCI clearly knew that the J4500 had right side blind spots since it argues that they are "inevitable" in buses. Again, given the PMK testimony, the admissions in the MSJ Punitive that blind spots are "inevitable" and the four foot blind spot that MCI experts documented, the Court can **not** hold as a matter of law that MCI lacked knowledge of the right side blind spot problem.

H. MCI Admits It Could Have Made Its Own Protective Tire Guard And Also Had Actual Knowledge Of The Availability And Benefits Of Both "Spats" And The S-1 Gard

1. MCI Engineers Admitted That MCI Could Have Built Its Own Protective Barrier

MCI asserts that "MCI Had Not Heard of the S-1 Gard Prior to 2007." (MSJ Punitive, pp. 6-9) First, the test is not whether MCI had "heard" of a specific commercially available alternative product (i.e., the S-1 Gard). The test is whether an alternative design (a barrier protector) was feasible when the bus was made:

> In the context of proving that a product was defective under the consumer-expectation test, this court has concluded that '[a]lternative design is one factor for the jury to consider when evaluating whether a product is unreasonably dangerous.' Therefore, a plaintiff may choose to support their case with evidence 'that **a safer alternative design was feasible at the time of manufacture**. However, any alternative design must be commercially **feasible**.

<u>Ford Motor Company v. Trejo</u>, 133 Nev. Adv. Opin 68) (Sept. 27, 2017) (Bold added)

Uncontroverted evidence proves both that MCI knew of the precise danger of bicyclists being crushed by the rear tire and also had the expertise to build a protective barrier that would completely eliminate the risk.

In the present case, MCI's PMK admitted that MCI knew that bicyclists could fall under MCI buses:

> Q. Okay. Let me ask it a little bit differently. Do you recognize that there's a theoretical potential that pedestrians or bicyclists could potentially be run over by rear tires of a bus under some scenarios?
> A. There may be a scenario where that could occur.
> Q. Okay. And generally -- you understand generally that that could happen under some scenarios?
> A. It's possible that that could happen.

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(Ex. 20; Hoogestraat Dep., 85:5-15)

Bryan Couch, the head of the J4500 design team, conceded that MCI had the expertise to build its own protective barrier to prevent such accidents if MCI had desired to do so:

> Q. Does MCI have sufficient expertise to put on a mechanical object like as S-1 deflector or something comparable of its own design?
> A. MI has the expertise to build structural components.
> Q. And did MCI, to your knowledge, give any consideration to building a structural component that would act as a deflector for the rear tires?
> A. To my knowledge, we did not look at something like that.

(Ex. 1; Couch Dep., 137:3-16) Hence, building an alternative design incorporating a rear tire protective barrier was within MCI's "expertise" at the time of bus manufacture regardless of whether or not MCI heard of the specific S-1 Gard protective barrier option.

2. MCI Knew Of Spats And Other Protective Barriers And Could Have Put A Spat Like Barrier Comparable To That Used On CAT Buses In Clark County

MCI's PMK testified that MCI knew that many buses place protective covers over their tires ("spats") to prevent human contact:

> Q. Have you seen buses that they have the wall just cover the entire -- or coaches, excuse me, cover the entire rear wheel section with surface material?
> A. Coaches?
> Q. Yeah.
> A. I've seen transit buses.
>
> . . . .
>
> Q. Have you heard the term "spat"?
> A. You can call it that, I guess, if that's what they call it.
> Q. Have you heard that term?
> A. I've heard the term "spat."
> Q. Okay. And what does that mean to you?
> A. It's just the decorative closeout over the tires, tire area.
>
> . . . .
>
> Q. Okay. If you have a person next to a J4500, there's basically no barrier between the tires and the person; right?
> A. Certainly the tires are exposed if that's what you mean.
> Q. Yeah, the tires are exposed. And in the transit bus with spats, the tires are not exposed; right?
> A. Yeah, part of the tire is not exposed.

(Ex. 20; Hoogestraat Dep., 106:5 to 107:15) Again, there is no reason that a full or partial spat could not have been used. Indeed, other buses use such protective barriers (e.g., many CAT buses here in

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Clark County have rear tire shielding).

In addition to MCI's knowledge about spats, the Vice President of MCI's parts division testified that he knew of other protective barriers in the 1997 to 2000 time frame that were similar to S-1 Gards:

> Q. All right. Apart from the S-1 Gard, are you familiar with any other type of barrier safety device that manufacturers of buses either did or could put in front of the right rear tires to move people or objects out of the way?
> A. There was a device, I believe it was British, I don't remember the -- the name, but it was in the front of the bus and it attempted to do something similar to this [the S-1 Gard].

(Ex. 9; Fierros Dep., 19:8:16) He had also heard of other types of wheel guards:

> Q. How about wheel guards, have you heard of wheel guards that are attached to the rear tires?
> A. Yes.

(Ex. 9; Fierros Dep., 20:4-6) The truth of the matter is that MCI had full and complete knowledge that other more safety conscious companies were using spats, wheel guards and other protective features.

3. MCI Had Actual Knowledge Of The Availability Of The S-1 Gard

The S-1 Gard came out in the late 1990s and was widely advertised at trade shows and trade literature. It was also the subject of glowing reviews in the scientific literature. See Green, "A Field Evaluation of the S-2 Gard: Transit and Shuttle Bus Applications"; SAE Technical Paper Series, Christopher W. Ferrone, November 16-18, 1998.

The S-1 Gard has now been installed on 50,000 buses. As a general proposition, MCI's claim that MCI (the largest bus manufacturer in North America) did not hear about S-1 Gards in the last two decades is incredibly hard to swallow. MCI certainly has not offered any proof of this astounding claim, i.e., no affidavits disclaiming such knowledge from MCI purchasing agents, MCI trade show attendees or MCI product development personnel.

The reason that MCI has failed to offer any evidence that no one at MCI had heard of the S-1 Gard is that Plaintiffs took two depositions that irrevocable proven that MCI was actually offered the S-1 Gard "at no cost" decades ago and MCI refused to even test the product:

> Q. Do you believe that you have offered -- that you met with representatives or

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subsidiaries of Motor Coach Industries and offered to sell the S-1 Gard to the manufacturer?
A. No sell. At that time, I believe I was going to do -- because safety, it's hard to sell. I wanted to let them – **give them parts at no cost to get them on the buses, so it** would become industry-mandated for the motor coach industry, because nobody puts money out. The companies aren't going to just write you a check.

(Ex. 27; Barron Dep., pp. 107-08) (Bold added)

Pablo Fierros, then head of MCI's parts division, has confirmed that he became aware of the S-1 Gard at a trade show in the time period 1997 through 2000:

A. . . . I remember in a trade show having a conversation with some people, I don't even know who were in there. I don't remember if it was on the aisles or on the booth, whether it was my booth or somebody else's booth, I remember some conversation about this product.

. . . .

Q. Okay. But would I be correct that this would have been during the time period 1997 through 2000 when you worked for Universal Coach Parts [MCI's wholly owned parts division]?
A. Yes.

(Ex. 9; Fierros Dep., 13:25 to 14:13)

Mr. Fierros direct supervisor was Jim Bernacchi -- the CEO of MCI. (Ex. 9; Fierros Dep., 9:15-25) Fierros reported directly to Bernacchi. (Ex. 9; Fierros Dep., 10:9-11; "Q. Okay. Did you report directly to Mr. Bernacchi? A. Bernacci. I did.") Despite this damning testimony, MCI claims that "[i]t is undisputed that MCI had never heard of the S-1 Gard prior to placing the subject coach on the market and had no reason to investigate such a device." (MSJ Punitive, 17:17-18)

The basis of MCI's legal sophistry is its claim that the Fierros knowledge of the S-1 Gard should be ignored because "Fierros Was Not an Employee or Managing Agent of MCI." (MSJ Punitive, 18:9-10) This assertion conveniently ignores the fact that Fierros direct supervisor was the CEO of MCI -- Bernacchi. Obviously, the CEO of MCI itself clearly is "of sufficient stature and authority to have some control and discretion and independent judgment" over the business. Likewise, Mr. Fierros himself was a Vice-President and General Manager of MCI's parts division and in charge of 1,200 employees. (Ex. 9; Fierros Dep., 9, 10) Fierros too was "of sufficient stature and authority" to control parts purchases.

The actual knowledge by Fierros of the S-1 Gard in and of itself is fatal to MCI's professed

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ignorance of barrier protectors. However, as eluded to above, other MCI employees such as the MCI PMK (Hoogestraat) and Couch (the head J4500 designer) have admitted actual knowledge of barrier protectors that are the same or similar to the S-1 Gard. Plaintiffs need only prove MCI's knowledge of protective devices in general and MCI's disregard of such safety features in the J4500 bus at issue. Plaintiffs need not prove actual knowledge of a specific barrier protector like the S-1 Gard as opposed to general knowledge of protective devices that would prevent human contact with the rear tire.

III. CONCLUSION

The central claim made in both motions is that MCI -- the largest bus company in North America -- supposedly did not know about air blasts, right side blind spots, proximity sensors or protective barriers, including the S-1 Gard. The truth is that MCI not only knew about air blasts, MCI commissioned extensive wind tunnel tests in 1993 to develop a safer alternative rounded bus front to reduce airblasts. MCI's aerodynamic engineer (Dr. Cooper) found a safer alternative design that has since been copied by Tesla and Mercedes but MCI failed to use it on the J4500.

The MCI PMK admitted knowing of the right side blind spot on the J4500 and this testimony is binding upon MCI. MCI experts documented a 4 foot right side blind spot. As for proximity sensors to overcome the dangerous blind spot risk, the MCI PMK also admitted that after-market side blind spot detection kits such as the Eaton VORAD system were readily available. Multiple witnesses -- including bus drivers -- have testified that proximity sensors should have been used and the bus driver in this case testified that a timely proximity sensor alert would have prevented the accident.

S-1 Gards were actually offered to MCI "at no cost" by the S-1 Gard manufacturer but MCI callously refused even to evaluate this key safety device that is now on over 50,000 buses around the world. The head of the MCI design team for the J4500 conceded that, based on the facts of this accident, MCI will now be compelled to consider the S-1 Gards. Thousands of bicyclists and pedestrians, including Dr. Khiabani, did not need to be injured or die before MCI finally woke up and realized a protective barrier is needed.

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Both motions for summary judgment should be denied for the reasons set forth herein.

DATED this 25th day of December, 2017.

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CERTIFICATE OF SERVICE

I hereby certify that on the 21st day of December, 2017, the foregoing JOINT OPPOSITION TO MCI MOTION FOR SUMMARY JUDGMENT ON ALL CLAIMS ALLEGING A PRODUCT DEFECT AND TO MCI MOTION FOR SUMMARY JUDGMENT ON PUNITIVE DAMAGES was served on all parties currently on the electronic service list via the Court's electronic filing system only, pursuant to the Nevada Electronic Filing and Conversion Rules, Administrative Order 14-2.

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DISTRICT COURT

COUNTY OF CLARK, NEVADA

KEON KHIABANI and ARIA KHIABANI, minors, by and through their Guardian, MARIE-CLAUDE RIGAUD; SIAMAK BARIN, as Executor of the Estate of Kayvan Khiabani, M.D. (Decedent), the Estate of Kayvan Khiabani, M.D. (Decedent); SIAMAK BARIN, as Executor of the Estate of Katayoun Barin, DDS (Decedent); and the Estate of Katayoun Barin, DDS (Decedent);

Plaintiffs,

vs.

MOTOR COACH INDUSTRIES, INC., a Delaware corporation; MICHELANGELO LEASING INC. d/b/a RYAN'S EXPRESS, an Arizona corporation; EDWARD HUBBARD, a Nevada resident; BELL SPORTS, INC. d/b/a GIRO SPORT DESIGN, a California corporation; SEVENPLUS BICYCLES, INC. d/b/a Pro Cyclery, a Nevada corporation; DOES 1 through 20; and ROE CORPORATIONS 1 through 20.

Defendants.

Case No. A-17-755977-C

Dept. No. XIV

APPENDIX OF EXHIBITS TO PLAINTIFFS' JOINT OPPOSITION TO MCI MOTION FOR SUMMARY JUDGMENT ON ALL CLAIMS ALLEGING A PRODUCT DEFECT AND TO MCI MOTION FOR SUMMARY JUDGMENT ON PUNITIVE DAMAGES

Plaintiffs by and through their attorneys of record, hereby submit this Appendix of Exhibits to Plaintiffs' Joint Opposition to MCI Motion for Summary Judgment On All Claims Alleging A

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Product Defect and to MCI Motion for Summary Judgment on Punitive Damages.

EXHIBIT NO.	DOCUMENT
1	Excerpts from Deposition Transcript of Bryan Couch
2	September 27, 2016, Autocar First For Car News and Reviews, 2017 Volvo buses to gain pedestrian and cyclist and cyclist detection tech, Collission detection systems could save lives in densely populated areas
3	NHTSA Traffic Safety Facts
4	Kato, Aerodynamic Effects to a Bicycle Caused by a Passing Vehicle, SAE (1981)
5	K.R. Cooper, The Effect of Front-Edge Rounding and Rear-Edge Shaping on the Aerodynamic Drag of Bluff Vehicles in Ground Proximity
6	K.R. Cooper, Wind Tunnel Investigation of the Aerodynamic Characteristics of Buses, August 1993
7	November 16, 2017 Teslarati entitled Tesla Semi Unveiled: 500+ mile range, Buggati-beating aero, 2019 production
8	Excerpts from the Deposition Transcript of Brad Lamothe
9	Excerpts from the Deposition Transcript of Pablo Fierros
10	Excerpts from the Deposition Transcript of David Dorr
11	Excerpts from the Deposition Transcript of Christopher Groepler
12	Excerpts from the Deposition Transcript of William Bartlett
13	Excerpts from the Deposition Transcript of Edward Hubbard
14	Excerpts from the Deposition Transcript of Erika Bradley
15	Excerpt from the Deposition Transcript of Robert Rucoba
16	Robert E. Breidenthal Report October 24, 2017
17	Supplemental Report of Expert Alexander W. LaRiviere
18	Excerpt from the Deposition Transcript of Michael Carhart, Ph.D.
19	Excerpts from the Deposition of David Krauss, Ph.D.
20	Excerpts from the Deposition of Virgil Hoogestraat
21	Excerpts from the Deposition Transcript of Mary Witherell
22	Model Overview: 2008 Volvo S80 - Volvo Car USA Newsroom, June 4, 2007 Press Release
23	Fanping Bu, Pedestrian Detection in Transit Bus Application: Sensing Technologies and Safety Solutions
24	Today's Trucking, September 2, 2005 Edition

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25	Voyager Ad, September 15, 2007
26	Excerpts from the Deposition of Brad Ellis
27	Excerpts from the Deposition of Mark B. Barron
28	S-1 Gard Dangerzone Deflector Product Information
29	Expert Witness Repot of Robert J. Cunitz, Ph.D. CHFP, October 5, 2017

DATED this 21st day of December, 2017.

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CERTIFICATE OF SERVICE

I hereby certify that on the 21st day of December, 2017, the foregoing APPENDIX OF EXHIBITS TO PLAINTIFFS' JOINT OPPOSITION TO MCI MOTION FOR SUMMARY JUDGMENT ON ALL CLAIMS ALLEGING A PRODUCT DEFECT AND TO MCI MOTION FOR SUMMARY JUDGMENT ON PUNITIVE DAMAGES was served on all parties currently on the electronic service list via the Court's electronic filing system only, pursuant to the Nevada Electronic Filing and Conversion Rules, Administrative Order 14-2.

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EXHIBIT 1

DISTRICT COURT

CLARK COUNTY, NEVADA

KEON KHIABANI and ARIA KHIABANI, minors by and through their natural mother, KATAYOUN BARIN; KATAYOUN BARIN, individually; KATAYOUN BARIN as Executrix of the Estate of Kayvan Khiabani M.D. (Decedent), and the Estate of Kayvan Khiabani, M.D.(Decedent),

Plaintiffs,

vs.

MOTOR COACH INDUSTRIES, INC. A Delaware corporation; MICHELANGELO LEASING INC. D/b/a RYAN'S EXPRESS, an Arizona corporation; EDWARD HUBBARD, a Nevada resident; BELL SPORTS, INC. D/b/a GIRO SPORT DESIGN, a California corporation; SEVENPLUS BICYCLES, INC. D/b/a Pro Cyclery, a Nevada corporation; DOES 1 through 20; and ROE CORPORATIONS 1 through 20.

Defendants.

CASE NO.: A-17-755977-C

VIDEOTAPED DEPOSITION OF BRYAN COUCH
LAS VEGAS, NEVADA
THURSDAY, OCTOBER 12, 2017

REPORTED BY: KAREN L. JONES, CCR NO. 694
JOB NO.: 425415

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Q. **Okay. How about the driver seats?**

A. What about them?

Q. **Were seat belts standard equipment in the driver seats prior to 2005?**

A. I believe so, yes.

Q. **So the driver had a seat belt as a standard piece of safety equipment, but the passengers did not; is that correct?**

A. Seat belts were in for the driver long before they were for the passengers.

Q. **And what's the rationale for that?**

A. I believe it's to keep the driver in his seat so he can maneuver, in the event of -- he has to make an evasive maneuver.

Q. **Okay. But what is the rationale for keeping the driver in the seat with a standard seat belt but not keeping the passengers in their seat with a standard seat belt?**

MR. RUSSELL: Objection; foundation.

THE WITNESS: The seating in a -- in a vehicle -- in a bus provides some compartmentalization. So the passengers --

BY MR. KEMP:

Q. **Okay. Let's go back to airbags.**

Are airbags a standard safety feature

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A. I don't recall.

Q. And same question for the J Series: Was there an overall FMEA?

A. Again, I don't recall if there was.

Q. But you recall that there was some FMEA on the E Series for what you referred to as high-risk systems; is that right?

A. Right.

Q. And would the same be true for the J Series?

A. Yes.

Q. And what would the high-risk systems be?

A. I don't -- so the -- probably the electrical system.

Q. Anything else?

A. Steering. Brakes.

Q. Do you have an understanding that a rectangular object moving through air will displace air?

A. A rectangular object will, yeah.

Q. Okay. And what do you call that?

A. What do I call what, sir?

Q. The air displacement.

Let's make it a little more specific.

Do you have an understanding that if a

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bus is moving, say, 25 miles an hour, it will displace -- the front of the bus will displace air?
A. A coach will displace air, yeah.
Q. And what do you call that?
A. It would be part of drag.
Q. Okay. Have you heard the term "side force"?
A. No.
Q. Okay. Ever heard the term "air blast"?
A. No.
Q. Okay. But what you would call it would be "drag"?
A. Right.
Q. Okay. Are there different ways to minimize the amount of air that a coach will displace when it's moving?
A. This isn't my area of expertise, so ...
Q. Okay. Was there an aerodynamic engineer involved in the development of the E Series?
A. There were engineers that would be looking at that.
Q. Okay. And who were they?
A. I don't recall.
Q. Okay. And when you said there were engineers that were looking at that, how do you

wind tunnel, right?

MR. RUSSELL: Objection; foundation.

THE WITNESS: Or there would be some type of simulation that could be done or -- on a scale model.

BY MR. KEMP:

Q. Or a computer simulation?

A. Yeah.

Q. Do you know if computer simulations were done?

A. I don't.

Q. And more specifically, do you know if computer simulations for drag coefficiency with regards to the E Series were done?

A. I don't.

Q. Who do you think would be the person who would know the most about that?

A. I don't know right now.

Q. Mr. Bittner maybe?

A. I don't know. He's been out of that -- he doesn't work at MCI anymore, and he --

Q. Where -- where does he work at now?

A. I'm not sure.

Q. Now, you said that the two reasons that you attempted to improve the drag coefficiency were

fuel and dust, right?

A. Yeah, uh-huh.

Q. Was one of the reasons to attempt to reduce air displacement that a bystander or bicycle would see?

A. Well, that would be the effect.

Q. Okay. Was that a safety concern?

MR. RUSSELL: Objection; foundation.

THE WITNESS: I don't know.

BY MR. KEMP:

Q. Okay. In other words, was there any sort of concern that if you had a higher amount of air displacement, it would potentially cause a bicyclist to wobble or pedestrians to, you know, be disrupted in some way?

MR. RUSSELL: Same objection.

THE WITNESS: Not to my knowledge. We -- I mean, the drivers, there's -- you have to be a licensed professional driver to drive our vehicles, and they're trained in obstacles on the road and how to drive.

BY MR. KEMP:

Q. So you think a licensed professional driver -- would be a CDL license; is that right?

A. Correct.

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MR. RUSSELL: Objection; foundation. Speculation. Incomplete hypothetical.

THE WITNESS: Again, it depends on how fast you're going and where the vehicle -- and how close the bicycle is to the vehicle.

BY MR. KEMP:

Q. So if you're going fast, like 55 miles an hour, and the bicycle's two feet away, in that event you would agree with me that air displacement and potential entrainment back into the side of the bus is a potential hazard, correct?

MR. RUSSELL: Same objections.

THE WITNESS: Again, it depends on the direction of the wind at the time and if the bicyclist -- how good a bike rider he is. It may not affect the bicycle at all.

BY MR. KEMP:

Q. I said potential hazard, not an actual hazard.

MR. RUSSELL: It's not a question.

BY MR. KEMP:

Q. Let's try one more time.

Assuming a bus was going 55 miles an hour, the bicyclist is within two feet, would you agree with me that air displacement and entrainment

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back into the side of the bus is a potential hazard to the bike rider?

MR. RUSSELL: Same objections.

THE WITNESS: No, I can't agree with that.

BY MR. KEMP:

Q. **Why not?**

A. Well, the air blast would push the bicyclist away from the vehicle.

Q. **So you think that if a bus is traveling 55 miles an hour and a bicyclist is within two feet, that the air blast will simply push the bicyclist away as opposed to making the bike wobble; is that correct?**

MR. RUSSELL: Objection; foundation. Speculation. Assumes facts not in evidence.

THE WITNESS: Again, I don't know. I'm not an expert in this, and so --

BY MR. KEMP:

Q. **I'm just asking what you think as a commercial CDL holder.**

A. And again, it's -- I don't know.

Q. **But you just told me like ten minutes ago that CDL drivers were trained to --**

A. To make sure that situation doesn't

occur and that the bus stays away from the bicyclist.

Q. All right. You said that the air blast will make the bicyclist and the bus move away. Can you tell me what mechanism you think that will occur by?

MR. RUSSELL: Objection; incomplete hypothetical. Speculation. Foundation.

THE WITNESS: It would be the air coming from the front of the bus.

BY MR. KEMP:

Q. So you think the air is going to just move the bicyclist and the bicycle away from the bus?

A. That's -- would be my -- with your situation that you're putting forth here, that's what I would say would happen. It's not pertinent to this situation, though. But in your case that you're providing.

Q. Okay. And how do you know -- well, tell me the facts, as you understand, of, quote, "this situation" is, unquote, as you're referencing?

A. Well, it's my understanding this was at low speed and the bicyclist was in his own separate bike lane, a ways from the side of the vehicle.

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A. What I said was we tried to find a proximity sensor to use as a backup sensor in that time frame, and as I recall, the testing that we did from the suppliers that were available to us in North America, we couldn't find one that was reliable enough, that met our test criteria.

Q. Okay. But Mercedes apparently found in 2005, the year before, a proximity sensor that at least Mercedes considered reliable enough to use in its buses, right?

A. In Europe.

Q. So proximity sensors work good in Europe but they don't work good in the United States; is that what you're telling me?

MR. RUSSELL: Objection; foundation.

THE WITNESS: I don't know that the supplier of this would work in North America because of our temperature extremes. It's a big challenge for a lot of European vehicles to work properly in North America because of our extreme climates that we have here.

BY MR. KEMP:

Q. You don't think Europe, which has Sweden and Finland, cold, and Italy, where you're going, relatively warm, you don't think they have extreme

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BY MR. KEMP:

Q. Right.

A. It would have been -- I believe in 2007 MCI did sell the most coaches of any North American bus manufacturer. Not in the world.

Q. Is there a reason why the largest coach manufacturer in North America could not develop its own proximity sensor, as opposed to waiting for someone like Bendix to sell it off-the-shelf parts?

MR. RUSSELL: Objection; foundation. Speculation. Incomplete hypothetical.

THE WITNESS: MCI does not make or design the electronic components. That's not our expertise. MCI's expertise is integrating products from other companies, and so that's not -- MCI does not have that expertise.

BY MR. KEMP:

Q. Okay. So safety features like proximity sensors, MCI doesn't use them until they're available from other companies, even if theoretically they could do it themselves?

MR. RUSSELL: Same objections. Predicate.

THE WITNESS: Proximity sensors are assists, assistants, they assist the driver.

in -- in engineering. And it's one of the things that, as I said before, that we've given -- MCI's given consideration to, is the visibility of the driver.

BY MR. KEMP:

Q. Okay. Why don't we talk about it not being your job for a minute.

MR. KEMP: Could you get that marked first.

(Exhibit 8 marked.)

BY MR. KEMP:

Q. So here's an organizational chart from September 2009 that we've marked as Exhibit 8.

And who is that at the top?

A. Myself.

Q. And what's your title?

A. VP of design engineering and product planning.

Q. Okay. And that was your title in September 2009?

A. That's what that says, yeah. I don't recall exactly.

Q. Okay. So you were the head person on design engineering at this point in time, right?

MR. RUSSELL: Objection; predicate.

that correct?

MR. RUSSELL: Objection; predicate.

THE WITNESS: We always are looking at mirrors and making sure that the drivers has the proper visibility of the vehicle.

BY MR. KEMP:

Q. Let's do it this way. From the time period 2000 to 2009, can you tell me about any one single thing you did to eliminate, reduce or mitigate right-side blind spot problems?

A. As I said, we didn't have a blind spot problem.

Q. So there was nothing you did during that time frame to eliminate, reduce or mitigate blind spots because you had no blind-spot problem?

MR. RUSSELL: Objection; predicate.

THE WITNESS: We -- MCI J Coach does not have a blind-spot problem.

BY MR. KEMP:

Q. So you as the head of design engineering didn't do anything to eliminate, reduce or mitigate the problem because you didn't think there was a problem; is that correct?

MR. RUSSELL: Same objection.

THE WITNESS: Again, as I said, we did

not have -- the J Coach does not have a blind-spot problem.

BY MR. KEMP:

Q. Can you tell me anything you did during the time period 2000 to 2009 to eliminate, reduce or mitigate right-side blind-spot problems on the J4500? Right-side blind spot problems, if any, on the J4500.

MR. RUSSELL: Objection; predicate.

THE WITNESS: Like I said, we didn't have any. We always look at mirrors, to make sure our mirrors are optimized as best they can be. But I don't recall whether there was anything specific done.

The only thing I recall is that the -- that there wasn't the problem, and --

BY MR. KEMP:

Q. Okay. I don't want to argue with you about whether it was a problem or not. I want to know what, if anything, was done that would eliminate a potential right-side blind spot problem on the J4500 from 2000 to 2009. Can you identify any specific action taken?

MR. RUSSELL: Objection; asked and answered.

you recall that discussion?

A. Yep.

Q. Does MCI have sufficient expertise to put on a mechanical object like an S-1 deflector or something comparable of its own design?

MR. RUSSELL: Objection; foundation. Speculation.

THE WITNESS: MCI has the expertise to build structural components.

BY MR. KEMP:

Q. And did MCI, to your knowledge, give any consideration to building a structural component that would act as a deflector for the rear tires?

MR. RUSSELL: Same objections.

THE WITNESS: To my knowledge, we did not look at something like that.

BY MR. KEMP:

Q. Do you think that's something that should at least be explored?

MR. RUSSELL: Same objections.

THE WITNESS: As I said, a coach is not operated in the same environment or have the same -- it's not built the same as a transit. We don't have a rear door. We don't have people coming in and out every 20 minutes. And quite frankly, although this

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new features that come out, and so we will review it. I'm not sure that we'll do it, but MCI will, I'm sure, look at it.

BY MR. KEMP:

Q. And you think that's an appropriate thing to do from a design engineering point of view?

MR. RUSSELL: Same objections.

THE WITNESS: I don't know.

BY MR. KEMP:

Q. Well, why would they look at it then, if it's not an appropriate thing to do from a design engineering point of view?

A. We will look at it because it's come up in this lawsuit.

Q. And by "it" we're talking about potentially designing a deflector similar to the S-1 Gard? That's "it"?

A. I think what MCI will do is we'll review the S-1 Gard to see if it's a feature that should be offered or not.

Q. Or something similar to an S-1 Gard, right?

A. I don't know.

Q. Okay. I mean, if there's a concern that the S-1 Gard hangs too low -- which is what I think

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EXHIBIT 2

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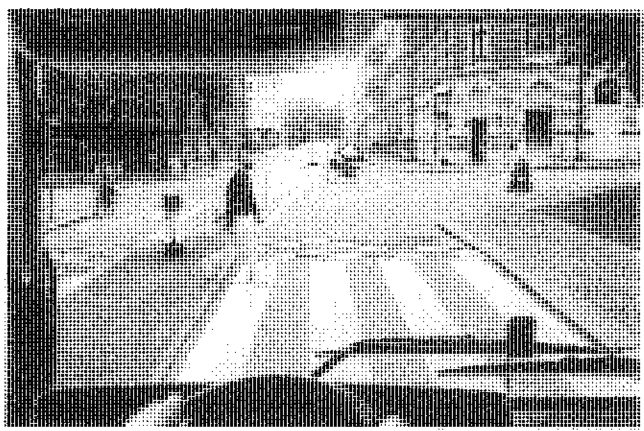
2017 Volvo buses to gain pedestrian and cyclist detection tech

Collision detection systems could save lives in densely populated areas



by **Sam Sheehan**
27 September 2016

Volvo has developed an advanced driver assist programme for its bus models that can detect and help prevent collisions with pedestrians and cyclists.

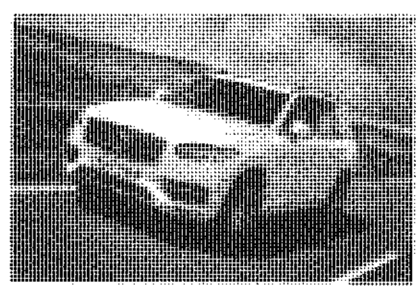
The system, which uses a camera mounted on the vehicle's exterior, will be rolled out from the start of next year on European buses. The camera processes images through complex algorithms to detect potential hazards, with its primary focus being to spot pedestrians and cyclists who could come into contact with the bus.

To alert the driver of a hazard or potential impact, lights and sound signals are projected in the cabin. If an impact is imminent, the pedestrian or cyclist is also warned with the automatic sounding of the bus's horn.

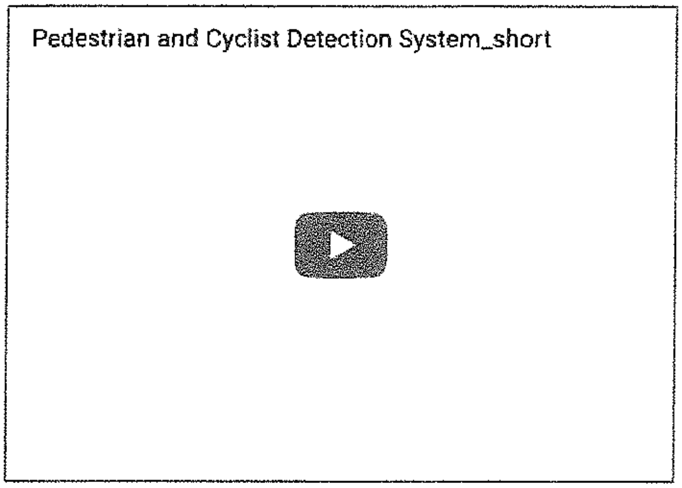
Volvo says the technology uses existing hardware that was developed for its cars. It

OUR VERDICT

Volvo XC90



"Accidents involving buses and unprotected road users seldom occur, but when they do the consequences may be very serious," explained Peter Danielsson, director of vehicle features and safety at Volvo Buses. "In order to minimise the risks, it is important that drivers and anyone moving around near buses – such as at bus stops and pedestrian crossings – pays close attention to the traffic. In this context the Pedestrian and Cyclist Detection System offers excellent support."



Volvo has also developed a minimum noise system for its electric drive busses. The zero emissions buses, which will be used in European cities such as Sweden's Gothenburg from next year, are significantly quieter than diesel equivalents and therefore far easier to go undetected by pedestrians.

"We've solved this problem by developing a synthetic background sound with a frequency range that is not perceived as disruptive," explained Danielsson. "It does not penetrate windows with triple glazing, unlike the low-frequency noise made by a diesel engine."

Volvo said that the system is particularly useful at speeds below 31mph, when road noise is low and so electric buses can make near-silent progress.

Volvo is investing heavily in the development of safety and autonomous technology. It recently demonstrated the first fully autonomous mining lorry in a mine 1300 metres below the surface of Sweden.

It has also pledged to that nobody will be killed in a new Volvo car from the year 2020.

Promoted stories

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Comments 3

Saucerer

"It has also pledged to that

27 September 2016

"It has also pledged to that nobody will be killed in a new Volvo car from the year 2020". Volvo cars is a separate company to the Volvo that makes trucks and buses but assume this pledge applies to both firms.

Cé hé sin

Volvo trucks, cars and buses

27 September 2016

It may become even more complicated because Volvo (the original Volvo) is looking for bids for its bus/coach and construction equipment divisions so soon there may be four different Volvos!

xxxx

helpful but

27 September 2016

" If an impact is imminent, the pedestrian or cyclist is also warned with the automatic sounding of the bus's horn." thus shifting any blame from the bus. It'll be annoying at night with all those false alarms horns going off in Urban land. Still at least Volvo are trying something

002201

EXHIBIT 3

Traffic Safety Facts

2015 Data

March 2017 DOT HS 812 382

NHTSA

Bicyclists and Other Cyclists

Key Findings

- There were 818 pedalcyclist deaths in 2015, which accounted for 2.3 percent of all traffic fatalities during the year.
- Seventy percent of pedalcyclists who died in motor vehicle crashes in 2015 died in crashes in urban areas.
- Over the 10-year period from 2006 to 2015, the average age of pedalcyclists killed in motor vehicle crashes increased from 41 to 45.
- The pedalcyclist fatality rate per million people was almost 6 times higer for males than females in 2015.
- Alcohol involvement – either for the motor vehicle operator or for the pedalcyclist – was reported in 37 percent of all fatal pedalcyclist crashes in 2015.
- More than 27 percent of the pedalcyclists who died in 2015 had blood alcohol concentrations (BACs) of .01 g/dL or greater.

Pedalcyclists, as defined for this fact sheet, are bicyclists and other cyclists including riders of two-wheel, nonmotorized vehicles, tricycles, and unicycles powered solely by pedals. A traffic crash is defined as an incident that involved one or more motor vehicles where at least one vehicle was in transport and the crash originated on a public trafficway such as a road or highway. Crashes that occurred on private property, including parking lots and driveways, are excluded. Pedalcyclist crashes in this fact sheet exclude bicycle crashes that do not involve motor vehicles.

In this fact sheet, the 2015 pedalcyclist information is presented as follows.

- Overview
- Environmental Characteristics
- Time of Day and Day of Week
- Age and Gender
- Alcohol Involvement
- Vehicle Type and Impact Point
- Fatalities by State
- Fatalities by City
- Important Safety Reminders

This fact sheet contains information on fatal motor vehicle crashes and fatalities based on data from the Fatality Analysis Reporting System (FARS). FARS is a census of fatal crashes in the 50 States, the District of Columbia, and Puerto Rico (Puerto Rico is not included in U.S. totals). Crash and injury statistics are based on data from the National Automotive Sampling System (NASS) General Estimates System (GES). The NASS GES is a probability-based sample of police-reported crashes from 60 locations across the country, from which estimates of national totals for injury and property-damage-only crashes are derived.

Overview

In 2015 there were 818 pedalcyclists killed in motor vehicle traffic crashes in the United States, an increase from 729 in 2014. An additional estimated 45,000 pedalcyclists were injured in crashes in 2015, which was not a significant change from the previous year. Pedalcyclist deaths accounted for 2.3 percent of all motor vehicle traffic fatalities (Tables 1 and 2), and made up 1.8 percent of the people injured in traffic crashes during the year.

The number of pedalcyclists killed in 2015 is 12.2 percent higer than the 729 pedalcyclists killed in 2014, while there were 10 percent fewer pedalcyclists injured than the estimated 50,000 injured in 2014.

U.S. Department of Transportation
National Highway Traffic Safety Administration
1200 New Jersey Avenue SE.
Washington, DC 20590

Table 1
Total Fatalities and Pedalcyclist Fatalities in Traffic Crashes, 2006–2015

Year	Total Fatalities	Pedalcyclist Fatalities	Percentage of Total Fatalities
2006	42,708	772	1.8%
2007	41,259	701	1.7%
2008	37,423	718	1.9%
2009	33,883	628	1.9%
2010	32,999	623	1.9%
2011	32,479	682	2.1%
2012	33,782	734	2.2%
2013	32,893	749	2.3%
2014	32,744	729	2.2%
2015	35,092	818	2.3%

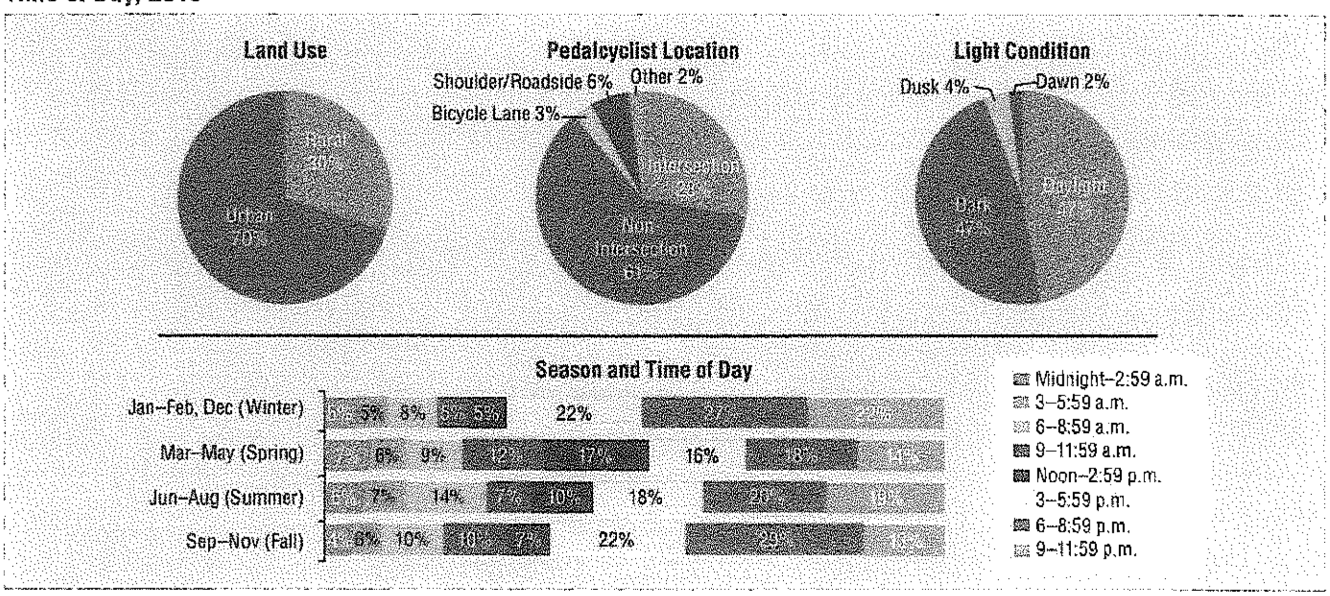
Source: Fatality Analysis Reporting System (FARS) 2006–2014 Final File, 2015 Annual Report File (ARF).

Environmental Characteristics

Figure 1 shows information about the settings surrounding pedalcyclist fatalities in 2015—land use, pedalcyclist location, light condition, and time of day and season.

- The majority of pedalcyclist fatalities occurred in urban areas (70%) as opposed to rural areas (30%).
- Most pedalcyclist fatalities occurred at non-intersections (61%); 3 percent occurred in bicycle lanes.
- Equal percentages (47%) of pedalcyclist fatalities occurred in daylight crashes as during dark. Four percent of the fatalities occurred during dusk, and the remaining 2 percent during dawn light conditions.
- Time of day is divided into eight 3-hour intervals starting at midnight, and season is defined by months.
- Regardless of season, the 6 p.m. to 8:59 p.m time period had the highest percentage (compared to all other 3-hour periods) of pedalcyclist fatalities: 27 percent in winter, 18 percent in spring, 20 percent in summer, and 29 percent in fall.
- The surrounding time periods (3 p.m. to 5:59 p.m and 9 p.m. to 11:59 p.m.) had the second and third highest percentages of the 3-hour time periods each season. In winter these two time intervals contained the same percentage of fatalities (22%); in spring, the afternoon (16%) was slightly higher than the late evening (14%); in summer, late evening was slightly higher (19%) than the afternoon (18%); and in the fall, the afternoon was higher (22%) than late evening (13%).

Figure 1
Percentage of Pedalcyclist Fatalities in Relation to Land Use, Pedalcyclist Location, Light Condition, and Season and Time of Day, 2015



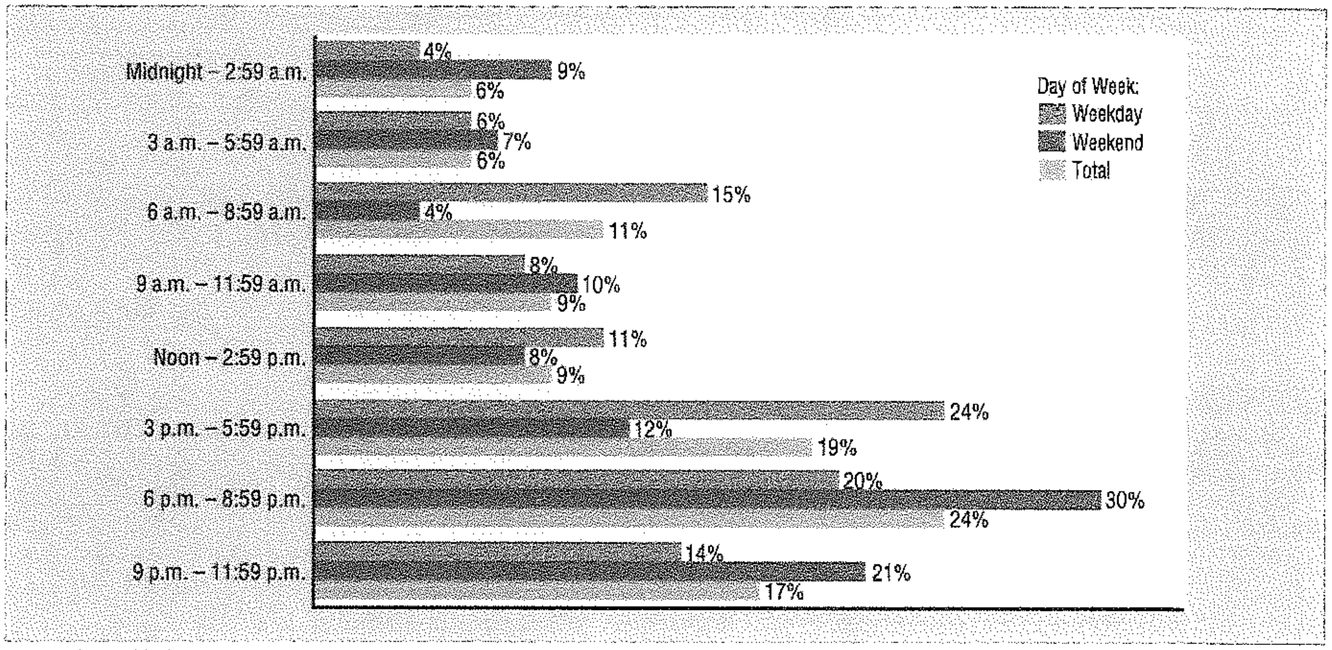
Source: FARS 2015 ARF. Note: Percentage of unknown values are not displayed. Segments may not total 100% due to rounding.

Time of Day and Day of Week

In Figure 2, time of day is divided into eight 3-hour time intervals starting at midnight, and day of week is defined as weekday (6 a.m. Monday to 5:59 p.m. Friday) and weekend (6 p.m. Friday to 5:59 a.m. Monday). To summarize this information concerning 2015 pedalcyclist fatalities:

- During weekdays, the time period with the highest frequency of pedalcyclist fatalities was from 3 p.m. to 5:59 p.m. (24%), compared to weekends during which 6 p.m. to 8:59 p.m. had the most frequent occurrence of pedalcyclist fatalities (30%).
- On the weekdays, 15 percent of pedalcyclist fatalities occurred between 6 a.m. and 8:59 a.m. On weekends, 4 percent of pedalcyclist fatalities occurred during this time.
- The time period with the largest frequency of pedalcyclist fatalities overall was 6 p.m. to 8:59 p.m. (24%) followed by 3 p.m. to 5:59 p.m. (19%).

Figure 2
Percentage of Pedalcyclist Fatalities, by Time of Day and Day of Week, 2015



Source: FARS 2015 ARF.

Age and Gender

In 2015, the average age of pedalcyclists killed in traffic crashes was 45. Over the past 10 years, the average age of pedalcyclists both killed and injured in motor vehicle crashes has steadily increased. The average age of pedalcyclists killed has increased from 41 in 2006 to 45 in 2015. The average age of pedalcyclists injured has increased from 30 in 2006 to 35 in 2015.

The majority of pedalcyclists killed (85%) or injured (80%) in 2015 were males. The largest number of both male (92) and female (16) fatalities were 55 to 59 years old. The largest number of males injured (4,000) occurred in the 10-to-14, 15-to-19, and 25-to-29 year age groups. For females, the largest number of pedalcyclists injured (2,000) was in the 20-to-24 age group.

In 2015 the population-based pedalcyclist fatality rate was almost 6 times higher for males than for females, and the injury rate was more than 4 times higher for males (see Table 2). Pedalcyclists 55 to 59 years old had the highest fatality rate (4.95 per million people) based on population. The rate for this age group for males, 8.68 per million males, was also the highest. For females, the age group 65-to-69 had the highest rate, 1.53 per million females. The highest injury rate (256 per million people) occurred in the 15-to-19 age group. This age group also had highest rate for males (513). Females age 20-to-24 had the highest pedalcyclist injury rate, 173.

Children 14 and younger accounted for 5 percent of all pedalcyclists killed and 12 percent of those injured in traffic crashes in 2015. Table 2 groups pedalcyclist killed and injured in 2015 according to their age and gender, and presents population based fatality and injury rates as well.

Table 2

Pedalcyclists Killed/Injured in Traffic Crashes and Fatality/Injury Rates, by Age and Gender, 2015

Age (Years)	Male			Female			Total		
	Killed	Population (thousands)	Fatality Rate*	Killed	Population (thousands)	Fatality Rate*	Killed	Population (thousands)	Fatality Rate*
<5	6	10,178	0.59	0	9,730	0.00	6	19,907	0.30
5–9	8	10,459	0.76	2	10,028	0.20	10	20,487	0.49
10–14	23	10,520	2.19	5	10,102	0.49	28	20,622	1.36
Children (≤14)	37	31,157	1.19	7	29,860	0.23	44	61,016	0.72
15–19	43	10,798	3.98	4	10,311	0.39	47	21,109	2.23
20–24	39	11,668	3.34	12	11,071	1.08	51	22,739	2.24
25–29	38	11,409	3.33	7	11,052	0.63	45	22,462	2.00
30–34	41	10,890	3.77	11	10,786	1.02	52	21,676	2.40
35–39	38	10,173	3.74	6	10,201	0.59	44	20,375	2.16
40–44	53	10,030	5.28	10	10,185	0.98	63	20,215	3.12
45–49	71	10,335	6.87	8	10,519	0.76	79	20,854	3.79
50–54	87	10,964	7.94	12	11,370	1.06	99	22,334	4.43
55–59	92	10,598	8.68	16	11,210	1.43	108	21,808	4.95
60–64	69	9,117	7.57	9	9,953	0.90	78	19,070	4.09
65–69	37	7,596	4.87	13	8,471	1.53	50	16,067	3.11
70–74	22	5,296	4.15	4	6,187	0.65	26	11,483	2.26
75–79	14	3,611	3.88	0	4,513	0.00	14	8,124	1.72
80+	11	4,587	2.40	1	7,500	0.13	12	12,087	0.99
People ≥65	84	21,090	3.98	18	26,671	0.67	102	47,761	2.14
Total†	**697**	**158,229**	**4.40**	**120**	**163,190**	**0.74**	**817**	**321,419**	**2.54**

Age (Years)	Male			Female			Total		
	Injured	Population (thousands)	Injury Rate*	Injured	Population (thousands)	Injury Rate*	Injured	Population (thousands)	Injury Rate*
<5	**	10,178	**	**	9,730	**	**	19,907	**
5–9	1,000	10,459	102	**	10,028	**	1,000	20,487	57
10–14	4,000	10,520	363	**	10,102	**	4,000	20,622	201
Children (≤14)	5000	31,157	160	**	29,860	**	5000	61,016	82
15–19	4,000	10,798	413	1,000	10,311	92	5,000	21,109	256
20–24	3,000	11,668	258	2,000	11,071	173	5,000	22,739	217
25–29	4,000	11,409	354	1,000	11,052	63	5,000	22,462	211
30–34	2,000	10,890	145	1,000	10,786	123	3,000	21,676	134
35–39	3,000	10,173	311	**	10,201	**	3,000	20,375	171
40–44	2,000	10,030	227	**	10,185	**	3,000	20,215	136
45–49	3,000	10,335	300	1,000	10,519	50	4,000	20,854	174
50–54	3,000	10,964	254	1,000	11,370	51	3,000	22,334	151
55–59	3,000	10,598	274	1,000	11,210	53	3,000	21,808	160
60–64	2,000	9,117	233	**	9,953	**	2,000	19,070	131
65–69	1,000	7,596	111	**	8,471	**	1,000	16,067	74
70–74	1,000	5,296	101	**	6,187	**	1,000	11,483	56
75–79	**	3,611	**	**	4,513	**	**	8,124	**
80+	**	4,587	**	**	7,500	**	**	12,087	**
People ≥65	2000	21,090	95	**	26,671	**	2000	47,761	42
Total	**36,000**	**158,229**	**229**	**9,000**	**163,190**	**54**	**45,000**	**321,419**	**140**

Sources: 2015 ARF. NASS GES 2015. Bureau of the Census population projections.
*Rate per *million* population. Population estimates from Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2015; Source: U.S. Census Bureau, Population Division; Release Date: June 2016. Retrieved from http://factfinder2.census.gov/bkmk/table/1.0/en/PEP/2015/PEPSR5H.
**Less than 500 injured; injury rate not shown. †One pedalcyclist of unknown gender is not included.
Note: Injured totals may not equal sum of components due to independent rounding.

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Alcohol Involvement

Alcohol involvement (BAC of .01 g/dL or higher) – either for a motor vehicle driver involved in a fatal pedalcyclist crash and/or the fatally injured pedalcyclist – was reported in 37 percent of the traffic crashes that resulted in pedalcyclist fatalities in 2015 as shown in Table 3. (Note Table 3 contains data about the number and percentages of crashes rather than the number and percentages of fatalities as in Table 4.) In 31 percent of the crashes, either the driver or the pedalcyclist (or both) was reported to have a BAC of .08 g/dL or higher.

Table 3
Alcohol Involvement of Drivers and Pedalcyclists in Crashes Resulting in Pedalcyclist Fatalities, 2015

	Driver, BAC=.00		Driver, BAC=.01–.07		Driver, BAC=.08+		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Pedalcyclist, BAC=.00	511	63%	21	3%	70	9%	601	74%
Pedalcyclist, BAC=.01–.07	27	3%	2	0%	6	1%	35	4%
Pedalcyclist, BAC=.08+	145	18%	8	1%	24	3%	177	22%
Total	683	84%	30	4%	100	12%	813	100%

Source: FARS 2015 ARF.
Note: The alcohol levels in this table were determined using the alcohol levels of pedalcyclists killed and the involved drivers (killed or surviving).

More than one-fourth (27%) of the pedalcyclists killed in 2015 had BACs of .01 g/dL or higher, and more than one-fifth (22%) had BACs of .08 g/dL or higher. These percentages are markedly lower than 10 years ago when 34 percent of pedalcyclists killed had BACs of .01 g/dL or higher and 28 percent had BACs of .08 g/dL or higher.

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As shown in Table 4, in 2006 the age groups with the highest alcohol involvement – at both .01+ g/dL and .08+ g/dL – were the 21-to-24 and 45-to-54 age groups; the 25-to-34 and 35-to-44 age groups both also had a large percent at .01+. In 2015 the percentage of those with any level of alcohol involvement were generally lower than in 2006. Those in the 25-to-34 and 45-to-54 age groups had highest percentage of fatally injured pedalcyclists at both the .01+ and .08+ BAC levels in 2015. 002206

Table 4
Alcohol Involvement of Pedalcyclists Killed in Traffic Crashes, by Age, 2006 and 2015

Age Group (Years)	2006					2015				
	Number of Fatalities	Percentage With BAC=.00	Percentage With BAC=.01–.07	Percentage With BAC=.08+	Percentage With BAC=.01+	Number of Fatalities	Percentage With BAC=.00	Percentage With BAC=.01–.07	Percentage With BAC=.08+	Percentage With BAC=.01+
16–20	55	80%	7%	13%	20%	51	91%	2%	7%	9%
21–24	33	58%	2%	40%	42%	41	69%	5%	26%	31%
25–34	93	58%	7%	35%	42%	97	64%	7%	29%	36%
35–44	119	58%	9%	33%	42%	107	72%	6%	22%	28%
45–54	163	57%	3%	40%	43%	178	65%	3%	32%	35%
55–64	102	72%	9%	20%	28%	186	72%	6%	22%	28%
65–74	50	90%	2%	8%	10%	76	85%	3%	12%	15%
75–84	32	84%	14%	2%	16%	21	96%	0%	4%	4%
85+	9	98%	1%	1%	2%	5	98%	2%	0%	2%
Total*	656	66%	6%	28%	34%	762	73%	5%	23%	27%

Source: FARS 2006 Final File, 2015 ARF.
*Excluding pedalcyclists under 16 years old and pedalcyclists of unknown age.

Vehicle Type and Impact Point

Table 5 presents the number of pedalcyclists killed by vehicle type and initial point of impact of the vehicle when it contacted the pedalcyclist in single-vehicle crashes in 2015.

- Ninety-six percent (783) of the pedalcyclists killed were involved in single-vehicle crashes.
- Pedalcyclists were impacted by the front of the vehicle in 84 percent of the fatal crashes.
- Light trucks were the most frequently involved vehicle in motor vehicle crashes in which a pedalcyclist was killed. Forty-five percent (352 of the 783) of the pedalcyclists killed were struck by light trucks. In 86 percent (301) of these crashes, the pedalcyclist came in contact with the front of the light truck.
- Large trucks and buses showed a different pattern than passenger vehicles with respect to impact point. Fewer than one-half of the pedalcyclists killed were struck by the front of the large truck, and just over one-half were struck by the front of the bus, compared to over 85 percent for other vehicles.
- The right side of the large truck was the most fequent impact point, accounting for 21 percent of the fatalities, whereas for passenger vehicles this percentage was 6 percent or less. This could be due to the wide right turns required of a large truck.

Table 5

Pedalcyclists Killed in Single-Vehicle Crashes, by Vehicle Type Involved and Point of Impact, 2015

	Initial Point of Impact on Vehicle										
	Front		Right Side		Left Side		Rear		Other/Unknown		Total
Vehicle Type	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
Passenger Car	294	92.5%	14	4.4%	5	1.6%	–	–	5	1.6%	318
Light Trucks*	301	85.5%	22	6.3%	9	2.6%	10	2.8%	10	2.8%	352
SUV	*114*	*88.4%*	*7*	*5.4%*	*5*	*3.9%*	*1*	*0.8%*	*2*	*1.6%*	*129*
Pickup	*140*	*82.8%*	*10*	*5.9%*	*4*	*2.4%*	*7*	*4.1%*	*8*	*4.7%*	*169*
Van	*44*	*89.8%*	*3*	*6.1%*	–	–	*2*	*4.1%*	–	–	*49*
Other/Unknown Light Truck	*3*	*60.0%*	*2*	*40.0%*	–	–	–	–	–	–	*5*
Large Truck	25	47.2%	11	20.8%	4	7.5%	8	15.1%	5	9.4%	53
Bus	5	55.6%	1	11.1%	–	–	1	11.1%	2	22.2%	9
Other/ Unknown Vehicle	33	64.7%	–	–	–	–	–	–	18	35.3%	51
Total	658	84.0%	48	6.1%	18	2.3%	19	2.4%	40	5.1%	783

*Includes other/unknown light trucks.
Source: FARS 2015 ARF

Fatalities by State

Table 6 shows the population, total traffic fatalities, pedalcyclist fatalities, the percentage of total traffic fatalities that were pedalcyclist, and the population based pedalcyclist fatality rates fatalities by State for 2015. Among all States and the District of Columbia, fatalities in all motor vehicle traffic crashes in 2015 ranged from 3,516 (Texas) to 23 (District of Columbia), in part depending on size and population. Note in this section, as well as the following section on fatalities by city, that the populations of States and cities can vary greatly from the recorded resident population. States with substantial seasonal tourism, such as Florida, and cities with a large influx of daily commuters, such as Washington, DC, have at times a substantially larger population than is reflected in their numbers of residents. Puerto Rico is included in Table 6, but is not included in the overall U.S. total.

In 2015:

- The largest number of pedalcyclist fatalities occurred in Florida (150), followed by California (129). Every other State had 50 or fewer pedalcyclist fatalities.
- There were no pedalcyclist fatalities in Alaska, Idaho, Maine, Rhode Island, or Wyoming.
- The percentage of pedalcyclist fatalities among total fatalities in States ranged from a high of 7 percent (Vermont) to a low of 0.4 percent (Montana and West Virginia) for those States experiencing pedalcyclist fatalities, compared to the national percentage of 2.3 percent.
- The highest fatality rate per million population was in Florida (7.4 fatalities per million residents) followed by Louisiana (7.3 fatalities per million residents), compared to the national rate of 2.5. Of those States that experienced pedalcyclist fatalitities, West Virginia had the lowest fatality rate per million population (0.54) followed by Connecticuit (0.84).

Additional State/county-level data is available at NHTSA's State Traffic Safety Information website at https://cdan.nhtsa.gov/stsi.htm.

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Table 6

Motor Vehicle Traffic Crash Fatalities, Pedalcyclist Traffic Fatalities, and Fatality Rates, by State, 2015

State	Resident Population (thousands)	Total Traffic Fatalities	Pedalcyclist Fatalities	Percentage of Total Traffic Fatalities	Pedalcyclist Fatalities per Million Population
Alabama	4,859	849	9	1.1%	1.9
Alaska	738	65	0	0.0%	0.0
Arizona	6,828	893	29	3.2%	4.3
Arkansas	2,978	531	3	0.6%	1.0
California	39,145	3,176	129	4.1%	3.3
Colorado	5,457	546	13	2.4%	2.4
Connecticut	3,591	266	3	1.1%	0.8
Delaware	946	126	3	2.4%	3.2
Dist of Columbia	672	23	1	4.3%	1.5
Florida	20,271	2,939	150	5.1%	7.4
Georgia	10,215	1,430	23	1.6%	2.3
Hawaii	1,432	94	2	2.1%	1.4
Idaho	1,655	216	0	0.0%	0.0
Illinois	12,860	998	26	2.6%	2.0
Indiana	6,620	821	12	1.5%	1.8
Iowa	3,124	320	5	1.6%	1.6
Kansas	2,912	355	3	0.8%	1.0
Kentucky	4,425	761	7	0.9%	1.6
Louisiana	4,671	726	34	4.7%	7.3
Maine	1,329	156	0	0.0%	0.0
Maryland	6,006	513	11	2.1%	1.8
Massachusetts	6,794	306	9	2.9%	1.3
Michigan	9,923	963	33	3.4%	3.3
Minnesota	5,490	411	10	2.4%	1.8
Mississippi	2,992	677	5	0.7%	1.7
Missouri	6,084	869	9	1.0%	1.5
Montana	1,033	224	1	0.4%	1.0
Nebraska	1,896	246	4	1.6%	2.1
Nevada	2,891	325	10	3.1%	3.5
New Hampshire	1,331	114	3	2.6%	2.3
New Jersey	8,958	562	18	3.2%	2.0
New Mexico	2,085	298	7	2.3%	3.4
New York	19,796	1,121	36	3.2%	1.8
North Carolina	10,043	1,379	23	1.7%	2.3
North Dakota	757	131	1	0.8%	1.3
Ohio	11,613	1,110	25	2.3%	2.2
Oklahoma	3,911	643	6	0.9%	1.5
Oregon	4,029	447	8	1.8%	2.0
Pennsylvania	12,803	1,200	16	1.3%	1.3
Rhode Island	1,056	45	0	0.0%	0.0
South Carolina	4,896	977	16	1.6%	3.3
South Dakota	858	133	1	0.8%	1.2
Tennessee	6,600	958	10	1.0%	1.5
Texas	27,469	3,516	50	1.4%	1.8
Utah	2,996	276	5	1.8%	1.7
Vermont	626	57	4	7.0%	6.4
Virginia	8,383	753	15	2.0%	1.8
Washington	7,170	568	14	2.5%	2.0
West Virginia	1,844	268	1	0.4%	0.5
Wisconsin	5,771	566	15	2.7%	2.6
Wyoming	586	145	0	0.0%	0.0
U.S. Total	321,419	35,092	818	2.3%	2.5
Puerto Rico	3,474	309	11	3.6%	3.2

Source: FARS 2015 ARF. Population estimates from Estimates of the Total Resident Population and Resident Population Age 18 Years and Older for the United States, States, and Puerto Rico: July 1, 2015 (SCPRC-EST2015-18+POP-RES); Source: U.S. Census Bureau, Population Division; Release Date: December, 2015; Retrieved from www.census.gov/programs-surveys/popest.html.

Fatalities by City

For each U.S. city with a population of over 500,000, Table 7 shows the population, total traffic fatalities, pedalcyclist fatalities, the percentage of total traffic fatalities that were pedalcyclist, and the population based fatality rates for both all traffic fatalities and pedalcyclist fatalities in 2015. The large cities with the highest pedestrian fatality rates were Albuquerque (8.94 pedalcyclist fatalities per 1 million people) and Tucson (7.52 pedalcyclist fatalities per 1 million people). Of those major cities that had pedalcyclist fatalities, the cities with the lowest fatality rates were Dallas (0.77 pedalcyclist fatalities per 1 million people) and Indianapolis (1.17 pedalcyclist fatalities per 1 million people). Four major cities did not report any pedalcyclist fatalities in motor vehicle crashes in 2015 – Boston, El Paso, Nashville, and Oklahoma City.

Table 7

Population, Total Traffic Fatalities, Pedalcyclist Traffic Fatalities, and Fatality Rates in Cities With Populations of 500,000 Or Greater, 2015 (sorted by highest to lowest resident population)

City	Resident Population	Total Traffic Fatalities	Pedalcyclist Fatalities	Percentage of Total Traffic Fatalities	Fatality Rate per 1 million Population	
					Total	Pedalcyclist
New York, NY	8,550,405	241	13	5.4%	28.19	1.52
Los Angeles, CA	3,971,883	224	16	7.1%	56.40	4.03
Chicago, IL	2,720,546	121	7	5.8%	44.48	2.57
Houston, TX	2,296,224	211	5	2.4%	91.89	2.18
Philadelphia, PA	1,567,442	93	7	7.5%	59.33	4.47
Phoenix, AZ	1,563,025	193	8	4.1%	123.48	5.12
San Antonio, TX	1,469,845	155	4	2.6%	105.45	2.72
San Diego, CA	1,394,928	95	3	3.2%	68.10	2.15
Dallas, TX	1,300,092	174	1	0.6%	133.84	0.77
San Jose, CA	1,026,908	64	5	7.8%	62.32	4.87
Austin, TX	931,830	105	2	1.9%	112.68	2.15
Jacksonville, FL	868,031	125	3	2.4%	144.00	3.46
San Francisco, CA	864,816	38	4	10.5%	43.94	4.63
Indianapolis, IN	853,173	95	1	1.1%	111.35	1.17
Columbus, OH	850,106	57	4	7.0%	67.05	4.71
Fort Worth, TX	833,319	83	1	1.2%	99.60	1.20
Charlotte, NC	827,097	69	2	2.9%	83.42	2.42
Seattle, WA	684,451	26	1	3.8%	37.99	1.46
Denver, CO	682,545	51	2	3.9%	74.72	2.93
El Paso, TX	681,124	50	0	0.0%	73.41	0.00
Detroit, MI	677,116	130	1	0.8%	191.99	1.48
Washington, DC	672,228	23	1	4.3%	34.21	1.49
Boston, MA	667,137	14	0	0.0%	20.99	0.00
Memphis, TN	655,770	102	3	2.9%	155.54	4.57
Nashville-Davidson metropolitan area, TN	654,610	66	0	0.0%	100.82	0.00
Portland, OR	632,309	36	2	5.6%	56.93	3.16
Oklahoma City, OK	631,346	86	0	0.0%	136.22	0.00
Las Vegas, NV	623,747	58	4	6.9%	92.99	6.41
Baltimore, MD	621,849	35	1	2.9%	56.28	1.61
Louisville/Jefferson County metropolitan area, KY	615,366	80	2	2.5%	130.00	3.25
Milwaukee, WI	600,155	67	1	1.5%	111.64	1.67
Albuquerque, NM	559,121	56	5	8.9%	100.16	8.94
Tucson, AZ	531,641	64	4	6.3%	120.38	7.52
Fresno, CA	520,052	15	1	6.7%	28.84	1.92

Source: FARS 2015 ARF. Population estimates from Annual Estimates of the Resident Population for Incorporated Places of 50,000 or More, Ranked by July 1, 2015 Population: April 1, 2010, to July 1, 2015; Source: U.S. Census Bureau, Population Division; Release Date: May 2016. Retrieved from http://factfinder2.census.gov/bkmk/table/1.0/en/PEP/2015/PEPANNRSIP.US12A.

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Important Safety Reminders

- All bicyclists should wear properly fitted bicycle helmets every time they ride. A helmet is the single most effective way to prevent head injury resulting from a bicycle crash.
- Bicyclists are considered vehicle operators; they are required to obey the same rules of the road as other vehicle operators, including obeying traffic signs, signals, and lane markings. When cycling in the street, cyclists must ride in the same direction as traffic.
- Drivers of motor vehicles need to share the road with bicyclists. Be courteous – allow at least three feet of clearance when passing a bicyclists on the road, look for cyclists before opening a car door or pulling from a parking space, and yield to cyclists at intersections and as directed by signs and signals. Be especially watchful for cyclists when making turns, either left or right.
- Bicyclists should increase their visibility to drivers by wearing fluorescent or brightly colored clothing during the day, and at dawn and dusk. To be noticed when riding at night, use a front light and a red reflector or flashing rear light, and use retro-reflective tape or makrings on equipment or clothing.

— NHTSA's Office of Safety Programs

For more information on Bicycle Safety visit www.nhtsa.gov/Driving-Safety/Bicycles.

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The suggested APA format citation for this document is:

National Center for Statistics and Analysis. (2017, March). *Bicyclists and other cyclists: 2015 data.* (Traffic Safety Facts. Report No. DOT HS 812 382). Washington, DC: National Highway Traffic Safety Administration.

For more information:

Information on traffic fatalities is available from the National Center for Statistics and Analysis (NCSA), NSA-230, 1200 New Jersey Avenue SE., Washington, DC 20590. NCSA can be contacted at 800-934-8517 or by e-mail at ncsarequests@dot.gov. General information on highway traffic safety can be found at www.nhtsa.gov/NCSA. To report a safety-related problem or to inquire about motor vehicle safety information, contact the Vehicle Safety Hotline at 888-327-4236.

Other fact sheets available from the National Center for Statistics and Analysis are *Alcohol-Impaired Driving, Children, Large Trucks, Motorcycles, Occupant Protection, Older Population, Passenger Vehicles, Pedestrians, Rural/Urban Comparisons, School Transportation-Related Crashes, Speeding, State Alcohol Estimates, State Traffic Data, Summary of Motor Vehicle Crashes,* and *Young Drivers.* Detailed data on motor vehicle traffic crashes are published annually in *Traffic Safety Facts: A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System.* The fact sheets and annual Traffic Safety Facts report can be found at https://crashstats.nhtsa.dot.gov/.

U.S. Department of Transportation

National Highway Traffic Safety Administration

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Quick Facts 2016

General Statistics

Fatal Crashes	
2016	34,439
2015	32,539
2014	30,056

Source: FARS

Fatalities	
2016	37,461
2015	35,485
2014	32,744

Source: FARS

Police-Reported Crashes	
2016	N/A†
2015	6,296,000
2014	6,064,000

Source: GES

People Injured	
2016	N/A†
2015	2,443,000
2014	2,338,000

Source: GES

Fatality Rate per 100 Million VMT	
2016	1.18
2015	1.15
2014	1.08

Source: FARS/FHWA

Fatality Rate per 100,000 Population	
2016	11.59
2015	11.06
2014	10.28

Source: FARS/Census

Injury Rate per 100 Million VMT	
2016	N/A†
2015	79
2014	77

Source: GES/FHWA

Injury Rate per 100,000 Population	
2016	N/A†
2015	761
2014	734

Source: GES/Census

Occupant Fatality Rate per 100 Million VMT by Vehicle Type

	Passenger Cars	Light Trucks	Large Trucks	Motor-cycles
2016	N/A	N/A	N/A	N/A
2015	0.90	0.73	0.24	25.65
2014	0.86	0.69	0.24	23.00

Source: FARS/FHWA

Rural Versus Urban Fatalities*

	Rural	Urban
2016	18,590 (51%)	17,656 (49%)
2015	17,572 (51%)	16,830 (49%)
2014	16,791 (51%)	15,917 (49%)

Source: FARS *Percent based on known land use.

Exposure Data

Vehicle Miles of Travel (Millions) by Vehicle Type

	Passenger Cars	Light Trucks	Large Trucks	Motorcycles	Total*
2016	N/A	N/A	N/A	N/A	N/A
2015	1,420,869	1,358,824	279,844	19,606	3,095,373
2014	1,396,098	1,314,458	279,132	19,970	3,025,656

Source: FHWA. Passenger car and light truck VMT revised by NHTSA. *Total includes buses.

Registered Vehicles by Vehicle Type

	Passenger Cars	Light Trucks	Large Trucks	Motorcycles	Total*
2016	N/A	N/A	N/A	N/A	N/A
2015	133,218,368	127,401,051	11,203,184	8,600,936	281,312,446
2014	131,138,925	123,470,278	10,905,956	8,417,718	274,804,904

Sources: Registered Passenger Cars and Light Trucks—Polk data from R.L. Polk & Co., a foundation of IHS Markit automotive solutions; Registered Large Trucks and Motorcycles—FHWA. Total Registered-Polk data and FHWA.
*Total includes buses.

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Quick Facts 2016

Clock Facts

Fatalities per Day	
2016	102
2015	97
2014	90

Source: FARS

Alcohol-Impaired Driving Fatalities per Day	
2016	29
2015	28
2014	27

Source: FARS

Pedestrian Fatalities per Day	
2016	16
2015	15
2014	13

Source: FARS

People Injured per Day	
2016	N/A†
2015	6,693
2014	6,405

Source: GES

Pedestrians Injured per Day	
2016	N/A†
2015	192
2014	178

Source: GES

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Alcohol

Alcohol-Impaired Driving Fatal Crashes	
2016	9,477
2015	9,350
2014	9,049

Source: FARS

Alcohol-Impaired Driving Fatalities and Fatality Rate per 100 Million VMT		
	Fatalities	Fatality Rate
2016	10,497	0.33
2015	10,320	0.33
2014	9,943	0.33

Source: FARS/FHWA

Percent of Drivers Involved in Fatal Crashes Who Had a BAC of .08 or Higher, by Vehicle Type				
	Passenger Cars	Light Trucks	Large Trucks	Motorcycles
2016	21%	20%	2%	25%
2015	21%	21%	1%	26%
2014	22%	22%	2%	29%

Source: FARS

Percent of Drivers Involved in Fatal Crashes Who Had a BAC of .08 or Higher, by Age									
	16–20	21–24	25–34	35–44	45–54	55–64	65–74	75+	Total
2016	15%	26%	27%	22%	19%	14%	9%	5%	19%
2015	16%	28%	27%	23%	19%	14%	9%	6%	20%
2014	17%	30%	29%	24%	20%	16%	10%	5%	21%

Source: FARS

Quick Facts 2016

Occupant Protection

Nationwide Seat Belt Use Rate	
2016	90.1%
2015	88.5%
2014	86.7%

Source: NOPUS Research Note DOT HS 812 351

Child Restraint Use by Age				
	<1 Year	1–3 Years	4–7 Years	8–12 Years
2016	—	—	—	—
2015	97%	94%	88%	84%
2014	—	—	—	—

Source: NSUBS

Passenger Vehicle Occupant Fatalities Who Were Unrestrained*, by Age Group							
	<4 Years	4–7 Years	8–12 Years	13–15 Years	16–20 Years	21+	Total
2016	45 (21%)	67 (33%)	116 (48%)	128 (62%)	1,211 (53%)	8,851 (48%)	10,428 (48%)
2015	54 (26%)	71 (37%)	93 (42%)	128 (57%)	1,169 (52%)	8,445 (48%)	9,968 (48%)
2014	35 (21%)	66 (33%)	92 (47%)	126 (59%)	1,145 (53%)	7,938 (48%)	9,410 (49%)

Source: FARS *Where restraint use was known.

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Children

Children (<5 Years Old) Fatalities by Person Type				
	Total	Total Occupants	Passenger Vehicle Occupants	Nonoccupants
2016	394	304	297	90
2015	378	282	276	96
2014	339	247	239	92

Source: FARS

Children (<5 Years Old) Injured by Person Type				
	Total	Total Occupants	Passenger Vehicle Occupants	Nonoccupants
2016	N/A†	N/A†	N/A†	N/A†
2015	49,000	47,000	46,000	2,000
2014	47,000	45,000	45,000	2,000

Source: GES

Quick Facts 2016

School Bus

Total School Bus Occupant Fatalities*		
	School Bus	Special-Use School Bus
2016	9	4
2015	9	4
2014	10	1

Source: FARS *In school-bus-related crashes.

School Bus Occupant (Age 18 and Younger) Fatalities*		
	School Bus	Special-Use School Bus
2016	7	1
2015	4	1
2014	3	0

Source: FARS *In school-bus-related crashes.

Pedestrian Fatalities (Age 18 and Younger) Struck by School Bus*		
	School Bus	Special-Use School Bus
2016	5	0
2015	5	0
2014	7	0

Source: FARS *In school-bus-related crashes.

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Motorcycles

Motorcyclist Fatalities	
2016	5,286
2015	5,029
2014	4,594

Source: FARS

Motorcyclist Fatalities Unhelmeted*	
2016	2,089 (41%)
2015	1,946 (40%)
2014	1,717 (39%)

Source: FARS
*Percent where helmet use was known.

Motorcyclists Injured	
2016	N/A†
2015	88,000
2014	92,000

Source: GES

Speeding

Speeding-Related Fatalities	
2016	10,111 (27%)
2015	9,723 (27%)
2014	9,283 (28%)

Source: FARS

Quick Facts 2016

Large Trucks

Fatalities in Crashes Involving Large Trucks	
2016	4,317
2015	4,094
2014	3,908

Source: FARS

People Injured in Crashes Involving Large Trucks	
2016	N/A†
2015	116,000
2014	111,000

Source: GES

Percent of Fatalities in Crashes Involving Large Trucks by Person Type			
	Truck Occupants	Occupants of Other Vehicles	Nonoccupants
2016	17%	72%	11%
2015	16%	74%	10%
2014	17%	73%	10%

Source: FARS

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Pedestrians

Pedestrian Fatalities	
2016	5,987
2015	5,495
2014	4,910

Source: FARS

Fatally Injured Pedestrians* Who Had a BAC of .01 or Higher	
2016	2,222 (39%)
2015	2,020 (39%)
2014	1,799 (38%)

Source: FARS *Age 14 and older.

Pedestrians Injured	
2016	N/A†
2015	70,000
2014	65,000

Source: GES

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Pedalcyclists

Pedalcyclist Fatalities	
2016	840
2015	829
2014	729

Source: FARS

Pedalcyclists Injured	
2016	N/A†
2015	45,000
2014	50,000

Source: GES

Quick Facts 2016

Lives Saved

Lives Saved by Age					
	Seat Belts 5 & Older	Frontal Air Bags 13 & Older	Child Restraints 4 & Younger	Minimum Drinking Age Laws	Motorcycle Helmets
2016	14,668	2,756	328	552	1,859
2015	14,067	2,596	272	542	1,800
2014	12,801	2,400	253	486	1,673

Source: NCSA

Additional Lives Savable by Seat Belts at Higher Use Rates*		
For a 1% Increase	At 95% Use	At 100% Use
240	1,194	2,456

Source: NCSA *Compared with 2016 national seat belt use rate of 90.1%.

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Leading Cause of Death

Motor vehicle crashes were the leading cause of death for age 10 and every age 16 through 23 in 2015.

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Source: Centers for Disease Control and Prevention, (2015) Leading Cause of Death

Economic and Comprehensive Costs to Society by Type of Crash
2010 Costs (in Billions)

Crash Type	Economic Cost	Comprehensive Cost*
All	$242	$836
Alcohol-Impaired	$44	$201
Speeding	$52	$203

Source: www-nrd.nhtsa.dot.gov/Pubs/812013.pdf

*Previous issues of Quick Facts contained only the economic costs. The total value of societal harm includes economic costs as well as quality of life lost, such as lost market and household productivity. These costs are for reported and unreported crashes.

†NHTSA's National Center for Statistics and Analysis (NCSA) redesigned the nationally representative sample of police-reported traffic crashes, which estimates the number of police-reported injury and property-damage-only crashes in the United States. The new system, called the Crash Report Sampling System (CRSS), replaced the National Automotive Sampling System (NASS) General Estimates System (GES) in 2016. However, the 2016 estimates are not currently available. NHTSA is currently processing the file to ensure the data is accurate and complete, and is finalizing the new weighting and calibration procedures to produce national estimates. Once completed, NHTSA will release the data and publish the estimated number of police-reported injury and property-damage-only crashes that occurred during 2016.

U.S. Department of Transportation
National Highway Traffic Safety Administration

NHTSA

DOT HS 812 451
October 2017

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FATALITY ANALYSIS REPORTING SYSTEM (FARS) ENCYCLOPEDIA

File Versions
2015 data based on FARS data publication, 1st release

GIS Map features

Vehicle Registration and VMT Changes

After 1/1 your browser will no longer be supported by this website. Please upgrade your internet browser for optimal viewing

Did You Know?
View Archive

- For every age group, the fatality rate per 100,000 population was lower for females than for males. The injury rate based on population was higher for females than for males in every age group, except for people under 10 years old and people over 64 years old. [People 2010]
- Of the persons who were killed in traffic crashes in 2010, 31 percent died in alcohol-impaired driving crashes. [People 2010]
- The injury rate in 2010 was the same as in 2009, at 75 persons injured per 100 million vehicle miles of travel. [Trends 2010]

National Statistics

	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994
Motor Vehicle Traffic Crashes																						
Fatal Crashes	32,166	30,056	30,202	31,006	29,867	30,296	30,862	34,172	37,435	38,648	39,252	38,444	38,477	38,491	37,862	37,526	37,140	37,107	37,324	37,494	37,241	36,254
Traffic Crash Fatalities																						
Vehicle Occupants																						
Drivers	17,466	16,470	16,520	16,838	16,474	16,864	17,670	19,279	21,717	22,831	23,237	23,158	23,352	23,625	22,914	22,914	22,971	22,654	22,730	22,572	22,370	21,596
Passengers	6,158	5,766	5,896	6,106	5,972	6,451	6,793	7,441	8,716	9,187	9,750	10,042	10,171	10,370	10,227	10,451	10,325	10,327	10,765	10,860	10,576	10,294
Unknown	71	71	67	73	64	56	63	71	94	101	83	76	104	110	102	86	96	107	114	102	118	108
Sub Total1	23,695	22,307	22,483	23,017	22,510	23,371	24,526	26,791	30,527	32,119	33,070	33,276	33,627	34,105	33,243	33,451	33,392	33,088	33,609	33,534	33,064	31,998
Motorcyclists	**4,976**	**4,594**	**4,692**	**4,986**	**4,630**	**4,518**	**4,469**	**5,312**	**5,174**	**4,837**	**4,576**	**4,028**	**3,714**	**3,270**	**3,197**	**2,897**	**2,483**	**2,294**	**2,116**	**2,161**	**2,227**	**2,320**
Nonmotorist																						
Pedestrians	5,376	4,910	4,779	4,818	4,457	4,302	4,109	4,414	4,699	4,795	4,892	4,675	4,774	4,851	4,901	4,763	4,939	5,228	5,321	5,449	5,584	5,489
Pedalcyclists	818	729	749	734	682	623	628	718	701	772	786	727	629	665	732	693	754	760	814	765	833	802
Other/ Unknown	227	204	190	227	200	185	151	188	158	185	186	130	140	114	123	141	149	131	153	154	109	107
Sub Total2	6,421	5,843	5,718	5,779	5,339	5,110	4,888	5,320	5,558	5,752	5,864	5,532	5,543	5,630	5,756	5,597	5,842	6,119	6,288	6,368	6,526	6,398
Total**	**35,092**	**32,744**	**32,893**	**33,782**	**32,479**	**32,999**	**33,883**	**37,423**	**41,259**	**42,708**	**43,510**	**42,836**	**42,884**	**43,005**	**42,196**	**41,945**	**41,717**	**41,501**	**42,013**	**42,065**	**41,817**	**40,716**
Other National Statistics																						
Vehicle Miles Traveled (Billions)	3,095	3,026	2,988	2,969	2,950	2,967	2,957	2,977	3,031	3,014	2,989	2,965	2,890	2,856	2,796	2,747	2,690	2,628	2,552	2,484	2,423	2,358
Resident Population (Thousands)	321,419	318,907	316,427	314,103	311,719	309,347	306,772	304,094	301,231	298,380	295,517	292,805	290,108	287,625	284,969	282,162	272,691	270,248	267,784	265,229	262,803	260,327
Registered Vehicles (Thousands)	281,312	274,805	269,294	265,647	265,043	257,312	258,958	259,360	257,472	251,415	245,628	237,949	230,633	225,685	221,230	217,028	212,685	208,076	203,568	201,631	197,065	192,497
Licensed Drivers (Thousands)	218,084	214,092	212,160	211,815	211,875	210,115	209,618	208,321	205,742	202,810	200,549	198,889	196,166	194,602	191,276	190,625	187,170	184,861	182,709	179,539	176,628	175,403
National Rates: Fatalities																						
Fatalities per 100 Million Vehicle Miles Traveled	1.13	1.08	1.10	1.14	1.10	1.11	1.15	1.26	1.36	1.42	1.46	1.44	1.48	1.51	1.51	1.53	1.55	1.58	1.65	1.69	1.73	1.73
Fatalities per 100,000 Population	10.92	10.27	10.40	10.76	10.42	10.67	11.05	12.31	13.70	14.31	14.72	14.63	14.78	14.95	14.81	14.87	15.30	15.36	15.69	15.86	15.91	15.64

Registered Vehicles																						
Fatalities per 100,000 Licensed Drivers	16.09	15.29	15.50	15.95	15.33	15.71	16.16	17.96	20.05	21.06	21.70	21.54	21.86	22.10	22.06	22.00	22.29	22.45	22.99	23.43	23.68	23.21

** Total fatalities for 1996 include 2 fatalities of unknown person type.

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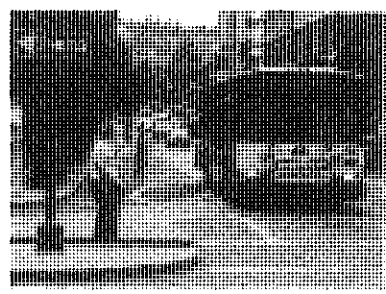
Pedestrian and Bicyclist Crash Statistics

In 2015, 5,376 pedestrians and 818 bicyclists were killed in crashes with motor vehicles (National Highway Traffic Safety Administration, Traffic Safety Facts). These two modes accounted for 17.7 percent of the 35,092 total U.S. fatalities that year. Here are more facts and figues on pedestrian and bicycle crashes:

Pedestrians

Click here to jump to Bicycle Crash figures



In 2015, 5,376 people were killed in pedestrian/motor vehicle crashes, nearly 15 people every day of the year (NHTSA Traffic Safety Facts). This represents the highest number of pedestrians killed in one year since 1996. Though total traffic fatalities in the US fell by nearly 18 percent from 2006 to 2015, pedestrian fatalities rose by 12 percent during the same ten year period.

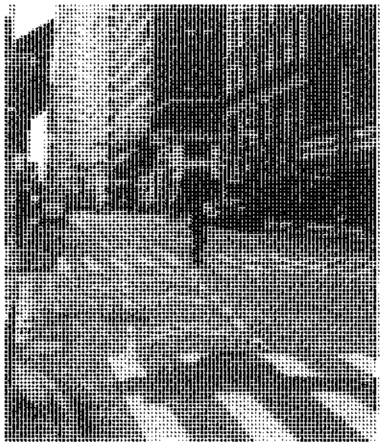
There were an estimated 70,000 pedestrians injured in crashes in 2015, compared to 61,000 in 2006 — a nearly 15 percent increase over ten years. Furthermore, we know from research into hospital records that only a fraction of pedestrian crashes that cause injury are ever recorded by the police.

Quick facts

- Pedestrian deaths in 2006: 4,795
- Pedestrian deaths in 2015: 5,376 (NHTSA Traffic Safety Facts)
- Change in pedestrian fatalities between 2006 and 2015: 12.1 percent increase
- Estimated pedestrian injuries in 2006: 61,000
- Estimated pedestrian injuries in 2015: 70,000 (NHTSA Traffic Safety Facts)
- Change in estimated pedestrian injuries between 2006 and 2015: 14.8 percent increase
- The total cost of pedestrian injury among children ages 14 and younger is $5.2 billion per year (Pedestrian and Pedalcyclist Injury Costs in the United States by Age and Injury Severity).

The raw numbers hide many trends, truths, and lessons, and they present a wide range of questions: Is walking more dangerous than other modes of travel? Is walking getting safer? Who is getting killed in pedestrian crashes, where, when, and why? The following section seeks to answer some of these questions and provide a better perspective and context for the facts.

Is walking more dangerous than other modes of travel?



Pedestrians are over-represented in the crash data, accounting for nearly 18 percent of all traffic fatalities but only 10.9 percent of trips. However, there is no reliable source of exposure data to really answer this question—transportation professionals don't have an accurate sense of how many miles people walk each year, or how many minutes or hours people spend walking or crossing the street (and thus how long they are exposed to motor vehicle traffic).

As with every mode of travel, there is clearly some risk associated with walking. However, walking remains a healthful, inherently safe activity for tens of millions of people every year. The public health community recognizes that lack of physical activity, and a decline in bicycling and walking in particular, is a major contributor to the hundreds of thousands of deaths caused by heart attacks and strokes—this number dwarfs the 32,675 total deaths due to motor vehicle crashes and the relatively small 4,884 pedestrian deaths in 2014. In fact, the number of deaths in 2000 caused by poor diet and physical inactivity increased by approximately 66,000, accounting for about 15.2 percent of the total number of deaths (1).

1. Allison, David B., Kevin R. Fontaine, JoAnn E. Manson, June Stevens, Theodore B. VanItallie, and Ali H. Mokdad. Annual Deaths Attributable to Obesity in the United States, JAMA. 1999; 282:1530-1538. Vol. 293 No. 3, January 19, 2005.

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Is walking getting safer?

Without a better understanding of how many people are walking, where they are walking, and how far/often they are walking, it is difficult to determine if safety improvements are truly being made. A reduction in pedestrian crashes could be attributed to fewer people walking in general, or to improvements in facilities, law enforcement, education, and behavior that are really leading to more people walking and to fewer pedestrian fatalities.

Causes of injury

According to the 2012 National Survey on Bicyclist and Pedestrian Attitudes and Behaviors, poor quality facilities are the leading cause of pedestrian injury.

Six most Frequent Sources of Injury	Percent
Tripped on an uneven/cracked sidewalk	24
Tripped/fell	17
Hit by a car	12
Wildlife/pets involved	6
Tripped on stone	5
Stepped in a hole	5

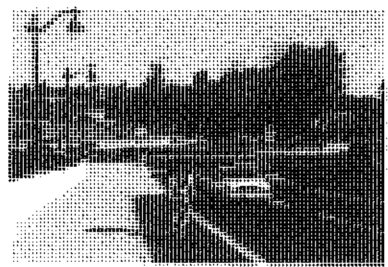
Who is getting killed in pedestrian crashes?

A detailed breakdown of the age, gender, and location of pedestrian crash victims is available from the National Highway Traffic Safety Administration (NHTSA) and the Insurance Institute for Highway Safety (IIHS) fact sheets. Some of the more noteworthy trends or numbers are:

- 70 percent of pedestrian killed in 2014 were males.
- Almost three out of every four pedestrian fatalities occur in urban areas (73 percent).
- More than a quarter (26 percent) of all pedestrian fatalities occurred between 6 and 8:59 p.m.
- 47 is the average age of pedestrians killed in 2014, and 37 is the average age of those injured in 2014.
- 34 percent of pedestrians killed had a blood alcohol concentration of 0.08 g/dL or higher.
- 14 percent of drivers in a pedestrian crash had a blood alcohol concentration of 0.08 g/dL or higher.
- California (697), Florida (588), and Texas (476) lead the nation in total pedestrian fatalities.

Bicycling

How many people are killed/injured riding bikes?



In 2015, 818 people lost their lives in bicycle/motor vehicle crashes, more than two people every day of the year in the U.S. This represents a 6 percent increase in bicyclist fatalities since 2006 and a 12.2 percent increase from the previous year (2014).

These numbers represent just over two percent of the total number of people killed and injured in traffic crashes in 2015.

The number of estimated bicyclist injuries dropped to 45,000 in 2015, down from 50,000 in 2014. However, like pedestrian injury estimates, research into hospital records shows that only a fraction of bicycle crashes causing injury are ever recorded by the police, possibly as low as ten percent.

Quick Facts

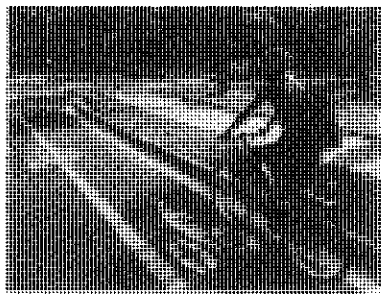
- Bicyclist deaths in 2006: 772
- Bicyclist deaths in 2015: 818 (NHTSA Traffic Safety Facts)
- Change in bicyclist fatalities between 2006 and 2015: 6 percent increase
- Estimated bicyclist injuries in 2006: 44,000
- Estimated bicyclist injuries in 2015: 45,000 (NHTSA Traffic Safety Facts)
- Change in estimated bicyclist injuries between 2006 and 2015: 2.3 percent increase
- The total cost of bicyclist injury and death is over $4 billion per year (National Safety Council).

Is bicycling more dangerous than other modes of travel?

Obviously with more than 800 deaths per year, there are risks associated with riding a bicycle. Bicycle fatalities represent less than two percent of all traffic fatalities, and yet bicycle trips account for only one percent of all trips in the United States. However, bicycling remains a healthful, inherently safe activity for tens of millions of people every year.

As mentioned, bicyclists seem to be over-represented in the crash data, but, there is no reliable source of exposure data as we don't know how many miles bicyclists travel each year, and we don't know how long it takes them to cover those miles (and thus how long they are exposed to motor vehicle traffic). Risk based on exposure varies by time of day (with night time being more risky), experience level of rider, location of riding, alcohol use, and many other factors. Until we have better exposure measures, we just don't know how bicyclist risk compares to other modes, but the health benefits of riding may offset some of this risk.

Is bicycling getting safer?



The 3 percent decline in fatalities from 2013 to 2014 is hopeful, but without knowing how many people are riding and how far they are riding, there's no way of knowing whether the drop in crashes is because conditions are actually safer, more people are bicycling, or they're bicycling in different locations.

In 1994, the U.S. Department of Transportation adopted a policy of doubling the percentage of trips made by bicycling and walking while simultaneously reducing by 10 percent the number of bicyclists and pedestrians injured in traffic crashes. The goals are to be pursued together—one cannot or should not be achieved at the expense of the other goal. Experience from many European countries suggests that increasing levels of bicycling can be done without increasing crash rates, and that strength in numbers can yield safety benefits.

Who is getting killed in bicycling crashes?

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A detailed breakdown of the age, gender, and location of bicycle crash victims is available from The National Highway Traffic Safety Administration. Some of the more noteworthy trends and numbers are:

- The average age of bicyclists killed in crashes with motor vehicles continues to increase, climbing to 45 years old in 2014, up from 39 in 2004, 32 in 1998, and 24 in 1988.
- 88 percent of those killed were male.
- 71 percent of bicyclist fatalities occurred in urban areas.
- 20 percent of bicyclist fatalities occurred between 6 and 8:59 p.m.
- 19 percent of bicyclists killed had blood alcohol concentrations of 0.08 g/dL or higher.
- In 35 percent of the crashes, either the driver or the bicyclist had blood alcohol concentrations of 0.08 g/dL or higher.
- California (128), Florida (139), and Texas (50) lead the nation in the number of bicyclist fatalities.
- Just two states, Rhode Island and Vermont, reported no fatalities in 2014.

Causes of injury

According to the 2012 National Survey on Bicyclist and Pedestrian Attitudes and Behaviors, nearly a third of all injuries are caused when bicyclists are struck by cars.

Six most Frequent Sources of Injury	Percent
Hit by car	29
Fell	17

Roadway/walkway not in good repair	13
Rider error/not paying attention	13
Crashed/collision	7
Dog ran out	4

For more pedestrian and bicyclist crash facts, check with these organizations:

- National Highway Traffic Safety Administration (NHTSA)
- NHTSA Traffic Safety Facts
- Insurance Institute for Highway Safety (IIHS)
- Fatality Analysis Reporting System (FARS)

Local bicycling and pedestrian data

Your local city planning agency or public works department may have inventories of walking and bicycling facilities and possibly, measures of walking and bicycling activity. If you are looking for local pedestrian and bicycle crash statistics, try these sources:

- Police Department
- Hospital/Emergency Room
- Local or State Department of Transportation (DOT)
- Department of Public Health or Other Sources

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Police Department

First, check with your local police department for crash records involving bicyclists and pedestrians. In addition to crash statistics, the police may be able to recommend other local sources of data. One thing to consider, however, is that police reports often represent a fraction of the total bicycle and pedestrian crashes in an area.

Hospital/Emergency Room

Another good source of crash data is the emergency room of the local hospital or health care facility. These records will help supplement the data found in police reports. Contact the hospital for help finding the appropriate department for crash statistics.

Local or State Department of Transportation

A third source for crash data is the state or local Department of Transportation. Start by contacting your state DOT and asking for a source of bicyclist and pedestrian crash statistics. Also ask for any local organizations or agencies that might be involved in bicycle ane/or pedestrian safety research in the community or region.

Department of Public Health or Other Sources

Other local sources of crash data can include Departments of Public Health, neighborhood safety advocates, university programs, and town transportation planning boards. Even if these sources do not have crash statistics, they may know of other agencies that collect such information.

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List of cyclist deaths in U.S. by year

List of cyclist or cycling deaths (any kind) in U.S. by year

Cycling generally includes the riding of unicycles, tricycles, quadracycles, and *similar* human-powered transport (HPVs). Note however that many HPV users *are not considered cyclists*, for example, using NHTSB statistics (US), skateboarder deaths are classified as pedestrians, [1] yet it is unclear how trikkes are classified.

The following table summarizes the number of people killed and/or injured in fatal *cyclist* collisions (as defined/reported by NHTSB) in the USA.[2] [3] Statistics (generally) may vary based on the definition of what constitutes an injury or death, in particular time after incident and complications for deaths, and severity for injuries, therefore comparing statistics across years or nations requires a bit of deeper investigation. Many injuries go unreported.

Year	U.S. Fatalities	U.S. Injuries	California Fatalities	Florida Fatalities	New York Fatalities[4]
2015	818[5]				
2014	729		128[6]		47
2013	749	48000	147[7]		40
2012	734	49000	123	120	45
2011	682	45000			57
2010	623		100	83	36
2009	628				
2008	718				
2007	701				
2006	772				45
2001	732				42

1. http://www.skatepark.org/park-development/advocacy/2014/02/2013-skateboard-fatalities/
2. "Pedestrian and Bicyclist Crash Statistics" (http://www.pedbikeinfo.org/data/factsheet_crash.cfm). National Highway Transportation Safety Administration.
3. http://www.latimes.com/business/autos/la-fi-hy-californa-leads-national-bicycle-deaths-20141027-story.html Bicycle traffic deaths soar; California leads nation LAT
4. in collisions with motor vehicles only. Source: "Summary of Bicycle/Motor Vehicle Crashes" (http://dmv.ny.gov/about-dmv/statistical-summaries). New York State Department of Motor Vehicles.
5. https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812382
6. http://www.ots.ca.gov/OTS_and_Traffic_Safety/Score_Card.asp
7. http://www.ots.ca.gov/OTS_and_Traffic_Safety/Score_Card.asp

See also

- Transportation safety in the United States

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Retrieved from "https://en.wikipedia.org/w/index.php?title=List_of_cyclist_deaths_in_U.S._by_year&oldid=790316321"

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EXHIBIT 4

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Aerodynamic Effects to a Bicycle Caused by a Passing Vehicle

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ABSTRACT

There are many reasons why a bicycle is caused to wobble by a passing vehicle, for example, human engineering factors, riding techniques, the conditions of the road, aerodynamic effects, etc.

In this report, aerodynamic effects to a bicycle by a passing vehicle have been investigated experimantally and theoretically. Experiments were made by driving the 1/6-scale vehicle model with a catapult arrangement near the 1/6-scale bicycle model which was at rest.

Aerodynamic forces acting on the bicycle model were measured with the aerodynamic balance mounted under the bicycle and the flow patterns around the bicycle caused by the vehicle were examined using visualization techniques.

To compare with the experimental results, numerical calculations were carried out on the passing motion of two bodies in an ideal fluid.

IN JAPAN, TRAFFIC CASUALITIES INVOLVING VEHICLES are decreasing every year, but there are many casualities even now. The use of bicycles and small sized motorcycles have been increasing rapidly since the first oil crisis in 1970, and therefore accidents between these bicycles and automobiles have become a social problem.

In this paper, aerodynamic effects to a bicycle caused by a passing vehicle on a narrow road have been investigated. This study includes two kinds of experiments, and a fundamental analysis. One experiment was to measure force acting on the bicycle model, the other was to observe the flow around a bicycle model or a circular cylinder symbolizing a bicycle using visualization techniques. The fundamental analysis was carried out using the method of image doublets and the finit element method. It was very difficult to analysis numerically this problem in actual fluid, so that we studied the problem using two circular cylinders in ideal fluid.

EXPERIMENT

EXPERIMENTAL APPARATUS - When a vehicle passed near a bicycle the experimental apparatus which was developed in order to investigate aerodynamic effects is shown in Fig.1.

This apparatus consists of a track, a carriage and a catapult. The track was 36 meters long by 0.11 meters wide. On this track, the vehicle (1/6-scale model) or the cylinder symbolizing a vehicle mounted on a carriage was catapulted using an elastic shock cord. After the carriage had passed through the test section, it was decelerated by a braking assembly.

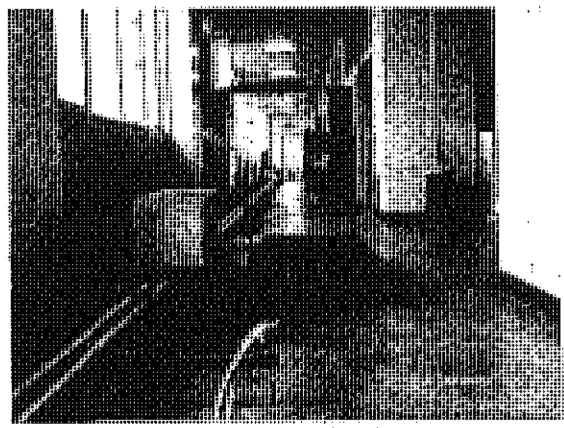

Fig.1-Overall system layout

MEASUREMENT OF AERODYNAMIC FORCE ACTING ON BICYCLE MODEL - When a vehicle passes near a bicycle at velocity V, aerodynamic force F acts on the bicycle. This force F varies in value at every moment with the advancing of the vehicle.

Fig.2 shows the coordinate system.

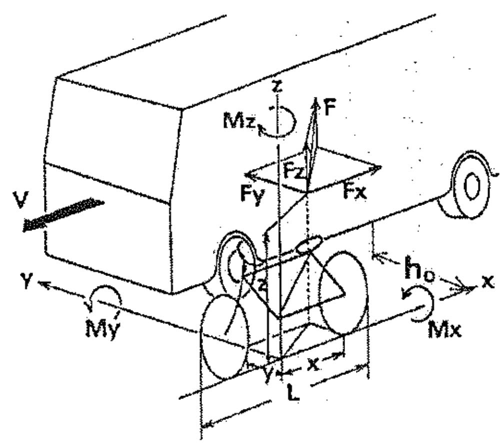

Fig.2-Coordinate system

The origin of coordinates is chosen as the middle point on the ground between the front and rear wheel of the bicycle. The components of aerodynamic force F were measured by an aerodynamic balance mounted under the 1/6-scale bicycle model. The components of force F are Fx, Fy and Fz in x-, y- and z-direction, respectively. In this experiment, only the component Fy was measured because it appeared that the bicycle was caused to wobble by it. Aerodynamic coefficient Cy of Fy is given as following,

$$Cy=Fy/\frac{1}{2}\rho V^2 S \qquad (1)$$

where ρ is density of fluid, and S is the projected area of the bicycle and the rider on x-z plane. Fig.3 and Fig.4 show the 1/6-scale model used in the experiment.

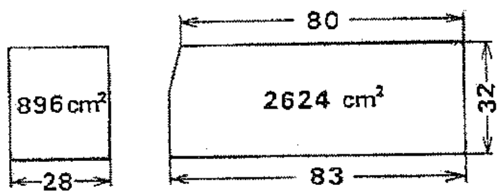

Fig.3- 1/6-scale vehicle model

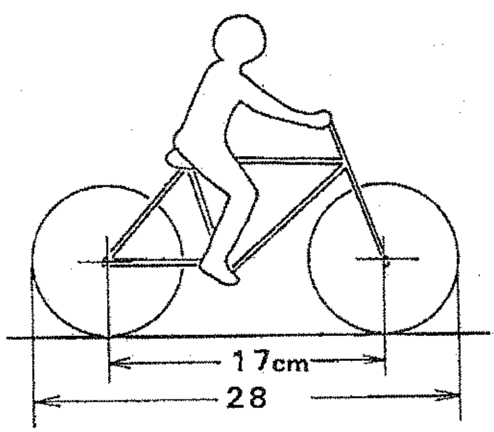

Fig.4- 1/6-scale bicycle model

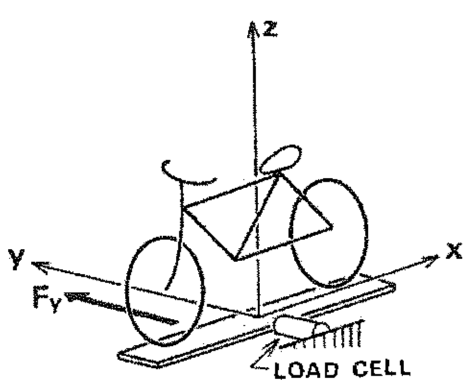

Fig.5-Skeleton of aerodynamic balance system

The skeleton of the aerodynamic balance is shows in Fig.5.

Fig.6 shows a sample of the data obtained by measuring force Fy.

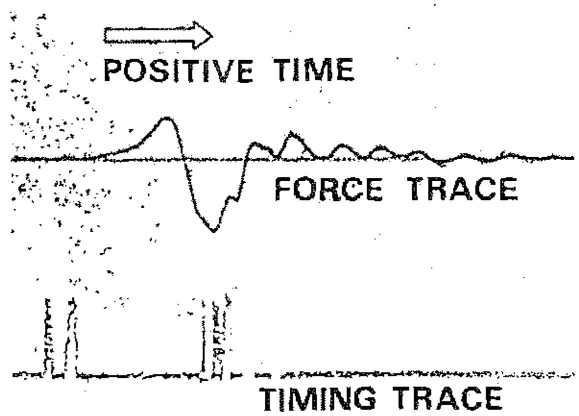

Fig.6-Force Fy, and timing trace

The first peak of force Fy occurs just as the front of the vehicle is even with the rear wheel of the bicycle and the negative value indicates that the force is in a direction away from the vehicle. The second peak occurs when the vehicle is approximately even with front of the bicycle, and the positive value tends to pull the bicycle toward the vehicle.

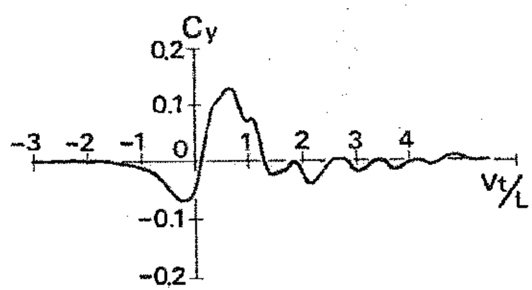

Fig.7-Cy variation

The instant when the front of vehicle is even with the center of the bicycle is chosen as the origin of time (t=0), and L is the overall length of the bicycle.

Fig.8 shows the Reynolds number effect on the force coefficient. Where ho is the distance between the bicycle and the vehicle, and Reynolds number Re is as following,

$$Re=V\ell/\nu \qquad (2)$$

V=velocity of vehicle
ℓ=overall length of vehicle
ν=kinematic viscosity.

As seen from Fig.8, the Reynolds number effect on force coefficient Cy was small except ho=60mm, for $Re=1.5\times10^5\sim3.5\times10^5$.

Fig.9 shows the reletion of the second peak value of aerodynamic coefficient Cy to distance ho. The change in the second peak value of Cy is nearly linear with distance ho.

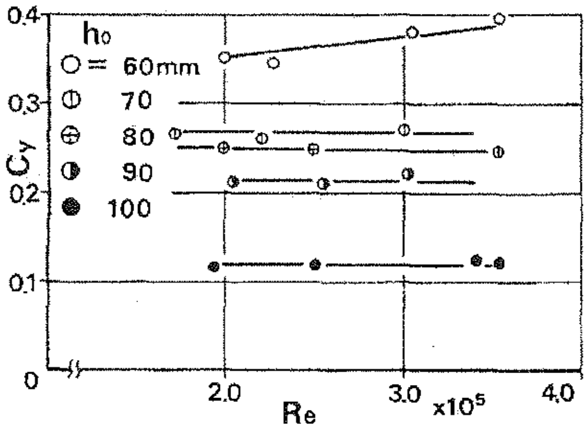

Fig.8 - Reynolds number effect on second peak value of Cy.

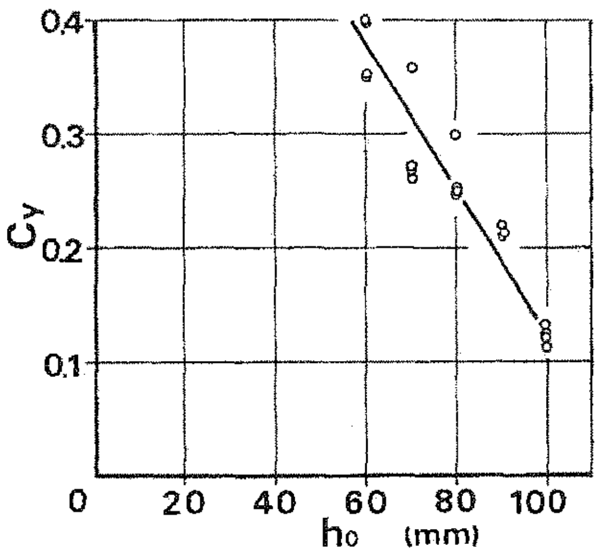

Fig.9 - Second peak value of Cy

OBSERVATION OF THE FLOW USING THE VISUALIZATION TECHNIQUE - Fig.10 shows the arragement of the apparatus to observe the flow around the two cylinders. A moving large cylinder passed by a stationary small cylinder from right to left. A slender pipe was stuck in any position around the small cylinder. Smoke produced by combustion of yellow phosphor was pushed out through this pipe, as soon as the large cylinder approached it. This experiment was carried out many times at each position of the pipe to observe the flow patterns using a V.T.R. Fig.11 shows the flow patterns around the small cylinder. In Fig.11, the instant when the center of the moving large cylinder is even with the center of the stationary small cylinder is chosen as the origin of time (t=0) and 2b is the diameter of the small circular cylinder.

The overall flow turns clock-wise around the small cylinder and the smoke direction at

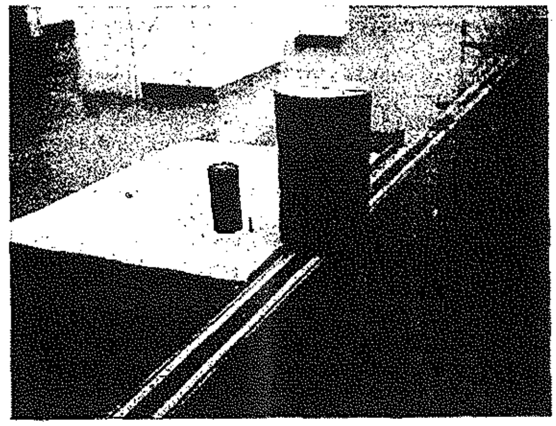

Fig.10 - Arrangement of two cylinder

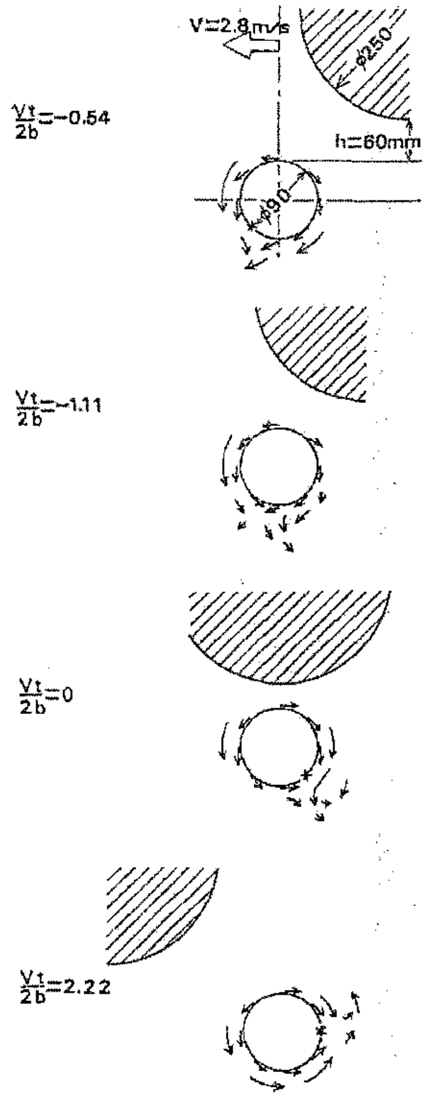

Fig.11 - Flow pattern around the stationary small cylinder

each position change as the passing of the large cylinder progresses. After the large cylinder passed by, the smoke direction is pulled in the direction of the large cylinder. And the positions marked with as asterisk (*) seem to be stagnation points.

Fig.12 shows the flow patterns around the bicycle. The experiment was carried out in much the same way as that of Fig.10. The origin of time (t=0) is chosen as the point when the front of the vehicle is even with the center of the bicycle and L is the overall length of the bicycle.

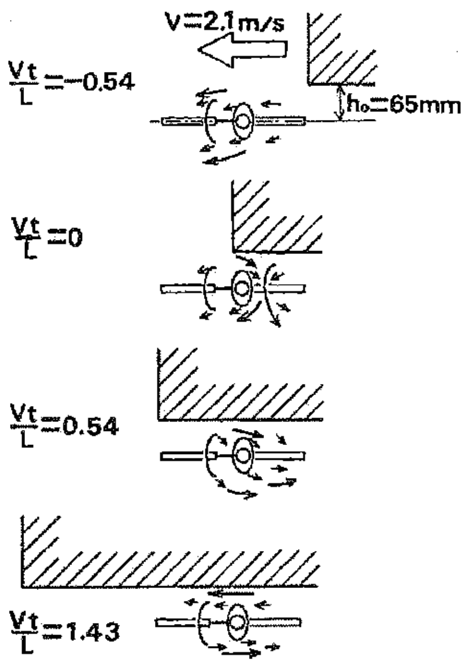

Fig.12 - Flow patterns around the bicycle

Smoke are pushed out as the vehicle approaches (see Fig.12-a). When the middle of the vehicle come to the center of the bicycle, the smoke between the vehicle and the bicycle is pallarel to the direction of progress. The smoke on the far side of the bicycle is moving in the opposite direction (see Fig.12-d). The direction of the smoke changes rapidly, during a minute time in which the front of the vehicle passed by the center of bicycle and then when the middle of the vehicle passed by it (see Fig.12-b,c).

NUMERICAL ANALYSIS

METHOD OF IMAGE DOUBLETS - Consider the case where circular cylinder A (of radius a) pass by circular cylinder B (of radius b) with velocity V pallarel to the x-axis in ideal fluid at rest. The instant when the two cylinder come closest is chosen as the origin of time (t=0) and the middle point of cylinder A snd B at t=0 is taken as the origin of the coordinate system. Let 2k be the closest distance between the center of cylinder at t=0. Fig.13 shows the coordinate system

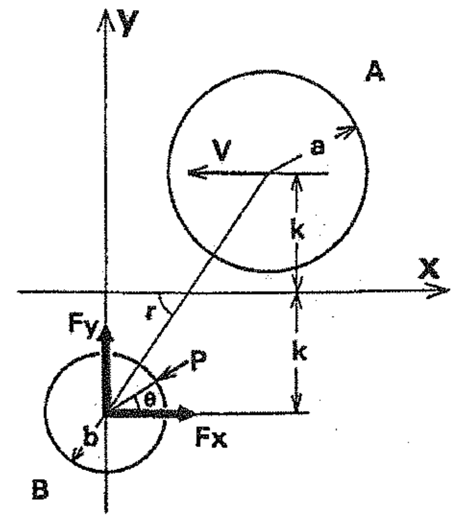

Fig.13 - Notation diagram for passing motion of two circular cylinders in an ideal fluid

The velocity potential around the two cylinders in ideal fluid is determined using the method of image doublets. Consequently, the expression for the velocity potential to the fifth approximation is as following,

$$\phi=\phi_1+\phi_2+\phi_3+\phi_4+\phi_5+\cdots\cdots, \tag{3}$$

$$\phi_1=\frac{Va^2(x-x_1)}{(x-x_1)^2+(y-y_1)^2},$$

$$x_1=-Vt,\ y_1=k,\ \xi_1=0,\ \eta_1=-k. \tag{4}$$

$$\phi_2=-\frac{Va^2b^2}{(x_1-\xi_1)^2+(y_1-\eta_1)^2}\times\frac{(x-\xi_2)\cos2\gamma+(y-\eta_2)\sin2\gamma}{(x-\xi_2)^2+(y-\eta_2)^2}$$

$$x_2=-Vt+Vt\delta'',\ y_2=k-2k\delta'',$$

$$\xi_2=-Vt\delta',\ \eta_2=-k+2k\delta',$$

$$\delta'=b^2/(V^2t^2+4k^2),\ \delta''=a^2/(V^2t^2+4k^2),$$

$$\gamma=\tan^{-1}(-2k/Vt). \tag{5}$$

$$\phi_3=\frac{Va^4b^2}{[(x_1-\xi_1)^2+(y_1-\eta_1)^2][(x_1-\xi_2)^2+(y_1-\eta_2)]^2}$$

$$\times\frac{(x-x_3)}{(x-x_3)^2+(y-y_3)^2},$$

$$x_3=-Vt+\frac{\delta''}{1-\delta'}Vt,\ y_3=k-\frac{2k\delta''}{1-\delta'},$$

$$\xi_3=-\frac{\delta'}{1-\delta'}Vt,\ \eta_3=-k+\frac{2k\delta'}{1-\delta'}. \tag{6}$$

$$\phi_4=-\frac{Va^4b^4}{[(x_1-\xi_1)^2+(y_1-\eta_1)^2][(x_1-\xi_2)^2+(y_1-\eta_2)^2]}$$

$$\times[(\xi_1-x_3)^2+(\eta_1-y_3)^2]$$

$$\times\frac{(x-\xi_4)\cos2\gamma+(y-\eta_4)\sin2\gamma}{(x-\xi_4)^2+(y-\eta_4)^2},$$

$$x_4=-Vt+\frac{(1-\delta')\delta''}{1-2\delta'}Vt,$$

$$y_4=k\left\{1-\frac{2(1-\delta')\delta''}{1-2\delta'}\right\},$$

$$\xi_4=-\frac{(1-\delta')\delta'}{1-2\delta'}Vt,$$

$$\eta_4 = k\left\{-1 + 2\delta'\frac{(1-\delta')}{1-2\delta'}\right. \qquad (7)$$

$$\phi_5 = \frac{Va^6b^4}{[(x_1-\xi_1)^2+(y_1-\eta_1)^2][(x_1-\eta_2)^2+(y_1-\eta_2)^2]}$$
$$\times[(\xi_1 - x_3)^2 + (\eta_1 - y_3)^2] \times \frac{1}{(x_1-\xi_4)^2+(y_1-\eta_4)^2}$$
$$\times \frac{(x-\xi_5)}{(x-\xi_5)^2+(y-\eta_5)^2}. \qquad (8)$$

$$x_5 = -Vt + \frac{(1-2\delta')\delta'}{(1-3\delta'+\delta'^2)}Vt,$$
$$y_5 = k\left\{1 - 2\frac{(1-2\delta')\delta'}{(1-3\delta'+\delta'^2)}\right\},$$
$$\xi_5 = -\frac{(1-2\delta')\delta'}{(1-3\delta'+\delta'^2)}Vt, \qquad (9)$$
$$\eta_5 = k\left\{-1 + 2\frac{(1-2\delta')\delta'}{(1-3\delta'+\delta'^2)}\right\}.$$

The x- and y-components of velocity are given as

$$\left.\begin{array}{l} u = u_1+u_2+u_3+u_4+u_5+\cdots\cdots, \\ u = u_1+u_2+u_3+u_4+u_5+\cdots\cdots, \end{array}\right\} \qquad (10)$$

where the resultant velocity is obtained as

$$q = \sqrt{u^2+v^2} \qquad (11)$$

and the pressure coefficient on cylinder B is obtained from the generlized Bernoulli's equation,

$$C_P = \frac{P-P_0}{\frac{1}{2}\rho V^2} = -\frac{\partial\phi}{\partial t}/\tfrac{1}{2}V^2 - \frac{q^2}{V^2}. \qquad (12)$$

where,
P=pressure on cylinder B
Po=pressure at infinity
ρ=density of fluid,

Force component Fx, Fy acting on cylinder B is given as follows:

$$\left.\begin{array}{l} F_X = -\oint_B Pb\cos\theta d\theta, \\ F_Y = -\oint_B Pb\sin\theta d\theta, \end{array}\right\} \qquad (13)$$

Furthermore, Fx, Fy are given by the following expression:

$$\left.\begin{array}{l} F_X = C_X\rho V^2 S/2, \\ F_Y = C_Y\rho V^2 S/2 \end{array}\right\} \qquad (14)$$

Where S is the cross section area of cylinder B and Cx, Cy are the force coefficients in the x- and y-direction, respectively. Let S=2b·1, and therefore

$$\left.\begin{array}{l} C_X = -\frac{1}{2}\oint_B C_P\cos\theta d\theta, \\ C_Y = -\frac{1}{2}\oint_B C_P\sin\theta d\theta \end{array}\right\} \qquad (15)$$

To rewrite the equations in dimensionless from, we define dimensionless quantities,

$$\left.\begin{array}{l} \frac{K}{b} = m,\ \frac{a}{b} = n,\ \frac{Vt}{2b} = S \\ 2m-n-1 = h, \end{array}\right\} \qquad (16)$$

and any point (x,y) on cylinder B are expressed in the dimensionless form

$$\frac{x}{b} = \cos\theta,\ \frac{y}{b} = \sin\theta - m. \qquad (17)$$

Example - Numerical calculations were carried out for the following cases:

n=1, 2, 3, 4, 5
m=2.75, 3.0, 4.0, 4.5, 5.0

The pressure distribution on the stationary cylinder B for n=4.0, m=3.5 are shown in Fig.14.

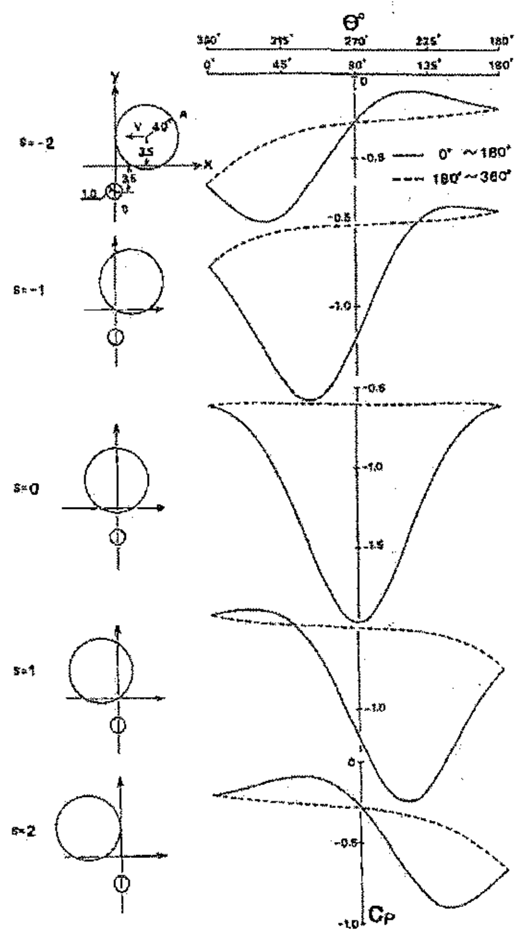

Fig.14 - Pressure distribution on cylinder B for n=4.0, m=3.5

The time history of force coefficients acting on cylinder B for n=4.0, m=3.5 are indicated in Fig.15.

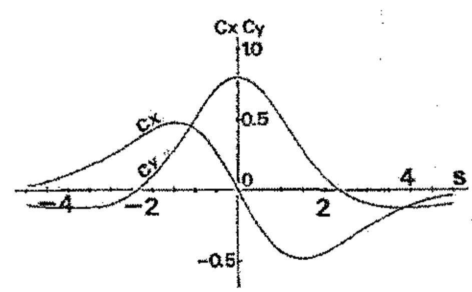

Fig.15 - Force coefficients variation for n=4.0, m=3.5

Fig.16 and Fig.17 show the time history of the force coefficients in the x- and y-direction acting on cylinder B for n=4.0 in the case of m=2.75, 3.0, 4.5, 5.0, respectively. Fig.18 shows the relationship between the maximum positive value of force coefficient Cy to h. Where h is the dimensionless distance between two circular cylinders.

The negative value of force coefficient Cy occurs up to approximately s=Vt/2b=-2 and the negative value indicates that the force is in a direction away from cylinder A. The positive value of Cy is at a maximum when the two cylinders come closest and the positive value force tends to pull the cylinder B toward the cylinder A. The maximum positive force increses markedly with the decreasing in distance between cylinder B and cylinder A.

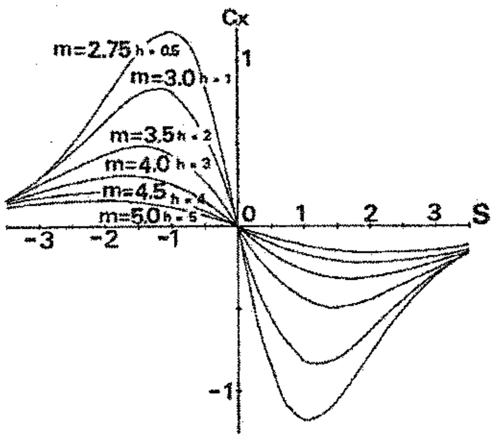

Fig.16 - Cx variation for n=4.0

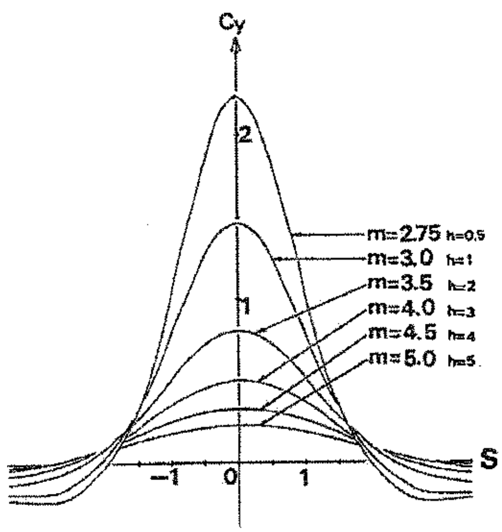

Fig.17 - Cy variation for n=4.0

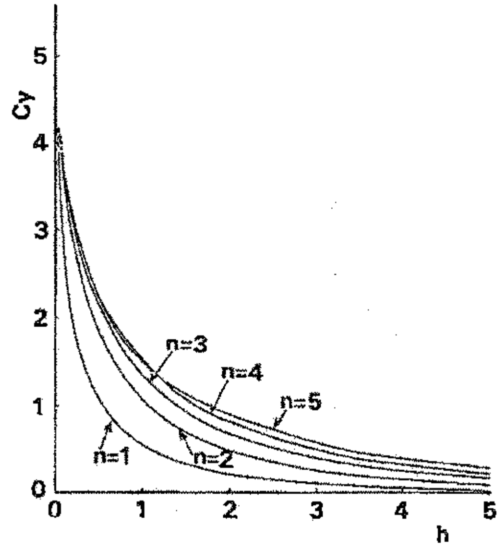

Fig.18 - Relationship between Cy to h for various n

FINITE ELEMENT METHOD - Potential flow to two circular cylinders is obtained by finding the solution to Laplace's equation

$$\frac{\partial^2\psi}{\partial x^2} + \frac{\partial^2\psi}{\partial y^2} = 0, \tag{18}$$

subject to boundary conditions

$$\left.\begin{aligned} \frac{d\psi}{dn} &= q \text{ on moving cylinder} \\ \frac{d\psi}{dn} &= 0 \text{ on stationary cylinder,} \end{aligned}\right\} \tag{19}$$

where ψ is the stream function, and $\frac{d\psi}{dn}$ is normal velocity to the surface of the moving cylinder. The x- and y-components of velocity are given as

$$\left.\begin{aligned} u &= -\frac{\partial\psi}{\partial y} \\ v &= \frac{\partial\psi}{\partial x}, \end{aligned}\right\} \tag{20}$$

The variational solution to this problem is the function ψ which minimizes the functional

$$x = \int_D \frac{1}{2}[(\frac{\partial\psi}{\partial x})^2 + (\frac{\partial\psi}{\partial y})]dD - \int_S q\psi dS, \tag{21}$$

Where D is a domain and S is the boundary of D. The region D+S is divided into triangular elements. Let there be m nodal point in the entire region of D+S. From the minimization of the functional is derived the following matrix equation

$$[K]\{\psi\}=\{F\}. \tag{22}$$

Where [K] is the global stiffness matrix whose elements are functions of the nodal coordinates, $\{\psi\}$ is the (m 1) column matrix whose elements are unknown ψ_1, ψ_2, ..., ψ_m, {F} is the global force vector which is determined by the prescribed boundary conditions.

In Fig.19 are shown the streamlines which were obtained from velocity potential calculated using the finite element method proposed by G.de Vries and D.H.Norrie.

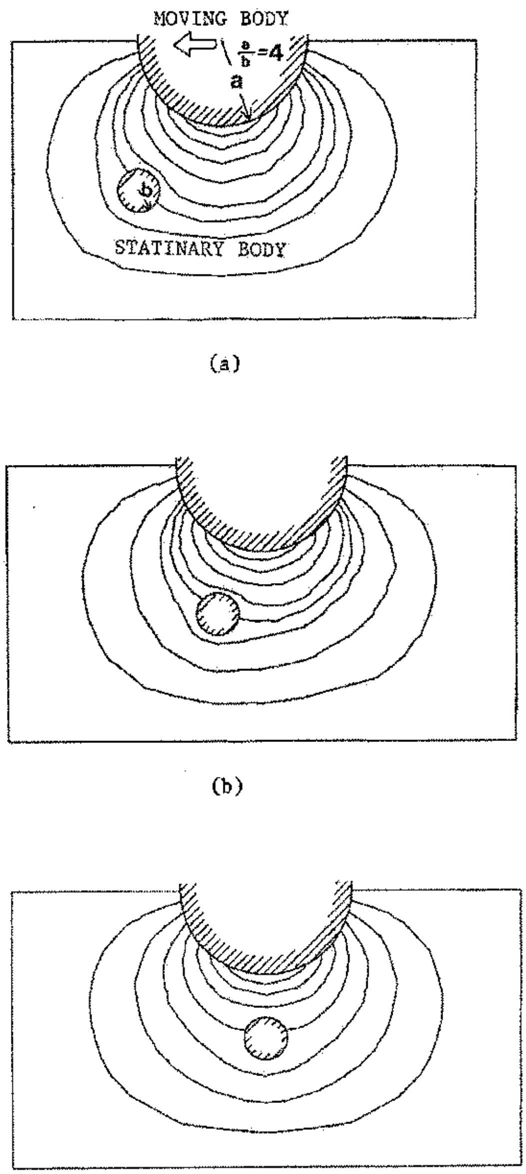

Fig.19 - Stremline pattern around two circular cylinders

The extention of the method to arbitrary bodies is under investigation.

CONCLUSIONS

From the results obtained from experiments and numerical calculations, the following conclusions were obtained:

1. The force acting on stationary body (bicycle) in a direction away from the moving body (vehicle) occurs for the first time as the passing begins.
2. The force which pulls the stationary body (bicycle) toward the moving body (vehicle) is at a maximum when the two bodies come closest.
3. The maximum pulling force increases markedly with the decreasing of the distance between the two bodies (bicycle and vehicle).
4. Because effects due to the viscosity are neglected in numerical analysis, the results of the numerical analysis after the instant when the pulling force occurs, do not agree with the experimental results.
5. The research on arbitrary bodies remains to be proved in numerical analysis.

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EXHIBIT 5

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The Effect of Front-Edge Rounding and Rear-Edge Shaping on the Aerodynamic Drag of Bluff Vehicles in Ground Proximity

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The Effect of Front-Edge Rounding and Rear-Edge Shaping on the Aerodynamic Drag of Bluff Vehicles in Ground Proximity

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ABSTRACT

Wind tunnel measurements on a rectangular vehicle-like shape and on two detailed, scale-model trucks have been employed to define the front and rear edge geometries that minimize aerodynamic drag. Optimum configurations are identified with sufficient detail for commercial vehicle design purposes. Comparisons of the model-scale measurements with limited measurements on a full-scale straight truck in a large wind tunnel support the interpretation of these test results.

THE AERODYNAMIC DRAG OF A BLUFF SHAPE is due to the pressure difference arising between the front and rear faces of the body, with only a secondary contribution due to skin friction. Bluff bodies are those bodies having significant regions of separated flow, irrespective of whether the separations occur at the front or the rear of the body. Most commercial road vehicles are typical bluff bodies.

Commonly, aerodynamic drag is reduced on such bodies by modifying the shapes of the front and rear edges to reduce the average front-face pressure and to increase the average base pressure, respectively. The addition of highly streamlined nose and tail pieces can dramatically reduce drag, but they may produce vehicle lengths and shapes that are unacceptable for road use and are commercially impractical. The impetus is thus toward finding methods of providing the majority of the benefits of such unacceptable, but effective, modifications with the smallest, least intrusive change to the body.

Front-edge rounding [1]* and rear-edge shaping [2], in the form of tapering or boat-tailing, have been used successfully for this purpose. However, while these techniques are recognized as being effective, no results of systematic investigations to establish the optimum geometries have been published.

Data from Carr [1] provide a useful preliminary survey of front-edge rounding, but these data cannot be readily or reliably extrapolated to full scale because of the low test Reynolds numbers and because few radii were tested. Hucho et al [3] show that the required front-edge radius on a full-scale van at high Reynolds number is less than predicted by model-scale wind tunnel tests at low Reynolds number. This situation is not acceptable to the designer who wishes to maximize vehicle volume and is being penalized by incorrect model-scale results. Testing must provide a sufficiently wide range of geometry and Reynolds number variations to allow extension of the measurements to full-scale.

The first part of this paper will address the problem of front-edge-radius-Reynolds-number behaviour. It demonstrates a useful data collapse that allows the selection of the optimum front-edge radius for box-shaped vehicles at full-scale Reynolds numbers. The data used are from simple, rectangular, vehicle-like shapes in ground proximity, mounted in a wind tunnel and tested at lower than full scale Reynolds numbers. The intent of this part of the paper is not to pinpoint the magnitude of the drag change on a particular vehicle but to demonstrate how low-Reynolds-number, wind-tunnel data can be used to select the best front-edge geometry at full-scale.

The rear end also offers possibilities for drag reduction [2], and the second part of the paper realistically addresses base drag reduction. It demonstrates that simple, non-intrusive rear end modifications can almost halve the base drag, but that the gains are modest compared to those available from the front of the vehicle. In this instance, the testing was done using detailed 1:10 scale models of two trucks.

Cooper [4] has suggested that forebody pressure drag contributes from 60 percent to 70 percent of the total wind-averaged drag of trucks and buses, while Marks et al [5] have measured the

*Numbers in parentheses designate references at end of paper.

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base drag contribution to be 15 percent to 25 percent of the total, depending on vehicle type. Obviously, forebody drag reduction is the first choice to make but this should not preclude resort to base drag reduction when simple, effective means are available.

Both tests reported in this paper were performed in the 2 m × 3 m wind tunnel of the National Research Council of Canada as part of a research program designed to improve wind tunnel test technique and to obtain a better understanding of the basic aerodynamic behaviour of surface vehicles.

TEST FACILITY AND DATA SYSTEM

The 2 m × 3 m wind tunnel of the National Research Council is a closed-jet, closed-return tunnel with a maximum speed capability of 100 m/sec. It was fitted with a full-span groundboard extending the full length of the test section, as shown in Figure 1. The settling chamber was fitted with 3 turbulence-reducing screens and a heat exchanger designed to keep the tunnel temperature nearly constant. The contraction ratio was 9:1. The mean flow dynamic pressure was uniform over the test section above the groundboard within ±0.5 percent of the mean, flow angularity in the horizontal and vertical planes was less than ±0.1°, the turbulence intensity with groundboard present was 0.5 percent, the longitudinal static pressure coefficient gradient was $-0.0044\ m^{-1}$, and the groundboard boundary layer displacement thickness at the leading edge of the turntable was 4 mm.

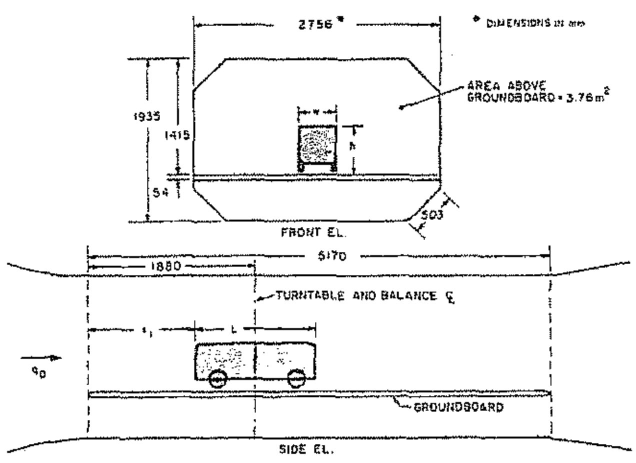


FIG. 1: WIND TUNNEL TEST SECTION (TO SCALE)

Aerodynamic forces and moments were measured by a six-component, servo-controlled, weigh-beam, pyramidal balance located below the tunnel floor. The balance measures in a wind-axis coordinate system with a virtual centre 447 mm above the top of the groundboard, vertically above the turntable centre. The balance ranges, resolutions, and accuracies for steady applied loads are summarized in Table 1. The aerodynamic loads were transferred from the model to the balance by a series of pins that connect the tire contact points of wheeled vehicles to a pair of shielded struts attached to the balance via a plate within the groundboard turntable, providing a tare-and-interference-free mounting.

TABLE 1

BALANCE MEASUREMENT CAPABILITIES

Component	Range	Resolution	Accuracy
Drag, Side Force	±4450 N	0.18 N	±2.25 N
Lift	±6675 N	0.27 N	±3.38 N
All moments	±2710 Nm	0.11 Nm	±1.36 Nm

The test-section dynamic pressure was obtained from a static pressure difference between the settling chamber and the entrance to the test section. This pressure difference was calibrated against a reference pitot-static tube mounted near the centre of the model volume (tunnel empty).

Force and moment data from the balance encoders, tunnel temperature, atmospheric pressure, turntable angular position, and test dynamic pressure were all sampled simultaneously by a PDP 11/60 computer. Each data point was formed from an average of 15 separate measurements made over an eight second period. The averaging was used to improve data repeatability in the presence of the unsteady forces and moments on the bluff shapes under test.

The repeatability of the model measurements was determined from four separate sets of measurements on the tractor-trailer model. These measurements included variations due to model installation, as each repeat measurement was made at different times during the test program. Between these, the model had been removed and disassembled. The tractor-trailer was chosen because it was the most complex model and because it was most sensitive to small geometry changes. The standard deviation of the drag coefficient measurements at all 14 yaw angles (56 data points in all) was found to be 0.003.

The balance data were converted to coefficient form as defined in the Notation at the end of the paper, corrected for blockage, and then transformed into a body-axis co-ordinate system using the co-ordinate origins defined in the following section.

The blockage correction appears as a dynamic pressure increase produced by a reduction in tunnel cross-sectional area near the model and is given by an expression derived by Maskell [6] for geometries where separated flow predominates. The expression for the dynamic pressure correction factor is:

$$q_c/q = 1 + 2.5\, C_{D_u} S/C \qquad (1)$$

It should provide a good correction for drag coefficients of 0.8 and higher but may under-correct at lower drag levels. Thus, the truck drag coefficients from the second part of the paper should be well-corrected while the corrections for the low-drag, simple bodies will not be as good. The shapes of the drag-coefficient-Reynolds-number curves are of most importance in the latter instance, not the absolute drag level. Any small errors in the edge-rounding data due to an inadequate blockage correction will not effect the conclusions drawn.

MODEL DETAILS, TUNNEL INSTALLATION AND TEST PROCEDURE

The two test programs that comprise this paper, and the models employed in them, are sufficiently different that the following discussions will deal separately with each.

The front-edge rounding study was qualitative in nature in that it investigated Reynolds number behaviour with edge-radius variations in order to better understand the extrapolation of model-scale wind tunnel measurements to full scale. A simplified, vehicle-like shape was used because the primary interest was not in the level of drag reduction on a specific shape but, rather, in general behaviour.

The rear-edge shaping study was more quantitative and more applied. It examined the potential for drag reduction through simple, practical methods of base drag reduction using two accurate, detailed truck models. It was hoped that the data would also apply to other box-shaped vehicles such as buses and rail vehicles.

Information on model dimensions and the wind tunnel installation are provided in Table 2 and by reference to Figures 1, 2 and 3.

The coordinate system to which the wind axis balance measurements were transformed is shown in Figure 4. The origin of coordinates was always at ground level on the longitudinal centre-line of the models, at the longitudinal locations, x_{cg}, given in Table 2.

FRONT-EDGE ROUNDING - The front-edge rounding studies were performed using the simplified box model shown in the drawing of Figure 3. The body was a rectangular block having height:width:length = 1:1:3. Several major model reference dimensions are summarized in Table 3. The model was sized to approximate a 1:4 scale van or a 1:8 scale straight truck body. The full scale truck body, for example, would have a width and height of 3048 mm and a length of 9144 mm. The model was connected to the balance mounting plate by four 13 mm diameter exposed cylindrical struts and had an underbody clearance of 0.075 of the model height. The front face was removeable, allowing the front-edge radii to be varied on the top and sides only, as can be seen in Figure 5. The lower front edge was always square. The following ten non-dimensional radii, $\eta = r/\sqrt{A_b}$, were tested: 0.000, 0.010, 0.025, 0.050, 0.063, 0.075, 0.100, 0.125, 0.150, 0.250.

The choice of reference length to normalize the edge radii, $\sqrt{A_b}$, was arbitrary and could equally well have been the hydraulic diameter. Either are probably superior to using height or width when applying the data to rectangular bodies as long as the ratio of height to width is not too far from unity, say $0.7<h/w<1.4$.

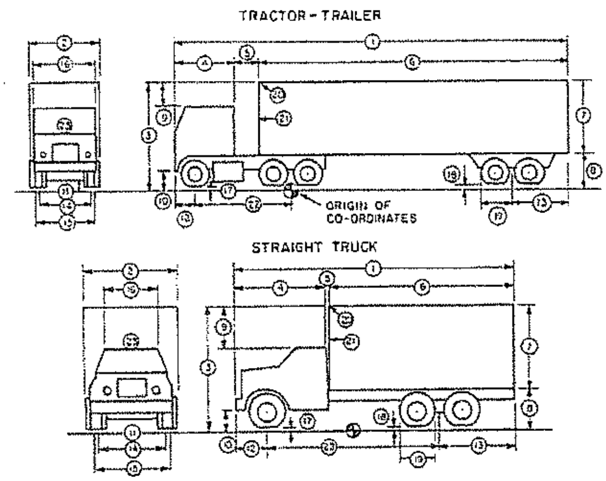


FIG. 2: MODEL DIMENSIONS

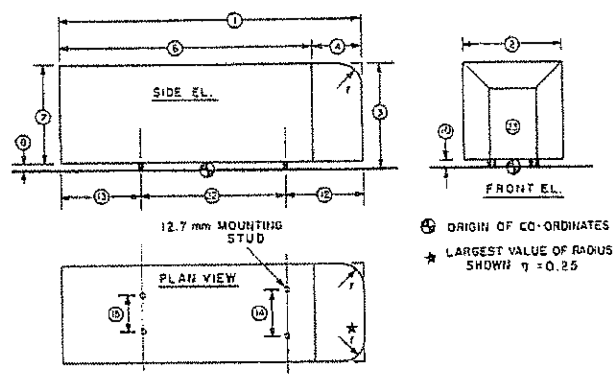


FIG. 3: RECTANGULAR MODEL USED FOR FRONT-EDGE ROUNDING STUDY

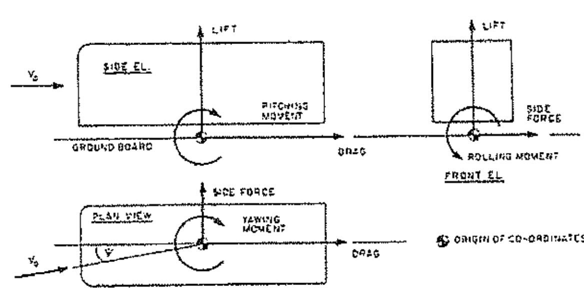


FIG. 4: BODY AXIS CO-ORDINATE SYSTEM

TABLE 2

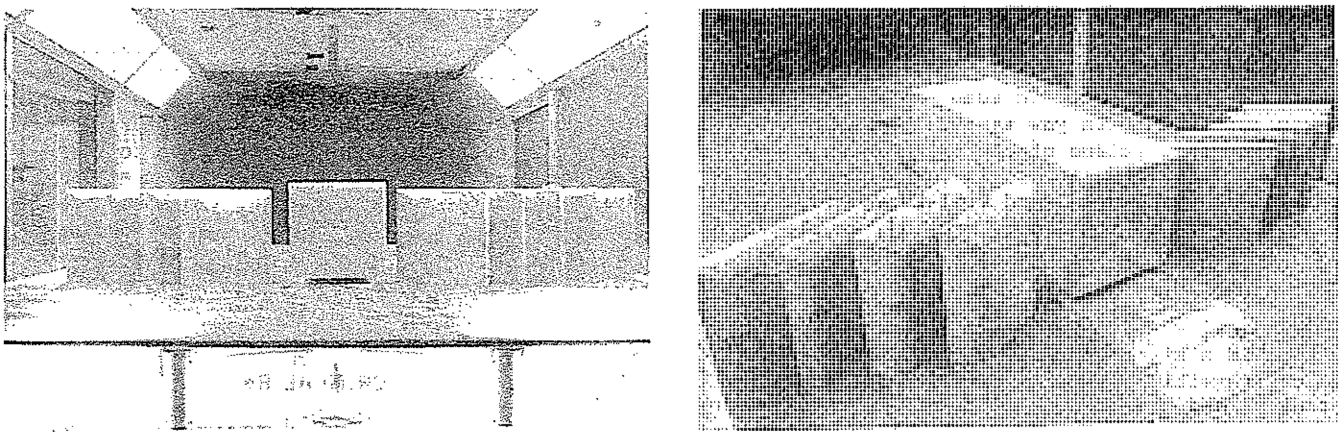
STANDARD CONFIGURATION MODEL DIMENSIONS, mm (See Figs. 2 and 3)

		Simple Box	Ford Truck	GMC Tractor-Trailer
1	Overall length, L	1143	935	1575
2	Overall width, w	381	244	244
3	Overall front height, h	406.4	336	412
4	Cab/front block length	—	242	219
5	Gap length	—	15	130
6	Trailer/body length	—	673	1219
7	Rear body height	381	230	289
8	Rear ground clearance	25.4	106	123
9	Roof height differential	—	80	116
10	Front ground clearance	25.4	54	58
11	Minimum ground clearance	25.4	30	30
12	Front overhang	291.5	78	71
13	Rear overhang	291.5	298	230
14	Front track width	174.6	189	200
15	Rear track width	139.7	175	179
16	Roof width	—	166	233
17	Front wheel air gap	—	1	1
18	Rear wheel air gap	—	1	1
19	Typical tire diameter	—	103	110
20	Front top geometry	variable (Fig. 4)	channel (Fig. 8)	channel (Fig. 7)
21	Front side geometry	variable (Fig. 4)	4.8 mm radius (Fig. 8)	24 mm, 45° bevel (Fig. 7)
22	Wheelbase, b	560	560	381
23	Total frontal area, A	0.1161	0.0778	0.0985
	Leading edge distance, x_1	1151	1575	1204
	Moment ref. centre re vehicle leading edge (12 + 22), x_{cg}	851.5	638	611

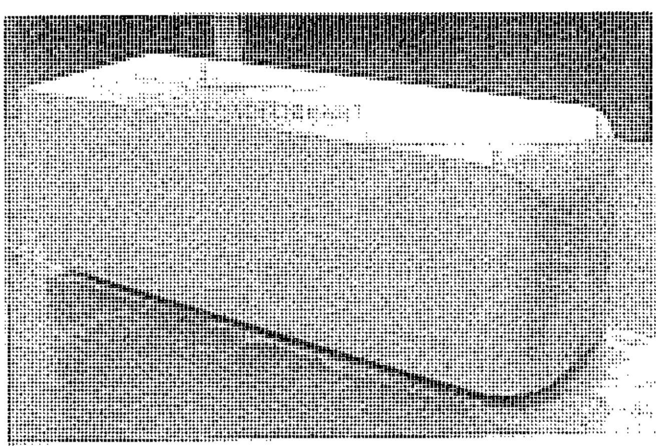
TABLE 3

MODEL REFERENCE AREAS (m^2) AND LENGTHS (mm)

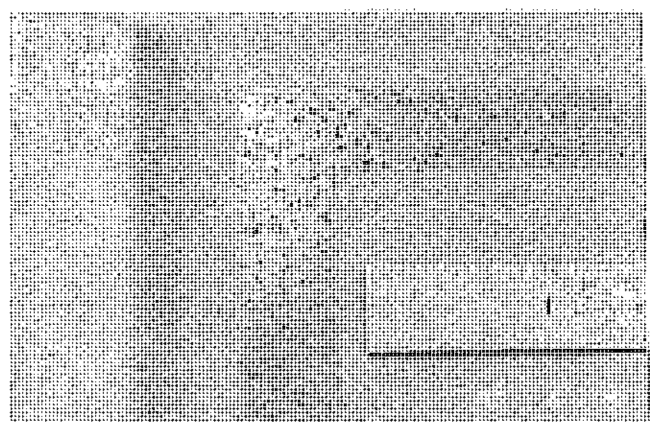
	Simple Box	Ford	GMC
Total frontal area, A	0.1161	0.0778	0.0985
Model body area, A_b	0.1161	0.0625	0.0706
Non-dimensionalizing length, $\sqrt{A_b}$	340.7	250.0	265.8
Wheelbase, b	560	560	381
Model-Tunnel area ratio	0.031	0.022	0.026



Model on ground board surrounded by alternate front panels



Details of model with η = 0.25 radius showing fit of front panel



Detail of 13 mm wide trip-strip at upper left corner of model formed from glass beads with g/r = 0.046, r = 0.9 mm, glued to body surface

FIG. 5: BLOCK MODEL USED FOR FRONT EDGE ROUNDING STUDY

Measurements were made at each edge radius, from a Reynolds number $Re_A = 1.6 \times 10^5$ (6 m/sec) to as high as $Re_A = 2.6 \times 10^6$ (100 m/sec), at yaw angles of 0°, 5°, 10°, 15°. The increment in Reynolds number was usually 1.20×10^5 (4.6 m/sec). The Reynolds number is defined as $Re_A = \sqrt{A_b}\, V/\nu$ where, in this case, $\sqrt{A_b} = h = w$ because the body had a square cross-section. The rectangular body also has $A_b = A$, as would be the case for rail vehicles or buses, but not for trucks. A_b is used to emphasize the fact that the reference area of the cargo box is the parameter of major significance because this area is directly affected by the rounding. Most runs were done with speed both increasing and decreasing to investigate possible flow hysteresis.

One full yaw run was done from -15° to +15°, for each value of radius at $Re_A = 2.2 \times 10^6$, to explore model symmetry and to define better the detailed yaw behaviour. The tunnel was accelerated to full speed at $\psi = 0°$, the model was positioned to $\psi = -15°$ and swept through 15 angle steps to $\psi = +15°$ and, in some cases, back to -15° again to investigate yaw hysteresis.

The descriptions of the various Reynolds number regimes referred to in this paper are related to the typical and well-known drag coefficient behaviour of the sphere [2], as sketched in Figure 6. The critical Reynolds number is taken as the value at which the drag coefficient begins to reduce from its nearly constant, subcritical value. The transcritical Reynolds number is a higher value of Reynolds number at which transition to fully turbulent flow has occurred and the drag coefficient is again constant with increasing Reynolds number. It defines the beginning of the transcritical Reynolds number region. The region of drag coefficient change between these limits is the *transitional* Reynolds number region.

Several methods of sealing the front blocks onto the model body were investigated, including: no seal, modelling clay, and 0.10 mm thick aluminum tape. Each method produced a slightly different critical Reynolds number and somewhat different transitional drag behaviour, but all had the same transcritical Reynolds number. The tape was chosen as the most consistent sealing method and was always applied such that it was as far round the edge as possible, and often near the point at which the radius was tangent to the side or roof panel.

Some additional wind tunnel time was available at the end of the main program so a brief investigation of flow-tripping was made using strips of sand particles or glass beads on the sides and top of the front face. The size of the roughness elements, the strip width and the strip location were varied. Although only a few cases were tested, the results are of sufficient interest to be included.

REAR-EDGE SHAPING - Rear-edge shaping in the form of an area reduction of the vehicle base, sometimes referred to as *boat-tailing* [2], was investigated as a method of base-drag reduction. These tests were performed using two 1:10 scale truck models. One was a 1:10 scale 1977 GMC Astro 95 tractor with a 1219 mm long, 412 mm high, smooth-sided Monon trailer having bevelled front posts (Figure 7). The other was a 1977 Ford LN 700 straight truck with a 673 mm long, 361 mm high body having slightly rounded front posts (Figure 8). The model reference lengths and areas are summarized in Table 3 and defined in the Notation. The total frontal areas were used for the calculation of aerodynamic coefficients while the square-root of the body reference areas, $\sqrt{A_b}$, were used to non-dimensionalize base component dimensions.

The models were equipped with all major underbody and driveline components and were fitted with a porous radiator simulation with approximately the correct radiator momentum loss. The truck models were mounted through the wheel contact points with an under-wheel air gap of 1.2 mm. The wheels were machined flat by this amount on their bottom surfaces. The models were fitted with removeable blocks that allowed different rear-end geometries to be mounted. The truck body and trailer could also be fitted with front-end blocks with rounded side and top edges providing lower drag configurations, in addition to the standard ones. Both front blocks had r = 23 mm, giving $\eta = r/\sqrt{A_b} = 0.091$ for the truck body and $\eta = 0.086$ for the trailer body, where the reference area is taken as the cargo-carrying body or trailer frontal area.

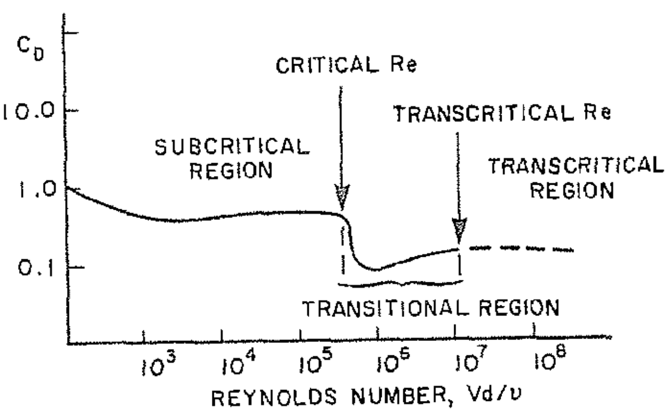
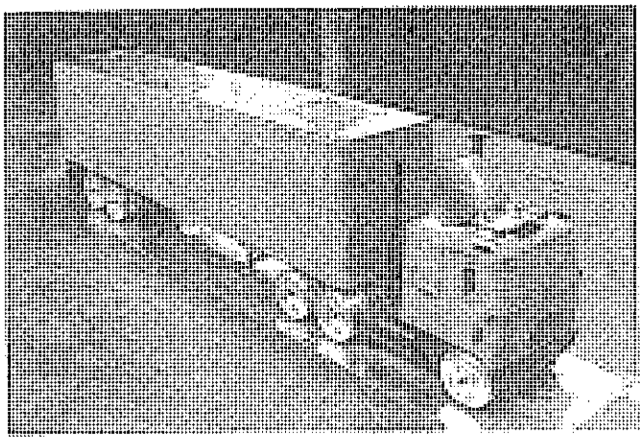
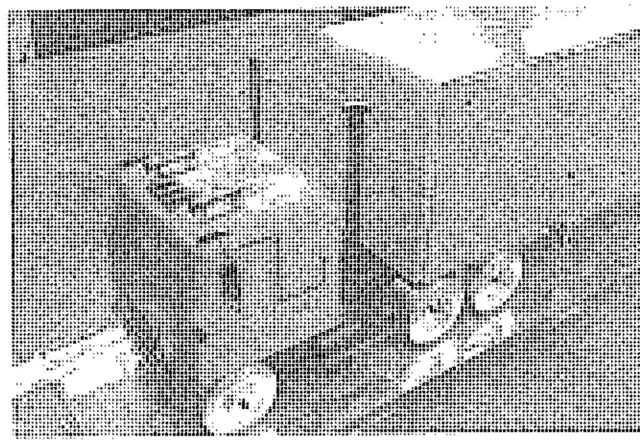


FIG. 6: TYPICAL DRAG VARIATION WITH REYNOLDS NUMBER (SPHERE [2])

Two types of rear-edge shaping were used; either a simple rounding by a circular-arc radius, or a bevel. These modifications were usually fitted to the top and sides only. The bevels and the radii were designed to be complementary pairs, such that the bevelled and rounded panels both ended at the same point, as shown in the sketch of Figure 9. Thus, each bevel-radius pair can be characterized by a non-dimensional length $\bar{\ell} = \ell/\sqrt{A_b}$, and by an angle θ. The panel length, ℓ, is defined as the panel length for the bevel and the chord length for the radius. Seven angles and five lengths were used for each rear shape, resulting in a basic test matrix of 140 yaw runs. The true lengths and non-dimensional lengths of

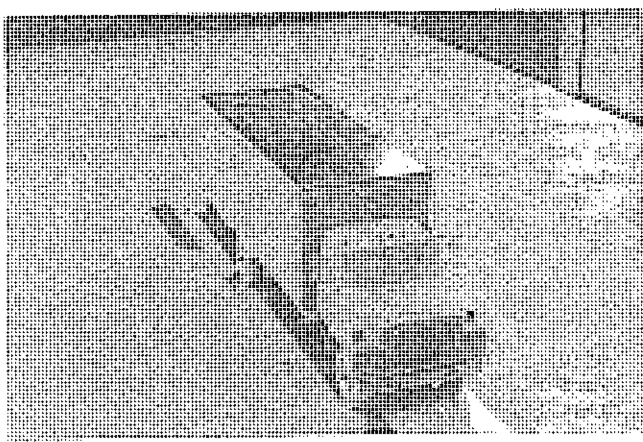


Standard trailer front face — deflector mounted

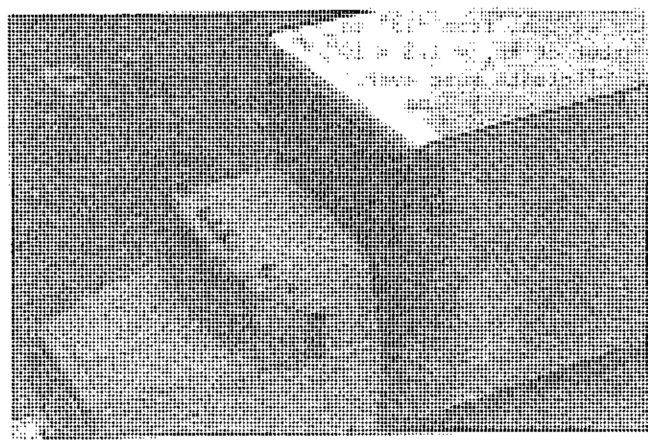


Rounded front face on trailer

FIG. 7: 1:10 SCALE, 1977 GMC ASTRO 95
AND MONON TRAILER



Standard truck body



Rounded front face on body

FIG. 8: 1:10 SCALE, 1977 FORD LN700
STRAIGHT TRUCK

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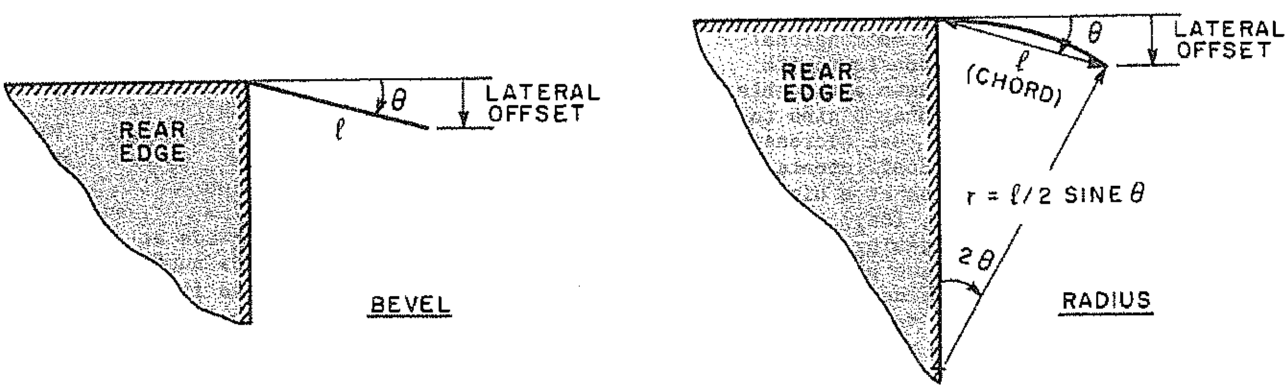

FIG. 9: GEOMETRY OF BEVELLED AND CURVED
REAR PANELS

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the rear panels are given in Table 4. The lateral offsets of the bevelled and curved panels, and the equivalent radii of the curved panels are summarized in Table 5 in a non-dimensional form. Multiplication of the non-dimensional radius or lateral offset by the panel length gives the actual radius or lateral offset.

The add-on pieces were made in the form of thin panels so that a three-sided base cavity was formed when they were installed. Once the basic aerodynamic behaviour was determined, the open bottom was closed with a flat, horizontal panel to provide a four-sided cavity. Only the best configurations were tested in this latter manner. Several of these cavities were then filled-in to establish whether the presence of a cavity, or just the shaping, was of most importance. Finally, a fully streamlined tail, built up of a series of six segments, was tested piece-by-piece for comparison with the simple boat-tailing approach on the straight truck. Photographs of the various configurations tested can be seen in Figure 10.

Each measurement was made over a range of 15 yaw angles, from -15° to +15°, at a test Reynolds number of $Re_A = 1.3 \times 10^6$ (V≈72 m/sec). The drag coefficients were averaged over a range of yaw angles to determine the wind-averaged drag coefficient as defined in [7], at a road speed of 90 km/h and for an annual hourly mean wind speed of 11.3 km/h. Thus, each drag-yaw curve is reduced to a single, average value of drag coefficient, greatly facilitating data interpretation.

The procedures of the SAE Standard Practice for the wind tunel testing of trucks and buses, J1252 [7], were followed.

DISCUSSION OF EFFECTS OF FRONT END ROUNDING

REYNOLDS NUMBER BEHAVIOUR - The major effects of front-edge rounding can be seen in Figure 11, Figure 12, Figure 13 and Figure 14, where the drag coefficient is plotted against Reynolda number for yaw angles of 0°, 5°, 10° and 15°, respectively. As expected, large drag reductions are possible with simple rounding. The form of the general Reynolds number behaviour is like the behaviour presented in Figure 6. At small radius, where radius is taken to mean the non-dimensional value $\eta = r/\sqrt{A}$, C_D is nearly constant with Reynolds number up to the maximum attainable value while, at larger radius, the drag begins to drop at a critical Reynolds number that decreases with increasing radius. The drag coefficients reduce to an asymptotic, plateau value at a higher transcritical Reynolds number, $(Re_A)_t$, that is also seen to reduce with increasing radius. The asymptotic drag coefficients are nearly conatant for radii above a threshold value. When the radius is below the threshold value different drag plateaus are found, where the plateau drag value increases for smaller radii. This can be seen for radii of 0.050 and 0.063 in Figure 13, for example.

The critical and transcritical Reynolds numbers increase with yaw angle, with the largest change seen at the smaller radii. The drag measurements in the transitional Reynolds number region were found to be considerably more unsteady than at lower or higher Reynolds numbers, probably due to periods of intermittent flow separation and reattachment. The transcritical Reynolds numbers, which will be the focus of later discussion, are indicated on each of the four figures, where possible.

Wool tufts were attached to one side and to the roof panels of the model in order to allow visualization of the surface flow as an aid to understanding the drag coefficient behaviour described above. The flow visualization studies were done at 0° and 10° yaw angles for three of the radii tested - $\eta = 0.050$, $\eta = 0.063$, and $\eta = 0.100$.

Leading edge flow separation, followed by flow reattachment farther downstream, was observed at subcritical Reynolds numbers for all three radii. The resulting separation regions, or separation bubbles, were usually smaller in size at the larger radii, for a given Reynolds number.

When the Reynolds number was increased above the critical value the separation bubble lengths were seen to decrease. Intermittent separated and fully-attached flow was observed for the largest two radii. The separation bubbles vanished and permanent, fully-attached flow was observed on the side and roof above the transcritical Reynolds number for these two radii at 0° yaw angle.

The separation bubble size on the side and roof seemed to decrease up to the transcritical Reynolds number and then remained approximately constant in size with further decreases in Reynolds number at 0° yaw angle for the smallest radius, $\eta = 0.050$.

Fully attached flow was observed on the leeward side at 10° yaw angle only, for the largest radius, $\eta = 0.100$, although attached flow was seen on the roof at this angle for both $\eta = 0.100$ and $\eta = 0.063$.

Several examples of this flow visualization are presented for 0° yaw angle in the photographs of Figure 15 and Figure 16. Figure 15 shows the reduction in separation bubble length for $\eta = 0.050$ from 0.36 of the body length at $Re_A = 1.82 \times 10^6$ to 0.20 of the body length at $Re_A = 2.30 \times 10^6$. At higher Reynolds numbers the bubble probably does not change much more, as suggested by the flattening drag curve of Figure 11. Figure 16 shows the separation behaviour with $\eta = 0.063$ at 0° yaw angle. Flow separation is seen on both the side and roof at $Re_A = 1.29 \times 10^6$, on the roof only with attached flow on the side at $Re_A = 1.67 \times 10^6$, and attached flow is seen on both roof and side at $Re_A = 2.04 \times 10^6$. The Reynolds number for combined separated and attached flow falls on a small drag plateau, as seen in Figure 11.

While these observations are only qualitative they do indicate that the front radii having equal, or almost equal, asymptotic, high-Reynolds number drag coefficients all had fully attached leading-edge flow. The varying drag coefficient asymptotes of the smaller radii are due to

TABLE 4

REAR PANEL GEOMETRY

Full-Scale Panel Length (mm)*	$\bar{\ell} = \ell/\sqrt{A_b}$ Ford	GMC
152.4	0.061	0.057
304.8	0.122	0.115
457.2	0.183	0.172
609.6	0.244	0.229
914.4	0.366	0.344

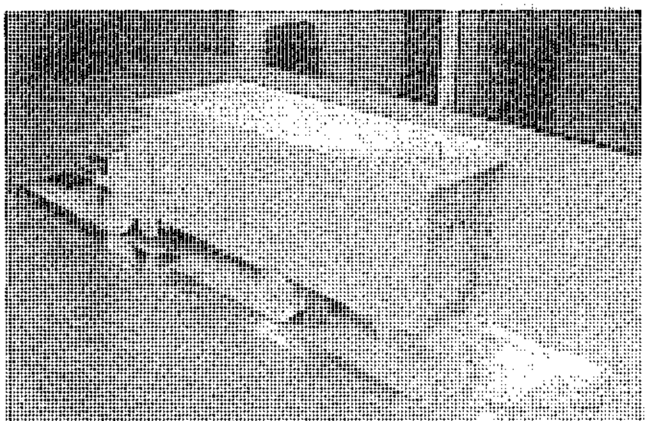
*Same panel length used for each truck.

TABLE 5

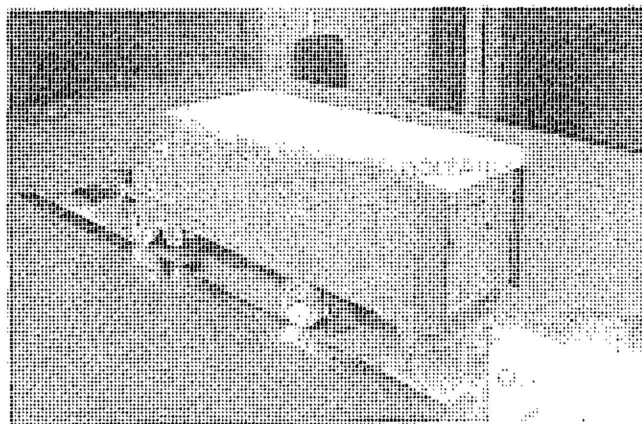
NON-DIMENSIONAL REAR PANEL RADII AND LATERAL OFFSETS

Panel Angle (deg.)	Radius/ℓ*	Lateral Offset/ℓ*#
5	5.74	0.087
10	2.88	0.174
15	1.93	0.259
20	1.46	0.342
25	1.88	0.423
30	1.00	0.500

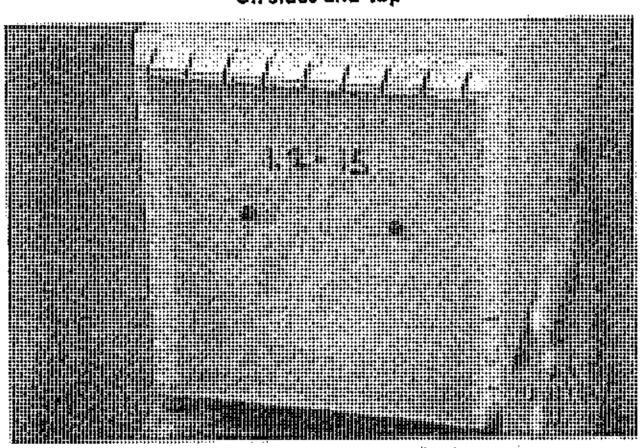
* Multiply by panel length to get radius and offset.
#Lateral offset identical for bevelled and curved panels at same angles and lengths.



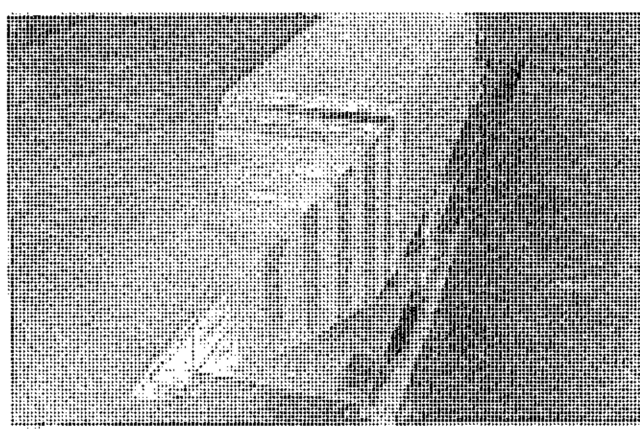
45.7 mm long bevelled panels ($\bar{\ell}$ = 0.183) at θ = 15° on sides and top



45.7 mm long curved panels ($\bar{\ell}$ = 0.183) at θ = 15° on sides and top (radius = 88.2 mm)



Slotted 30.5 mm bevelled panels at θ = 15° on sides and top. Bottom of cavity with typical closure



Full tail with length of 305 mm. Top contour identical to sides, bottom flat

FIG. 10: TYPICAL REAR-EDGE MODIFICATIONS ON FORD LN700