
NORTH CAROLINA

IN THE GENERAL COURT OF JUSTICE

WAKE COUNTY

SUPERIOR COURT DIVISION

BRIAN CECCARELLI and LORI)
MILLETTE, individually and)
as class representatives,)
)
Plaintiffs,)

v.)

No. 10-CvS-019930

TOWN OF CARY,)
)
Defendant.)

DEPOSITION OF GREG FULLER, P.E.

MONDAY, OCTOBER 15, 2012

ITS and Signals Conference Room

North Carolina Department of Transportation

750 North Greenfield Parkway

Garner, North Carolina

2:00 p.m.

Volume 1 of 1

Pages 1 through 99

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T A B L E O F C O N T E N T S

<u>WITNESS</u>	<u>DIRECT</u>	<u>CROSS</u>	<u>REDIRECT</u>
<u>GREG FULLER</u>			
By Mr. Stam	7-66		93-97
By Ms. Martineau		66-93	

EXHIBITS

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>MARKED</u>
<u>Plaintiff</u>		
A	North Carolina State University civil engineering curriculum for students entering after 7/10 (Sum2 '10), with attachment	7
B	"Application of the ITE Change and Clearance Interval Formulas in North Carolina," Steven M. Click, Ph.D., P.E., <i>ITE Journal</i> , 1/08	14
C	Determination of Yellow Change and Red Clearance Intervals	19
D	e-mail, Garner to Alexander, 3/9/05, with attachment	24
E	equations, The relationship between acceleration, velocity and time	46
F	Critical Distance - also known as the Distance Required to Stop	46
G	A Simple Computation of Critical Distance	49
H	Cary Towne Boulevard and Convention Drive (EB), Kildaire Farm Road and Cary Parkway (NB), Cary Parkway and Kildaire Farm Road (WB), Walnut Street and Meeting Street (SB)	51

T A B L E O F C O N T E N T S
(continued)

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>MARKED</u>
I	Traffic Engineering Handbook, 6th Edition, excerpts	54
J	Standard Practice for Compliance with Traffic Signal and Electrical/Programming Detail Plans	56
K	Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition, including Revision 1 dated May 2012 and Revision 2 dated May 2012, excerpts	61
<u>Defendant</u>		
1	Signal Upgrade, Western Boulevard Extension and Convention Drive - Principal Lane	68
2	Clearance Time Sheet	71
3	Signal Upgrade, Kildaire Farm Road at Cary Parkway	73
4	Signal Upgrade, SW Maynard Road at Kildaire Farm Road	76
5	Signal Upgrade, Walnut Street at Meeting Street, 10/26/09	79
6	Signal Upgrade, Walnut Street at Meeting Street, 10/26/09	81
7	Signal Upgrade, Walnut Street at Meeting Street, 6/24/09	82
8	Signal Upgrade, High House Road at Cary Parkway, 10/5/06	83
9	Signal Upgrade, High House Road at Cary Parkway, 2/17/11	85

T A B L E O F C O N T E N T S
 (continued)

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>MARKED</u>
10	Signal Upgrade, Kildaire Farm Road at Cary Parkway, 4/28/09	85
11	Signal Upgrade, Kildaire Farm Road at Cary Parkway, 6/23/10	87

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PROCEEDINGS

1:57 p.m.

(This deposition was taken pursuant to the North Carolina Rules of Civil Procedure.)

(Whereupon,

GREG FULLER, P.E.

was called as a witness, duly sworn, and testified as follows:)

DIRECT EXAMINATION

1:57 p.m.

By Mr. Stam:

Q State your name and business address, please.

A Greg Fuller, North Carolina Department of Transportation, 750 North Greenfield Parkway, Garner 27595.

Q And how long have you been with DOT?

A Since October of 1989.

Q What is your position now?

A I am currently the head of the ITS and Signals Unit.

Q What does ITS stand for?

A Intelligent Transportation Systems.

Q How long have you had that position, or an equivalent position if the name changed, approximately?

A Since December 2001.

Q And has that been your full-time occupation since then?

A Yes, sir.

Q What education did you have preparing you for that

1 position?

2 A I have a bachelor of engineering technology degree in
3 electrical engineering.

4 Q From?

5 A The University of North Carolina at Charlotte,
6 graduated May 1989.

7 Q Okay. Any further education?

8 A No education, but I'm a licensed professional engineer
9 in the state of North Carolina.

10 Q All right. When did you get your license? How long
11 have you been licensed?

12 A I think 1999. I would have to--I've got it my office
13 if you need me to go get it.

14 Q No. No, that's fine. What would you say the
15 definition of engineering is?

16 A Applying classroom theory to real world practical
17 applications.

18 Q Would the classroom theory include mathematics,
19 physics, and other sciences?

20 A Yes.

21 (Plaintiffs Exhibit A was
22 marked for identification.)

23 Q Okay. I'll show you what's been marked for
24 identification as Plaintiffs Deposition Exhibit A, which--if
25 you can tell us what it appears to be?

1 A This is the civil engineering curriculum from North
2 Carolina State University.

3 Q Not looking at every detail, but does it appear to be
4 the same type of curriculum you would have had at University
5 of North Carolina Charlotte?

6 A I'm an electrical engineer, so I had a different
7 curriculum.

8 Q Okay. Would--did you--looking at the first year, did
9 you have such courses as Physics for Engineers and
10 Scientists?

11 A Yes.

12 Q Did you have mechanics?

13 A No.

14 Q Hydraulics?

15 A No.

16 Q Okay. Did you have probabilities and statistics for
17 engineers or a course similar?

18 A I had a similar course.

19 Q Did you have principles of electrical engineering?

20 A Yes, sir.

21 Q Would you agree that physics and mathematics are
22 foundational to sound application of engineering principles
23 to the real world?

24 A Yes.

25 Q What does the yellow light mean?

1 A Yellow light means that the green interval is fixing
2 to terminate.

3 Q And what--does it mean anything other than that?

4 A No, not that I can think of.

5 Q If that's all that it means, why does it matter how
6 long the yellow change interval is?

7 A Because we have to give the motorists the opportunity
8 to stop before entering the intersection. And if they cannot
9 stop, then they have to have sufficient time to clear through
10 the intersection---

11 Q (interposing) Okay.

12 A ---before conflicting traffic.

13 Q So that appears to be two functions---

14 Ms. Martineau: (interposing) Of what?

15 Q ---of the yellow light for the driver.

16 Ms. Martineau: Objection to the form of the
17 question. That's not what he said.

18 Q You identified--it seemed to me you had a compound
19 sentence there. Would you agree that the yellow light means,
20 first of all, that you have to give warning to the motorist
21 to stop if the motorist can, and second, you need to give
22 warning to the motorist to proceed through if the motorist
23 can't stop?

24 Ms. Martineau: Objection to the form of the
25 question.

1 A That's an "or."

2 Q Correct.

3 A All right.

4 Q And each of those parts of the warning are equally
5 necessary; is that correct?

6 A The motorist has to make a decision.

7 Q Right. At what point does the motorist make a
8 decision?

9 A As soon as they see the light turn yellow.

10 Q Okay. How long does it take the motorist to make a
11 decision and to react to that decision with whatever physical
12 changes need to be made?

13 (Ms. Glover enters at 2:03 p.m.)

14 Ms. Martineau: Can we go off the record for a
15 second?

16 Mr. Stam: Yeah.

17 The Reporter: Off the record. 2:03 p.m.

18 (Discussion off the record.)

19 The Reporter: On the record. 2:04 p.m.

20 By Mr. Stam:

21 Q If a driver sees a yellow--let's go back to my
22 previous question. How long do you assume a typical driver
23 will take to perceive and react to the yellow light warning?

24 A In North Carolina we allow 1.5 seconds for a
25 perception-reaction time.

1 Q Okay. And is that based on the 85th percentile of
2 drivers?

3 Ms. Martineau: Objection to the form of the
4 question. Go ahead.

5 A Most--most IT handbooks recommend 1 second. In North
6 Carolina we feel like due to the aging driver, as well as the
7 distracted driver, that we will allow more perception-
8 reaction time.

9 Q Doesn't AASHTO recommend 2.5 seconds?

10 A I'm not familiar with where that comes from. I use
11 the IT handbook.

12 Q Okay, which is 1.5?

13 A 1.

14 Q 1? Do you know what AASHTO is?

15 A No.

16 Q Okay. Is 1.5 intended to be the average driver or the
17 85th percentile driver?

18 A I'm not familiar with a term 85th percentile driver.
19 We use 85th percentile speed, but I do not know what you're
20 referring to when you say 85th percentile driver.

21 Q Well, so is the 1 second or 1.5 second, then, the
22 average of all drivers?

23 A We feel like it's--it's a safe reaction time to use
24 based on the driving population.

25 Q Okay. By 85th percentile for reaction time, what I

1 would mean is that--if I were using it, which I'm not, I mean
2 you're the witness, not me--is that 85 percent would be able
3 to perceive and react at 1.5 or less and 15 percent would
4 take 1.5 or greater.

5 Ms. Martineau: Make sure he asks you a question. If
6 he's just making statements--you're here today to answer his
7 questions.

8 A Okay. Well, I'm not familiar with any terminology the
9 85th percentile reaction time.

10 Q All right. You are familiar with that term with regard
11 to speed?

12 A Yes.

13 Q All right. Well, if we could just use the same
14 concept with regard to perception and reaction, combined
15 perception plus reaction time, I'm trying to discover what
16 you mean by 1.5 seconds as being safe.

17 Ms. Martineau: Do you have a question for him?

18 Mr. Stam: Yes.

19 Ms. Martineau: Okay.

20 By Mr. Stam:

21 Q So my question, again, is 1.5 seconds either what you
22 figure to be the 85th percentile, number two, the average, or
23 something else?

24 A I'm not sure.

25 Q Okay. If some witnesses in this case, but not you,

1 have thought the only purpose of a yellow light is to warn
2 drivers that a red light is coming, would you agree or
3 disagree with that being the only purpose?

4 A Repeat the question, please.

5 Q Yes. If a witness stated the only purpose of the
6 yellow light is to warn drivers that a red light is coming
7 next, would you agree or disagree with that proposition?

8 A I would agree with that.

9 Q You would agree that it's the only purpose of a yellow
10 light is to warn drivers that a red light is coming?

11 Ms. Martineau: Objection, asked and answered.

12 Mr. Stam: True, but he's given two different
13 answers, so let me try a third time.

14 Q And I may have mixed--I may have mixed you up with a
15 double negative.

16 A Yeah. Yeah, can I ask you a question? When you say
17 I've given two different answers, what---

18 Q Well, previously you said no because you found two
19 functions for the yellow light, but right then you said yes,
20 so---

21 A No, I said the driver has to make a decision---

22 Q (interposing) Okay.

23 A ---when the yellow light comes on. They have to make
24 a decision whether to stop or proceed through the inter-
25 section.

1 Q Okay.

2 A But the yellow light means that the red is fixing to
3 begin. The green is terminating.

4 Q Okay. Is the ITE yellow change interval based on
5 sound physics?

6 A I'm assuming it is because it has been in practice
7 since 1965, and it's been tried and proven.

8 (Plaintiffs Exhibit B was
9 marked for identification.)

10 Q I'll hand you what's been marked--what's been marked
11 for identification as Plaintiffs Deposition Exhibit B.

12 Mr. Stam: Here's the one for---

13 Ms. Martineau: Give that to the court reporter?

14 Mr. Stam: No, that's for Dr. Hummer.

15 Ms. Martineau: Oh, got it.

16 Mr. Stam: And I'll you an extra there.

17 By Mr. Stam:

18 Q And I'll ask if you're familiar with that document.

19 A Yes, sir.

20 Q I understand you were the co-chair of the task force?

21 A That is correct.

22 Q And what is the relation of the task force--and you
23 can define what the task force was--with relation to this
24 article? In other words, is this article like the official
25 report or the--just something Steven Click did on his own?

1 What is the stat of this published article?

2 A This is an article that Steven Click did on his own to
3 publish in the national *ITE Journal* so other states could
4 have this information and see the process that North Carolina
5 went through.

6 Q Okay. Using this article if you want to, what is the
7 physics definition expressed in English of the yellow change
8 interval according to ITE?

9 Ms. Martineau: Objection to the form of the
10 question. Are you asking him just to read what the
11 calculation means? Is that what you want him to do?

12 Mr. Stam: I'll repeat the question.

13 By Mr. Stam:

14 Q What is the physics definition expressed in English,
15 not symbols, of the yellow change interval according to ITE?

16 Ms. Martineau: Same objection. You can answer.

17 A I'm not sure what you mean by the physics definition.
18 I mean what--what do you want to know? Do you want to know
19 what the--what is used to make up the yellow time?

20 Q At the bottom of page 20---

21 A (interposing) Right.

22 Q ---appears to be a formula. And I'll state, as I've
23 stated before, that scribbling on top of the formula is mine;
24 it's not part of the original document.

25 A Uh-huh.

1 Q And then for every term, lettered term or numeric
2 term, there appears to be a definition. So my question is,
3 is that the formula for the yellow change interval at the
4 bottom of page 20, middle column?

5 A That is the ITE formula. That's known in the industry
6 as the ITE formula.

7 Q Okay.

8 A Yes.

9 Q Just since the Court may or may not know how to
10 express things in English looking at a formula, could you,
11 using English, tell us what that formula is?

12 A It has the design velocity in feet per second. It has
13 the deceleration rate in feet per second squared, has the
14 acceleration due to gravity. It has the perception-reaction
15 time, which we discussed while ago. Then it has the width of
16 the intersection plus the vehicle length. And I think that
17 is it. And it--that makes up the total formula, which
18 includes the yellow change plus the all-red clearance.

19 Q All right. Would the yellow change interval be what
20 we would refer to as the length of time in seconds that the
21 yellow light is facing the oncoming driver?

22 A Yes.

23 Q Okay. And if you could explain to the Court what the
24 red clearance interval is?

25 A The red clearance interval is the time that every

1 display at the intersection will be red.

2 Q No matter which way you're coming into the
3 intersection?

4 A No matter which way---

5 Q (interposing) Okay.

6 A ---would be red.

7 Q So the total length, that is Y plus R, of the yellow
8 plus the all-red equals the part of the equation on the right
9 side of the equality; is that correct?

10 A That is correct.

11 Q Okay. Now, I see in two places--it's the only place
12 in this document, on this formula, where I see the same
13 letter used twice---

14 A (interposing) The v?

15 Q ---and that is the v. Okay. So would that v have the
16 same value whenever it's used?

17 A Yes.

18 Q Okay. So v in the first--that you call the first--the
19 second term of the equation would use the same value of v in
20 the third term of the equation? And if I don't have the---

21 A (interposing) That's---

22 Q ---vocabulary right---

23 A (interposing) That's correct.

24 Q Okay. So for example if the first v there is--that's
25 in feet per second. I'm just--I don't know how to do that,

1 so I'm just going to use miles per hour.

2 A Uh-huh.

3 Q So if the first v is 45 miles per hour, then the
4 second v would be 45 miles per hour?

5 A Yes.

6 Q If the first v is 20 miles per hour, then the second v
7 would be 20 miles per hour?

8 A Yes.

9 Q Okay. That's the nature of an equation is that if you
10 use the same term twice, it's the same value; is that
11 correct?

12 A Yes.

13 Q Okay. Do you know what--well, what does the term
14 "critical distance" mean, if you use it?

15 Ms. Martineau: What do--for traffic engineers?

16 Q If--Mr. Fuller, if you use the term "critical
17 distance" in discussing traffic signalization, what do you
18 mean by that?

19 A I don't use the term "critical distance." I've--I've
20 heard it used and read in reports, and it's the minimum
21 stopping distance.

22 Q At what speed?

23 A Whatever the design speed is.

24 Q Okay. So if the design--and what is the design speed?
25 I understand--is that the speed limit unless there's been a

1 speed study done?

2 Ms. Martineau: Are you talking about through or left
3 turn?

4 Mr. Stam: I'm asking what the term means,
5 design speed.

6 By Mr. Stam:

7 Q And we could--I think it would be good if I--so you
8 could have two things at once---

9 (Plaintiffs Exhibit C was
10 marked for identification.)

11 Q I'll show you what's been marked for identification as
12 Plaintiffs Deposition Exhibit C. And that appears to be a
13 blown-up excerpt of something from B. You're probably very
14 familiar with it. Are you familiar with it?

15 A Yes.

16 Ms. Martineau: Object to the form of that question.

17 Q If you'll just give me a minute to---

18 (Pause.)

19 Q Okay. Looking at both Exhibits B and C, whichever one
20 you prefer to look at it--I believe C is on page 24 of
21 Exhibit B and might not be quite as legible---

22 A (interposing) That's correct.

23 Q ---depending on your eyesight.

24 A Well, let me--hold on. The one in the report is a
25 July 2005. The one you showed me in Exhibit C is a July

1 2009. There may be some editorial changes.

2 Q Okay. And I'm going to come back to any changes---

3 A (interposing) Okay.

4 Q ---over the periods, but it's the same type document.

5 Ms. Martineau: You want him to compare it, the 7/05
6 to the 7/09? I mean it--it shows what it shows, and it is
7 different. You have 7/09 here and 7/05 is on page 24.

8 By Mr. Stam:

9 Q Okay. Yeah, if you would--if you would compare them
10 and see if---

11 Ms. Martineau: (interposing) Can you go off the
12 record so he can--why don't you just pick one and ask him
13 questions about it? I don't think it's fair--it's a waste of
14 people's time to try to sit here and compare them word for
15 word.

16 By Ms. Martineau:

17 Q I'm not going to waste your time.

18 A I don't know what you're asking here.

19 Mr. Stam: All right. Off the record for a
20 second.

21 The Reporter: Off the record. 2:18 p.m.

22 (Discussion off the record.)

23 The Reporter: On the record. 2:19 p.m.

24 Mr. Stam: Back on the record.

25 By Mr. Stam:

1 Q If you would compare Exhibit C to Exhibit B, page 24,
2 top left, and see if you see any differences between those
3 documents?

4 Ms. Martineau: Well, if you want him to--if we're
5 going to do that, we're going to go off the record so you
6 could take a good look at this.

7 Mr. Stam: That's fine.

8 Ms. Martineau: I would just pick one and ask him
9 questions about it. Why don't you just pick--ask him
10 questions about it so he doesn't have to compare it word for
11 word to make sure it's the same? I mean they say what they
12 say.

13 Mr. Stam: All right. All right. All right.

14 By Mr. Stam:

15 Q I'm looking at Exhibit C.

16 A Okay.

17 Q Okay. I'm just setting the context so that you know
18 where it comes from. Looking at Exhibit C, if you were
19 computing the yellow change interval for a street with a
20 speed limit of 45 miles per hour with 0 grade, do you know
21 what you would come up with since you've done it many times?

22 Ms. Martineau: Object to the form of the question;
23 as opposed straight through versus left turn?

24 A A straight--a through movement or left turn?

25 Q Yeah, straight through. Let's take straight through.

1 A I can calculate it here in the chart. I don't have my
2 calculator with me, but I can tell you.

3 Q Referring to page 22 of Exhibit B or 24?

4 A No, 26.

5 Q Is it figure---

6 A What was your question again, a 45 mile per hour speed
7 limit?

8 Q With no grade.

9 A No grade, and it's a--and it's a through movement?

10 Q Uh-huh.

11 A The yellow change interval should be a minimum of 4.5
12 seconds.

13 Q Okay. All right. What if it is for a left turn?
14 What should it be?

15 A Three seconds.

16 Q And where do you see that?

17 A Well, 0 grade, if you use the yellow change interval
18 formula, you will come up with a value of 2.9 seconds.

19 Q All right. Where is that?

20 A That's--we use a design speed for left turns of 20 to
21 30 miles per hour. And using a design speed of 20 miles per
22 hour, you would get a yellow change interval of 2.9 seconds,
23 which we would round up to 3.

24 Q Okay. Now, you agreed with me that if the v is used
25 twice in the same equation that it should have the same

1 value?

2 A Yes.

3 Q Okay. So going back to the equation on page 20 of
4 Exhibit B, if you would?

5 (Witness complies.)

6 A Uh-huh. I've got it.

7 Q And if you were computing the correct yellow change
8 interval for a left turn---

9 A (interposing) Uh-huh.

10 Q ---but where the speed limit is 45---

11 A (interposing) No. Speed limit--we do not use a
12 design speed of 45 for a left turn.

13 Q Okay. Why not?

14 A You cannot make a left turn movement at the posted
15 speed limit.

16 Q All right.

17 A The posted speed limit is for through movement.

18 Q Okay. Where does it say that in this Exhibit C or B?

19 A In Exhibit C---

20 Q (interposing) All right.

21 A ---if you will look, the third paragraph under the
22 notes section.

23 Q Which says what?

24 A "For most left turn lanes assume a speed of 20 miles
25 per hour to 30 miles per hour. For locations with unusual

1 conditions, a higher or lower speed may be appropriate."

2 Q Okay. Now, assume a speed of 20 miles per hour at
3 what point?

4 A For your entire calculation, to calculate the yellow
5 change interval as well as the all-red clearance interval.

6 Q All right. Is this when--is the 20 miles per hour
7 when the driver first sees the yellow light? Is it when the
8 driver has completed the turn? Is it the stop--at the stop
9 bar? What is---

10 A (interposing) It makes no difference. It is a design
11 speed that we use, and it was validated during our clearance
12 interval task force.

13 Q Okay. I'll show you---

14 Mr. Stam: Let's see. Here we go. Elizabeth,
15 this is the thing I gave you earlier today.

16 Ms. Martineau: Yes, I have it.

17 Mr. Stam: That's going to be D.

18 (Plaintiffs Exhibit D was
19 marked for identification.)

20 By Mr. Stam:

21 Q I'll show you what's been marked for identification--I
22 obtained this by subpoena from---

23 A (interposing) Uh-huh.

24 Q ---your DOT attorney today.

25 A Yes.

1 Q It appears to be an e-mail. And then do you see about
2 the fourth page back Calculation of Yellow Change and All-Red
3 Clearance Intervals, The North Carolina Experience?

4 A Yes.

5 Q Okay. Now, first of all--looking at the first page,
6 which is an e-mail, first of all, who is Will Garner and
7 Pamela Alexander?

8 A They were both employees of the North Carolina
9 Department of Transportation in the ITS and Signals Unit.
10 Mr. Garner has since retired from DOT.

11 Q Okay.

12 A Ms. Pamela Alexander is still employed---

13 Q (interposing) Okay.

14 A ---with NCDOT.

15 Q All right. And who is Matt Carpenter?

16 A Matt Carpenter is with the City of High Point. He's a
17 traffic engineer with the City of High Point. He was a
18 member of the NCSITE clearance interval task force.

19 Q All right. Unless you've recently had a chance to do
20 it, would you take a look at these two e-mails to familiarize
21 yourself with them?

22 Ms. Martineau: Do you want to ask him if he's ever
23 seen these before or---

24 Mr. Stam: I got them in response to a subpoena
25 to him, so---

1 A (interposing) Yeah. I have---

2 Ms. Martineau: Okay.

3 A I've seen them. I mean I can't--I'll read it.

4 Ms. Martineau: No, go ahead. Take your time. I
5 didn't--I didn't know that--I thought this was your response
6 of DOT, but if it's specific to him, okay.

7 By Mr. Stam:

8 Q Would you read the first e-mail beginning the third
9 line that says "Do these slower vehicles," that sentence?

10 A "Do these slower vehicles get shorted on the time they
11 need to clear the intersection because we have only
12 considered the end of queue speeds?"

13 Q Okay. And if you would do the next sentence as well?

14 A "I know there is no 'one size fits all' solution, but
15 it seems to me that using a speed closer to be mid queue and
16 doing an 85th would result in a clearance interval for the
17 left turn that would be more appropriate."

18 Q Now, the writer of this, Mr. Garner---

19 A (interposing) Uh-huh.

20 Q ---appears to be saying we're measuring speed from the
21 end of the queue. What do you mean by the end of the--what
22 did DOT, Mr. Garner, mean by the end of the queue?

23 Ms. Martineau: Objection to the form of the
24 question. Answer if you know.

25 A I have no idea what Mr. Garner was alluding to. He

1 was also a member of the task force.

2 Q Okay. Do you know what he meant by suggesting using a
3 speed closer to the mid queue?

4 A I would--I would take it to mean mid queue would be
5 the middle of the vehicles that are waiting to turn.

6 Q Okay.

7 A If you had six vehicles, mid queue would be the third
8 or fourth.

9 Q Third vehicle. Beginning of the queue might be the
10 first vehicle, the end of the queue the sixth vehicle?

11 A Whatever.

12 Q That's how I would take it.

13 A That's how I would take it.

14 Q All right. Did it occur to anybody to measure the
15 speed not of vehicles in a queue, but of vehicles that are
16 not in a queue but that are approaching at the posted speed
17 limit?

18 A It's not relevant.

19 Q Why?

20 A You have to slow down to make a left turn.

21 Q All right. When do you have to slow down to make a
22 left turn?

23 A It depends on how aggressive a driver you are and how
24 much risk you want to take.

25 Q Okay. Using your typical assumptions of deceleration

1 at 11.2 seconds per second and your assumption of typical
2 perception-reaction time of 1.5 seconds--using those
3 assumptions, what would be the answer to my question?

4 A I don't know. I don't have a calculator to calculate.

5 Q Is it possible to calculate it? I know you don't have
6 a calculator here, but is that something that could be calcu-
7 lated?

8 A Repeat the question.

9 Q Okay. If a driver is turning left, going the speed
10 limit, assuming---

11 A A driver cannot turn left and go the speed limit.
12 That's physically impossible.

13 Q All right, at the time of the actual turn, at the stop
14 bar. Can a driver go the speed limit a mile away from the
15 left turn signal?

16 A Sure.

17 Q Can they go the speed limit a quarter of a mile away?

18 A A left-turning vehicle would have to get into a left
19 turn lane.

20 Q Right. Can the driver be going the speed limit 500
21 yards--feet away?

22 A It depends on if we have a left turn bay.

23 Q Assuming there's a--well, whether there's a bay or
24 not, if they're---

25 A (interposing) There are a lot of assumptions that you

1 can make.

2 Q Right. But if you make the assumption that the
3 typical driver takes 1.5 seconds to perceive and react and
4 that the typical driver will decelerate at 11.2 feet per
5 second per second---

6 Ms. Martineau: (interposing) Is that for straight
7 or for turning?

8 Mr. Stam: We're talking about turning---

9 Ms. Martineau: (interposing) Is that an assumption,
10 a recognized assumption for left-turning drivers? That's
11 their rate of deceleration? I mean you're assuming a lot of
12 things not in as evidence.

13 By Mr. Stam:

14 Q Mr. Fuller, in the case of left-turning drivers, do
15 you still use the 1.5 second perception and reaction time?

16 A Yes.

17 Q In the case of left-turning drivers, do you still use
18 the assumption of 11.2 seconds per second for deceleration?

19 A Yes.

20 Q Okay. Then is it possible to calculate, even if you
21 don't have the calculation here with you--I'm not asking
22 that---

23 A (interposing) Uh-huh.

24 Q ---at what speed a driver who intends to turn left can
25 approach the intersection before beginning to decelerate?

1 A No, because you have to know the physical character-
2 istics of the intersection. You'd have to know the grade of
3 the intersection. You'd have to know the turn. You have to
4 know---

5 Q I'll amend my question to say 90-degree angles, 0
6 grade.

7 Q How far is your left turn bay?

8 Q How long will it typically be?

9 A It depends on the site specific design based on the
10 volumes we have.

11 Q All right. You design them. How about in Cary? How
12 about in Cary at Meeting Place and Walnut Street?

13 A I'm not familiar with the left turn bay.

14 The Witness: Do you have that?

15 Ms. Martineau: We could look at the signal plan.

16 A Okay. Well, it may not have the length of the left
17 turn bay because it--it is irrelevant to our signal design.

18 Q If you knew the length of the left turn bay, if you
19 knew it was 0 grade, if you knew that it was a 90 degree, if
20 you made your five second assumption and your 11.2 feet per
21 second per second deceleration, is it possible to calculate
22 at what point a driver who intends to turn left would need to
23 begin to decelerate from the posted speed limit?

24 A I don't know. I've never made that calculation, and
25 I'm not aware if any of my engineers have ever made that

1 calculation. It's irrelevant to the calculation of the
2 yellow change interval.

3 Q Would you please turn to page 7 of the exhibit--we're
4 on Exhibit D, but it's page 7 of the paper by Mr.--oh, I'm
5 sorry.

6 A By Mr. Click?

7 Q I'm sorry. Let's take his title page first before I
8 get to page 7. And I'm looking for a date on his--this
9 paper, and I don't see one. Do you know the relationship
10 between this paper and Exhibit B, which was published in *ITE*
11 *Journal*? In other words, is this a---

12 A (interposing) Uh-huh.

13 Q ---a draft, I mean a pre--paper before this one?

14 A That's what it appears to be.

15 Q Okay. Do you know when Exhibit D was prepared by Mr.
16 Click and Mr. Jones?

17 A I could find--I don't know specifically, but I know--I
18 think it was e-mailed to me as an FYI.

19 Q Okay.

20 A I mean I could get you the date after going through
21 some e-mails if you need it.

22 Q We might, but it--was it before the published article?

23 A I think so.

24 Q Okay. Do you know--and I assume since page 2 refers
25 to things happening in the summer of '05 that it would---

1 A That's--that's when the clearance interval task force
2 was working.

3 Q All right. Then it would be after--sometime after the
4 summer of 2005?

5 A This paper was written after the clearance interval
6 task force.

7 Q Correct. Okay. Now, David L. Jones, P.E., does he
8 work for DOT or---

9 A He worked for Post, Buckley, Schuh & Jernigan, which
10 is now Atkins. And to my knowledge, he is still employed
11 with them.

12 Q Okay. Is this paper the result of the task force
13 investigation?

14 A Yes.

15 Q Okay. And what--since you were the co-chair of the
16 task force---

17 A (interposing) Yes.

18 Q ---officially what's the name of the task force and
19 who comprised it? You could take an hour to talk about that,
20 but if you could give a two or three minute answer, if you
21 know what I'm saying.

22 A The purpose of the task force was for NCDOT to have
23 some clear guidelines for calculating yellow change intervals
24 and all-red clearance intervals across the state highway
25 system, which is over 9,000 traffic signals. It was also to

1 be used by municipalities as well as the private sector with
2 engineers that design traffic signals.

3 Q Now, you would not contend that the only purpose for
4 the results of the task force would be clarity, would you? I
5 mean wouldn't safety be a factor you would be looking at as
6 well?

7 A Safety and efficiency were used to determine the
8 guidelines.

9 Q Okay.

10 A I mean as traffic engineers, we want safety and
11 efficiency every day.

12 Q So clarity---

13 A (interposing) And we always strive for safety.

14 Q Clarity, safety, efficiency---

15 A Uniform.

16 Q Uniformity?

17 A Uniform guidelines.

18 Q Okay. Would you turn to page 7 of the paper?

19 (Witness complies.)

20 Q So neither of the authors worked for DOT, but this
21 report---

22 A (interposing) Mr. Click was employed with DOT while
23 he was a member of the task force.

24 Q I understand.

25 A Okay.

1 Q Okay. So after the task force was over he worked for
2 Tennessee Technology University. But when he did the study
3 he was working for NCDOT?

4 A That is correct.

5 Q Okay. Thank you very much. All right. Page 7, would
6 you take a moment to look to the second half of that page,
7 Speed Issues, and when you've had a chance to look at it let
8 me know and I'll sort of ask a question.

9 (Witness peruses document.)

10 A Yes.

11 Q Would you take--would you mind reading for the Court
12 the final paragraph that's not too long that begins
13 "Initially"?

14 A "Initially, the Speed subcommittee set out to
15 calibrate a 2-speed model, one speed for a vehicle
16 approaching a left turn which would be used to
17 calculate the yellow interval, and a second speed for
18 a vehicle negotiating a left turn that would be used
19 to calculate the all-red. Unfortunately, difficulty
20 in quantifying all the variables associated with the
21 approaching speed - adjacent through speed, turn bay
22 length, number of left turn lanes, among others -
23 resulted in a recommendation that left turn calcula-
24 tions continue to be made using a single speed,
25 determined when the vehicle was negotiating the left

1 turn. The results of this investigation are shown in
2 Table 1."

3 Q And Table 1, is that on page 8?

4 A Yes.

5 Q Now, just to be crystal clear, that 20 mile per hour
6 that y'all use is determined when the vehicle was negotiating
7 the left turn?

8 Ms. Martineau: Objection to the form of the
9 question.

10 Q Is that what this means?

11 Ms. Martineau: Objection to the form of the
12 question. You can answer.

13 The Witness: I can answer?

14 Ms. Martineau: Yes.

15 A The 20 miles per hour is used as a design speed, which
16 could be taken--we use that--it could be at any point. But
17 that is what we use to determine the yellow change and the
18 all-red interval. 20 miles per hour will give you a lower
19 yellow change interval but a longer all-red clearance
20 interval.

21 Q Okay, lower yellow change, higher all-red. But now
22 back to my question.

23 A Uh-huh.

24 Q This seems to say to me---

25 Ms. Martineau: (interposing) Well, he's testifying,

1 not you; right?

2 Mr. Stam: That's right.

3 Ms. Martineau: Okay.

4 Mr. Stam: I've got a good question here.

5 By Mr. Stam:

6 Q If you'll look at the second to the last line that
7 begins "determined when the vehicle was negotiating the left
8 turn," that seems to say to me that the 20 mile per hour was
9 determined just where it says, at the stop bar when it's
10 negotiating the left turn. Is that what this means or not?

11 Ms. Martineau: Objection to the form of the
12 question. You can answer.

13 The Witness: I can answer?

14 Ms. Martineau: Uh-huh.

15 A It doesn't mean it's at the stop bar. It--that's the
16 interpretation of the people taking the speed measurement.
17 But if you can look at Table 1 where we took over 1,100
18 samples, the average speed was below 20 miles per hour.

19 Q Okay.

20 A So we validated what we had been using for many years.

21 Q All right. Where is that? Is that in the second
22 to---

23 A That's in the speed where you see "Average."

24 Q Average. So is that 17.1?

25 A The average of all is 17.1 miles per hour.

1 Q The 85th percentile---

2 A (interposing) Was right on 20.

3 Q ---was 20. Okay. But my question is different.

4 Where is that speed measured?

5 A I was not a member of the speed subcommittee.

6 Q Okay. What is your best understanding of where that
7 speed was measured?

8 Ms. Martineau: And Mr. Fuller, you don't have to
9 guess, but if you have an understanding, go ahead and tell
10 him what your understanding is.

11 A I don't because I was not on the speed subcommittee.

12 Q Okay.

13 A Now, I will say that the determination of design speed
14 for left turn was one of the key issues that we wanted to
15 address with the task force and that's why we set up a
16 special committee to look specifically at that.

17 Q Do you remember who the principal people were on that
18 speed subcommittee?

19 A I can assume that Matt Carpenter, Will Garner, and I
20 know Pam Alexander chaired the speed subcommittee.

21 Q Those two people that the e-mail is from?

22 A The e-mail, yeah. But I know Pam Alexander chaired
23 the speed subcommittee.

24 Q Are they both licensed engineers as well as you know?

25 A Yes.

1 Q Do either of them have training in physics beyond the
2 freshman course of---

3 A (interposing) I cannot speak to that.

4 Q Okay. Now, you were the co-chair of the overall task
5 force.

6 A Right.

7 Q Are you saying you never attended the meetings of the
8 speed subcommittee?

9 A The speed subcommittee presented their findings to the
10 entire committee when we met.

11 Q Okay. Did you ever attend any meetings of the sub-
12 committee when it was meeting separately?

13 A With the speed?

14 Q Yes.

15 A Not to my recollection.

16 Q Okay. Do you recall any discussion at the meeting of
17 the full committee at which this was presented on that
18 question of where the speed was measured with respect to
19 left-turning vehicles?

20 A Not to my recollection.

21 Q Okay. Does the ITE yellow change interval embed the
22 formula to compute a critical distance?

23 A Repeat the question.

24 Q Does the ITE yellow change formula, which you have---

25 A (interposing) Right.

1 Q ---before you, embed the formula to compute the
2 critical distance?

3 A I don't know what the critical distance is.

4 Q I think you previously testified that it was the safe
5 stopping distance.

6 A That's what I--I said that's what I would assume it
7 is.

8 Q Okay.

9 A But I'm not okay with the official term "critical
10 distance."

11 Q Regardless of whether that's a proper term or not---

12 A (interposing) Uh-huh.

13 Q ---what you mean by a safe stopping distance is my
14 question. Does the--I'm going to use that term in my
15 question. Does the ITE yellow change interval formula embed
16 the formula to compute the safe stopping distance?

17 Ms. Martineau: Objection to the form of the
18 question. You can answer.

19 A I have not derived the ITE formula.

20 Q Have you studied it?

21 A I studied it in 2005, yes.

22 Q Okay. By chance I think the original article where it
23 was set out was Denos Gazis in 1959. Have you read his
24 article on the problems with the amber light?

25 A Oh, I can't say that I read the article from 1959, no.

1 Q All right.

2 A A lot has changed in traffic signal design since 1959.

3 Q True. Cars can stop quicker now; is that true?

4 A Yes.

5 Q We can do all-red clearance intervals now that perhaps
6 we couldn't do in 1959?

7 A Not every state does all-red clearance intervals.

8 Q But I mean technologically it's possible. That's my
9 question.

10 A It's possible in North Carolina. Some equipment it
11 may not be possible with in other states. I don't know.

12 Q Okay. But it's possible here?

13 A Possible in North Carolina, and we require it.

14 Q Have the laws of motion of the universe changed since
15 1959?

16 A Not that I'm aware.

17 Q Okay. In the ITE--well, let me--strike that. Within
18 the ITE formula, what's the physics expression that tells us
19 where the safe stopping distance is?

20 A That would be the deceleration rate.

21 Q In the ITE yellow change interval formula, does
22 setting v change the length of the safe stopping distance?

23 A Yes.

24 Q All right. Looking at page 1 of Exhibit B,
25 according--or anything else you'd like to look at--according

1 to the physics embedded in the ITE--this is a two-part
2 question, so hold on.

3 According to the physics embedded in the ITE yellow
4 change interval formula, where is the v supposed to be
5 measured for straight through movement?

6 A It doesn't tell you where it's supposed to be
7 measured. In North Carolina we use the posted speed limit
8 for straight-through movements unless there is a speed study
9 that has been performed.

10 Q My question is where do you measure that?

11 Ms. Martineau: Objection, asked and answered.

12 Q At the--do you measure it at the stop bar, 100 feet
13 out, 200 feet out, 300 feet out, in the middle of the
14 intersection?

15 Ms. Martineau: Are you asking when they do do a
16 speed study---

17 Mr. Stam: (interposing) Yeah.

18 Ms. Martineau: ---where do they measure it?

19 Mr. Stam: Yes. Yes.

20 Ms. Martineau: You can answer that if you know.

21 A I--a speed study is measured--I take it as a free flow
22 speed. You wouldn't measure the speed at the stop bar at an
23 intersection when you--when you may be slowing down to stop.
24 When--I do not--I do not determine speed limits, but it's my
25 understanding that they take free flow measurements.

1 Q Second question: with respect to a driver who intends
2 to turn left, according to the physics embedded in the ITE
3 yellow change interval formula shown at the middle of the
4 bottom of page 20 on Exhibit B, where is v supposed to be
5 measured?

6 Ms. Martineau: Objection, asked and answered. You
7 can answer again.

8 A It's engineering judgment.

9 Q When v is--using the ITE yellow change formula, when v
10 is 45 miles per hour for a level road and assuming NCDOT
11 constants for perception-reaction time and deceleration,
12 where is the safe stopping distance? How far away is it from
13 the intersection? Do you know?

14 A I don't know right--right now, but we could calculate
15 it.

16 Q It is possible to calculate it?

17 A Yes.

18 Q Okay. Do you have a ballpark idea where it might be?

19 A I'm not going to speculate.

20 Q Okay. There has been testimony in this case by others
21 that it's 294 feet. Does that sound reasonable to you?

22 Ms. Martineau: Objection. He just said he's not
23 able to calculate it right now.

24 Mr. Stam: I'm not asking for a calculation.

25 A If you--I mean if you will show me--if you will show

1 me how they calculated that, I'll be glad to look at it.

2 Q That's coming. That's coming. Once a driver
3 approaches the intersection who is going straight through and
4 has crossed over the line at 294 feet, and using the NCDOT
5 constants of 1.5 seconds for perception-reaction time and
6 11.2 seconds per second for deceleration, can this driver
7 reasonably stop after having crossed that line?

8 A After having crossed the line?

9 Q After having--when--if the yellow light comes on
10 closer than 294 feet from the intersection?

11 A No. They should proceed through the intersection.

12 Q And if they proceed at or above the speed limit,
13 they'll be safe; is that correct? They will---

14 Mr. Stam: (interposing) Objection. Objection
15 to the form of the question as to safe. Answer if you can.

16 Q But now you can answer.

17 A Yes, they can proceed through the intersection.

18 Q Unless there's an emergency or adverse weather
19 conditions or other unusual situations in general, are
20 drivers allowed to drive at the speed limit in North
21 Carolina?

22 A I think most drivers drive above the speed limit in
23 North Carolina.

24 Q Okay. Okay. Going back to Exhibit B, if I could, if
25 you would go to page 21, the bottom of the first column?

1 (Witness complies.)

2 Q The italicized sentence, one sentence, if you would
3 read that?

4 A At the very bottom?

5 Q The very bottom that goes to the next column.

6 A "Calculation of the yellow change and all-red
7 clearance intervals should not vary based on the presence or
8 absence of enforcement devices."

9 Q Would cameras at an intersection be an example of an
10 enforcement device?

11 A If it's a red light camera.

12 Q Right.

13 A If it's a traffic monitoring camera, no.

14 Q All right. I'm talking about a red light camera,
15 sorry.

16 A Red light camera, yes.

17 Q Okay. That would be an enforcement device so that the
18 calculations don't change if---

19 A (interposing) That's correct.

20 Q The next italicized part a couple of paragraphs down
21 says, "Separate practices should not exist for different
22 regions of the state, unique vehicle streams, or left-turning
23 vehicles versus through vehicles." Does that mean that the
24 practices should be the same for through vehicles as for
25 left-turning vehicles?

1 A You use a different design speed for left-turning
2 vehicles versus through vehicles.

3 Q I understand that. I just haven't ever found out from
4 anybody where they measure the design speed for left-turning
5 vehicles. I know this is repetitive, but if you could
6 enlighten me on that, I'll then get away from it.

7 A I would suggest that you speak to the speed committee
8 that looked at this and collected these 1,106 sample points.

9 Q That doesn't help me, though, as to--thank you. Thank
10 you. There is a--on the third column there's an italicized
11 part, "The minimum value for yellow should the 3.0 seconds."

12 Let me ask you about a tractor-trailer truck
13 approaching at 45 miles per hour intending to turn left at an
14 intersection whether there's a camera or not. If 1.5 seconds
15 is used for perception and reaction time and three-quarters
16 of a second is used for the air brakes to engage, how much
17 time is left for the actual braking of that truck?

18 A I'm not answering that question.

19 Q Okay. Do you have an assumption about the length of
20 time necessary for the air brakes of a large truck to engage?

21 A No, I do not.

22 Q Have you ever heard that discussed?

23 A No, I haven't.

24 Q Do you know whether it takes any time for the air
25 brakes of a large truck to engage regardless of what the

1 amount of time is? Do you know that there is a time lag?

2 A I do not know.

3 (Plaintiffs Exhibit E was
4 marked for identification.)

5 Q I'll show you what's been marked for identification as
6 Deposition Exhibit E and ask you if you are familiar with any
7 of these equations.

8 A It's been a long time since 1989. I'm sure I have,
9 but I'm not going--I can't verify whether they're correct now
10 or not without going back and researching it.

11 (Plaintiffs Exhibit F was
12 marked for identification.)

13 Q I'll show you what's been marked for identification as
14 Exhibit F.

15 Mr. Stam: Off the record.

16 The Reporter: Off the record. 2:57 p.m.

17 (Discussion off the record.)

18 The Reporter: On the record. 2:57 p.m.

19 By Mr. Stam:

20 Q I'll show you what's been marked for identification as
21 Plaintiffs Deposition Exhibit F, which appears to be various
22 equations to determine critical distance, but which I will
23 use the term "the safe distance to stop." And see if you're
24 familiar with any of those equations.

25 A Can we go--can we stop?

1 Mr. Stam: Sure. Stop anytime.

2 Ms. Martineau: Off the record for a second.

3 The Reporter: Off the record. 2:58 p.m.

4 (Discussion off the record.)

5 The Reporter: On the record. 2:58 p.m.

6 Ms. Martineau: We can go back on the record just for

7 a second. Mr. Stam had provided copies of Exhibits I guess F

8 and Exhibit E to me prior to today to share with Lisa Moon,

9 one of our experts for the Town of Cary, which I did.

10 I did not share these with you so you've not had any

11 opportunity to see these before. And so, you know, you're

12 not required to do any calculations or any math in this

13 deposition. He's--the question was just are you familiar

14 with them or not. If you would just answer that question,

15 then we could go off the record and we can talk about it or

16 you can take as much time to look at it as you need.

17 Mr. Stam: Yeah.

18 By Mr. Stam:

19 Q I'm not going to ask you to do any math problems here.

20 I'm just asking your familiarity with these type of

21 equations.

22 Ms. Martineau: And Mr. Fuller, if you would just let

23 him know whether or not in your day-to-day job

24 responsibilities now in your position with NCDOT are these

25 equations that you use in your day-to-day role with NCDOT.

1 A I don't use--I don't use this equation.

2 Ms. Martineau: Sure. And that's--I mean he's only
3 asking you about what you do.

4 The Witness: Okay. Okay.

5 A No, I don't use these equations.

6 By Mr. Stam:

7 Q Are you familiar with the terms, for example the v
8 being velocity and t being perception, t sub p?

9 A Yeah.

10 Q So it's not the terms that are unfamiliar to you---

11 A (interposing) No.

12 Q ---but the equations are not familiar to you; is that
13 correct?

14 A I don't use these. We have professional engineers
15 that do use them.

16 Q Such as?

17 A The ones that do signal design.

18 Q Okay.

19 A Whoever---

20 The Witness: Again, can we go off the record?

21 Ms. Martineau: Sure. Let's go off the record and
22 take a break.

23 The Reporter: Off the record. 3:00 p.m.

24 (Discussion off the record.)

25 The Reporter: On the record. 3:01 p.m.

1 Q So my question to you is are you familiar with these
2 equations? Do you use them? Do you have any criticism of
3 them? Do you have any questions about it?

4 Ms. Martineau: Objection to the form of the
5 question. And Mr. Fuller, you're not here to ask questions;
6 you're here to answer his questions.

7 A I would like to have time to study it before I offered
8 a comment.

9 Mr. Stam: To your DOT counsel, are y'all not
10 waiving signature, I assume?

11 Ms. Martineau: Yeah, he definitely needs to read it
12 before he signs it.

13 Mr. Stam: Right.

14 By Mr. Stam:

15 Q Mr. Fuller, if when you get a chance at your leisure
16 to look at this when the deposition comes to you, if you
17 would like to supplement your answer---

18 A (interposing) Okay.

19 Q ---I would be--I would be delighted.

20 A And this will be Exhibit G?

21 Q Right.

22 A Okay.

23 Q And you'll have copies of all the exhibits when the
24 deposition is sent to you.

25 A Okay.

1 (Plaintiffs Exhibit H was
2 marked for identification.)

3 By Mr. Stam:

4 Q I don't know if you have seen this. It's been an
5 exhibit in this lawsuit. And if you would just tell me if
6 you have seen these four pages of documents before prepared
7 by Mr. Ceccarelli from data supplied by the Town of Cary?

8 (Witness peruses documents.)

9 A I have not seen these.

10 Q Would you look at the--let's see, the second page of
11 that document, if you would, the second page. We can come
12 back to the others. I'll tell you what it purports to be,
13 and then I will have a question for you.

14 This purports to be the number of citations given at a
15 particular intersection over time and then the gray being
16 when the 4.0 seconds in the signal plan went down to 3.0
17 seconds. And then at sort of the end of the gray they
18 turned--when it goes down to 0 was they turned the camera
19 off.

20 A Uh-huh.

21 Q Now, as an engineer and one of the top engineers at
22 DOT on signal traffic, if you saw this graph and knew it was
23 0 grade, 45 miles per hour, and that all of a sudden the
24 number of violations went from about 70 a month as measured
25 by the camera looking at red light violators up to 350, 400,

1 450 a month, what would that tell you as an engineer?

2 Ms. Martineau: Objection to the form of the question,
3 lack of foundation. You can answer.

4 Q If it tells you anything.

5 A How many crashes occurred at this intersection?

6 Q Oh, I have no idea.

7 A Because I'm--that's what we're--we're interested in
8 crashes mainly.

9 Q Okay. I don't know the answer to that. So if I don't
10 know the answer--let's just say you don't know the number of
11 crashes---

12 A (interposing) Uh-huh.

13 Q ---but what you see is with no other explanation at
14 that point that the violations go up--would you say
15 geometrically, or maybe that's not the right term--
16 astronomically, hugely? I don't know the right term, but
17 suddenly they go up. You have a base number of violators
18 when you're using 4 seconds, but when you say 3 seconds you
19 have many times that number. Does that suggest anything to
20 you---

21 Ms. Martineau: (interposing) Objection to the form
22 of---

23 Q ---as an engineer?

24 Ms. Martineau: Objection to the form of the
25 question, lack of foundation. You can answer.

1 The Witness: I can answer?

2 Ms. Martineau: Yeah, sure.

3 Ms. Strickland: If you can.

4 A It--it does indicate that something caused it to
5 change dramatically.

6 Q If you would look at the third page? And again, this
7 was prepared by Mr. Ceccarelli from data supplied by the Town
8 of Cary.

9 A Has--can I ask a question.

10 Q Sure.

11 A Has this been verified by the Town?

12 Ms. Martineau: No, it has not.

13 The Witness: Okay.

14 Mr. Stam: The data hasn't been verified?

15 Ms. Martineau: His graphs have not been verified.

16 Mr. Stam: Do you have a different graph?

17 Ms. Glover: We don't prepare these graphs.

18 Mr. Stam: But the underlying data was supplied
19 by Cary.

20 Ms. Martineau: We supplied Mr. Ceccarelli some data.
21 What he did with it from that point I have no idea.

22 Mr. Stam: Okay.

23 By Mr. Stam:

24 Q Okay. Mr. Fuller, I'm representing to you---

25 A (interposing) Uh-huh.

1 Q ---that this is a graph prepared by Mr. Ceccarelli.
2 So ignore the should bes and the would bes up there, but that
3 it purports to say that at a certain point at Cary Parkway
4 and Kildaire Farm Road it was 4 seconds for the left turn
5 arrow and then it became 3 seconds, and the number of
6 citations went up quite dramatically. Does that tell you
7 anything as an engineer?

8 Ms. Martineau: Objection to the form of the
9 question, lack of foundation. You can answer if you can.

10 A As an engineer, it would alarm me.

11 (Plaintiffs Exhibit I was
12 marked for identification.)

13 Q Okay. I'll show you what has been marked as Exhibit I
14 to your deposition. And see if that's a document that you
15 are familiar with.

16 A Yes, I'm familiar with the *Traffic Engineering*
17 *Handbook*.

18 Q And this is the--portions of the sixth edition, which
19 is dated when?

20 A 2010.

21 Q And is this a document you use in your work?

22 A We refer back to it when needed, yes.

23 Q If you would go to page--I don't see a page number on
24 it, but it's the third sheet there. Are you familiar with
25 that page?

1 A Yes, I've read this page.

2 Q Would you look at the second to last paragraph and
3 just read those two sentences?

4 A "As can be seen from the formula above, slower speeds
5 result in higher values of yellow clearance time.
6 When calculating the needed time, consideration should
7 be given to the values for the 15th percentile speed,
8 particularly at wider intersections."

9 Q All right. First, what is the 15th percentile speed?

10 A The 15th percentile speed is the speed is--that 15
11 percent of the sampling size are going above the posted speed
12 limit.

13 Q Okay, above the posted speed limit?

14 A Uh-huh.

15 Q Okay. Now, looking at the first sentence, I would ask
16 you this question. And whether you're looking at the
17 sentence or not, I just wanted to call it to your mind.

18 If I have two vehicles proceeding on Kildaire Farm
19 Road and one is going to go straight through the intersection
20 and the other is going to turn left at that intersection onto
21 Cary Parkway, and at some point back they're right in the
22 same--they're side by side, which of those two vehicles is
23 going to need more time to get through the intersection
24 safely and legally?

25 Ms. Martineau: Objection to the form of the

1 question. You can answer.

2 The Witness: Answer what, now?

3 Ms. Martineau: You can answer if you can, if you can
4 remember his question.

5 By Mr. Stam:

6 Q I'll be glad to repeat it if you want me to.

7 A Yeah. Well, I mean the one turning left is going to
8 need more time to clear the intersection.

9 Q Than the one going straight through?

10 A Uh-huh.

11 (Plaintiffs Exhibit J was
12 marked for identification.)

13 Q Okay. I'll show you what's been marked for
14 identification as Exhibit J. Is that a document with which
15 you're familiar?

16 A Yes, sir.

17 Q And what is it called?

18 A It's the Standard Practice for Compliance with Traffic
19 Signal and Electrical Programming Detail Plan developed by
20 the North Carolina Department of Transportation.

21 Q And is this--do you use this in your work?

22 A Well, we developed this.

23 Q Okay. So it's an official document of your---

24 A (interposing) Yes.

25 Q Okay. Now, looking at--well, the whole document, is

1 it true that some municipalities approved by the department
2 can prepare traffic signal plans on their own subject to
3 after the fact review by DOT?

4 Let me get at it this way. Let me withdraw that
5 question. Does the Town of Cary maintain its own traffic
6 signal plans in--now, 2012?

7 A If they have town signals, yes. They--they maintain
8 signals for the Department of Transportation.

9 Q Right. Now, do they do it just on town maintained
10 roads or do they do it on state maintained roads?

11 A No, they do it on--they do it on state maintained
12 roads.

13 Q Okay. So---

14 Ms. Martineau: (interposing) Just for clarification
15 purposes, when you say maintained, I mean there's two
16 definitions. I think you're mixing definitions.

17 A Yeah.

18 Q That's what I'm going to get up to. That's what I'm
19 going to get to.

20 Ms. Martineau: I want to make sure that you're---

21 Q (interposing) What is--are you familiar with what
22 intersections are at issue in this case? I probably have a
23 list somewhere.

24 A No, I've got them. I've got them there. I'm familiar
25 with the three that are in the affidavit I signed.

1 Q Okay.

2 A Cary Towne Boulevard and Convention.

3 Q Right.

4 A Kildaire Farm Road and Cary Parkway, Walnut Street and
5 Meeting Street.

6 Q I think there are about four others.

7 Ms. Martineau: And you've looked at others I know,
8 but there--these were--that's just from your affidavit, but
9 you've looked at others. He's looked at all--I believe he's
10 looked at all the signal plans at issue in this case.

11 Mr. Stam: All right.

12 By Mr. Stam:

13 Q What is the authority of the Town of Cary with respect
14 to signal plans at those intersections at issue in this case,
15 those three you mentioned plus the other three or four left
16 turn intersections?

17 A All--all signal plans would have to be approved by
18 NCDOT.

19 Q Okay, before they do it or after they do it?

20 Ms. Glover: Objection. There's no evidence--
21 when you say "they," are you insinuating that the Town of
22 Cary prepared the signal plans, because that's not the
23 evidence in this case.

24 By Mr. Stam:

25 Q Before or after the Town of Cary wants to do--wants to

1 do something, does it get your approval or not?

2 Ms. Martineau: Objection to the form of the
3 question. You can answer if you understand it.

4 A NCDOT would have to approve before any changes were
5 made depending on certain criteria on the signal plan.

6 Q The third paragraph of this document reads,
7 "Municipalities approved by the department to prepare traffic
8 signal plans with or without department review shall... ."
9 Are you saying there are no municipalities that are approved
10 by the department to prepare traffic signal plans without
11 department review?

12 A No, I did not say that.

13 Q Is the Town of Cary approved by the Department of
14 Transportation to prepared traffic signals without department
15 review?

16 A No.

17 Q Are there any municipalities in North Carolina
18 approved by the department to prepare traffic signal plans
19 without department review?

20 A Yes.

21 Q Which ones?

22 A Charlotte, Greensboro, Winston-Salem.

23 Q But not Cary?

24 A Not Cary.

25 Q If a signal plan comes in from Cary for approval, to

1 whom does it go for approval?

2 A We will assign it to one of four or five engineers
3 depending on workload.

4 Q So it doesn't matter what town it's from who it goes--
5 is assigned to?

6 A We have our signal design section regionalized. We
7 have an eastern region, we have a central region, and we have
8 a western region. And we try to keep it within that region
9 unless we just have some workload issues.

10 Q Which region is Cary in?

11 A Central.

12 Q All right. Who would--unless some special circum-
13 stance---

14 A (interposing) Right.

15 Q ---who would handle the central division requests for
16 traffic signal approval?

17 A Well, it would--it would go to Buddy Murr.

18 Q Murr?

19 A Murr, M-u-r-r.

20 Q Okay.

21 A And his regional engineer is Boniface Madu.

22 Q Would you spell that for the court reporter?

23 A Yeah. B-o-n-i-f-a-c-e, M as in Mary, a-d-u.

24 Q Would you go to page 2 of that document?

25 (Witness complies.)

1 Q At the bottom third of the document, it says, "The
2 following are samples of 'as-built' changes that do not
3 require a plan-of-record or a revised plan." And it has
4 these timing changes.

5 A Uh-huh.

6 Q What does--what do the last three timing changes mean?

7 A Seconds per--seconds per actuation, time before
8 reduction, and time to reduce?

9 Q Yeah. Would you explain those?

10 A They're all tied to the coordination plans, not the
11 local intersection control, but when you have a group of
12 traffic signals that are coordinated along a corridor and you
13 try to help with the green timing.

14 Q It's green timing?

15 A Uh-huh.

16 Q Not yellow timing?

17 A No, sir, green timing.

18 Q Okay.

19 A It's called a volume density operation.

20 Mr. Stam: I'm getting near the end.

21 (Plaintiffs Exhibit K was
22 marked for identification.)

23 Q I'll show you what's been marked as Exhibit K.

24 Ms. Martineau: And Paul, we talked about this
25 before. Exhibit K is not exactly the same as Moon's Exhibit

1 G, right? There's one extra page?

2 Mr. Stam: There's one extra page---

3 Ms. Martineau: (interposing) Okay.

4 Mr. Stam: ---and I'll point out which one it
5 is. It's the last--the page attached.

6 Ms. Martineau: Okay.

7 By Mr. Stam:

8 Q Can you tell us what this document this?

9 A It's *Manual on Uniform Traffic Control Devices*, the
10 2009 edition.

11 Ms. Martineau: Is it the whole manual or just
12 excerpts of the manual?

13 The Witness: It's just pages taken from it.

14 Q Okay. Do you know of any pages that would relate to
15 how long the yellow change interval should be that I have not
16 included? I've--for the record, I've got page 485, 486, 487,
17 488, 489, 512, and then a page that says "Part 1, General"
18 and says "Page 1." And it's the page that was not in the
19 Moon deposition.

20 Ms. Martineau: And I object to the form of the
21 question because he doesn't have the full manual here, but to
22 the best of his knowledge he can---

23 Mr. Stam: Sure.

24 A These are related to traffic signal. I don't--without
25 looking at all the pages, I don't know if anything's left

1 out, but yes, they are related. Section 4 is the section of
2 the MUTCD that refers to traffic signal.

3 Q Okay. And when you review your deposition, if you
4 think of other pages that should be considered, please feel
5 free to extend your answer. If you would look at page 1,
6 which is the last page of the exhibit, under section A.02,
7 Principles of Traffic Control Devices, sub 02, "To be
8 effective, a traffic control device should meet five basic
9 requirements." Do you see where I am?

10 Ms. Martineau: Under Guidance, Section 1A.02?

11 Mr. Stam: Under Guidance, yeah.

12 A Uh-huh.

13 Q Okay. I want to ask you about C and E with respect to
14 the yellow change interval for a driver who is turning left.

15 A Well, first of all, this guidance is talking about all
16 traffic control devices, not just traffic signals.

17 Q Does it include traffic signals such as yellow--green,
18 yellow, red lights?

19 A Well, it includes the traffic signal, yes, but it also
20 includes other traffic control devices.

21 Q I understand. I understand. With respect to a driver
22 who is going to turn left at an intersection, what is the
23 clear, simple meaning of the yellow light that comes on with
24 respect to that driver?

25 A The yellow light comes on?

1 Q The yellow light comes on. What is the clear, simple
2 meaning of that yellow light to a driver?

3 A That movement is fixing to terminate.

4 Q Okay. And what is a driver supposed to do about it?

5 A They have to make a decision whether to stop without
6 entering the intersection or proceed through the inter-
7 section.

8 Q Okay. So to go back to my truck driver, for example,
9 who has--well, I'll strike that because you don't know how
10 long it takes for air brakes to engage so I can't really ask
11 you about that, can I?

12 Okay. Go to E. With respect to a driver approaching
13 an intersection where the posted speed limit is 45 miles an
14 hour, but this driver is planning to turn left for example on
15 Kildaire Farm Road and a turn left on Cary Parkway, does the
16 yellow signal which comes on 3.0--is it 3.0 seconds---

17 Ms. Glover: Yes.

18 Mr. Stam: Thank you.

19 Q ---which comes on 3.0 seconds before it goes red, is
20 it your opinion that that driver is given adequate time for a
21 proper response?

22 A In a left turn, yes.

23 Mr. Stam: Okay. If I could have five minutes?
24 We'll step out.

25 The Reporter: Off the record. 3:27 p.m.

1 (A brief recess was taken.)

2 The Reporter: On the record. 3:28 p.m.

3 By Mr. Stam:

4 Q Mr. Fuller, you testified that if a left-turning
5 driver saw a yellow light, the driver had to decide whether
6 to stop or to proceed. If the driver correctly decides to
7 proceed, at what speed must the driver proceed to clear the
8 intersection?

9 Ms. Martineau: Objection to the form of the question
10 because it depends on the distance from the stop line.

11 The Witness: Do you want me to answer?

12 Ms. Martineau: Sure.

13 Ms. Strickland: If you can.

14 A That's a decision that the driver has to make and how
15 aggressive the driver is and the speed that they're
16 approaching stop bar at.

17 Q Well, let's take two drivers. I believe you said the
18 average was at 18 seconds--18 miles an hour entering?

19 A That's from the sample size that we took with the
20 speed committee.

21 Q The sample; right, right. Let's take one driver
22 that's approaching the intersection at--right at the
23 intersection at 30 miles an hour and a second driver who's
24 approaching at 15 miles an hour. At what speed should each
25 driver proceed?

1 Ms. Martineau: Objection to the form of the
2 question. You can answer if you can.

3 A What does the intersection look like?

4 Q When the driver makes this decision either to stop or
5 go, can you tell me for any particular driver, if you knew
6 that driver's speed, where stop turns into go or go turns
7 into stop?

8 A It depends on how far back they are from the stop bar.

9 Q And is that something that can be calculated?

10 A How far--I don't think a driver could calculate it. I
11 mean---

12 Q Could you calculate it?

13 A We calculate it with our yellow change interval and
14 all-red clearance interval.

15 Mr. Stam: No further questions.

16 Ms. Martineau: I'm going to have some questions, but
17 I want to take a break first so I can write them down.

18 Mr. Stam: Sure.

19 The Reporter: Off the record. 3:31 p.m.

20 (A brief recess was taken.)

21 The Reporter: On the record. 4:07 p.m.

22 **C R O S S - E X A M I N A T I O N** 4:07 p.m.

23 By Ms. Martineau:

24 Q Mr. Fuller, my name is Elizabeth Martineau. I'm an
25 attorney for the Town of Cary, and I do have some additional

1 questions for you. Can you tell me a little about your work
2 experience in traffic engineering?

3 A I've been employed with North Carolina DOT for 23
4 years. I started mainly in the Signals Management Section
5 working with traffic signal equipment and the hardware. I
6 was in the ITS Section, what stands for Intelligent
7 Transportation Systems, working with computers and
8 communications and new technology to improve the safety and
9 efficiency along corridors, mainly interstate and our
10 freeways.

11 And since December of 2001, I have been the state ITS
12 and signals engineer, which is over the Signals Management
13 Section, the ITS Section, and the Signal Design Section. And
14 we're responsible for the planning, design, and the
15 operations and maintenance of traffic signals and ITS
16 devices.

17 Q And through your work with NCDOT, particularly the--
18 being in charge of the signal--traffic signal engineering
19 department, are you familiar with the standards of practice
20 for NCDOT engineers?

21 A For traffic signal design, yes.

22 Q Also in your role with NCDOT, do you have the
23 opportunity to work with or review signal plans designed by
24 non-DOT engineers, outside consulting engineers for example?

25 A Yes, my staff does on a--on a pretty much daily basis.

1 Q Okay. Are you also familiar in your job with signal
2 traffic design engineering standards of care for the state of
3 North Carolina?

4 A Yes.

5 Q I want to show you--well, in part of your role here or
6 in earlier conversations between myself and NCDOT have you
7 had the opportunity to look at the signal plans that are at
8 issue in this case?

9 A Yes.

10 (Defendant Exhibit 1 was marked
11 for identification.)

12 Q I'm going to mark--hand you what I'm marking as
13 Exhibit 1 to your deposition. And before I ask you questions
14 about Exhibit 1, Mr. Fuller, are you generally familiar with
15 what is required in order to change a speed limit on a state
16 owned road that's within a municipality?

17 A Generally, yes. I'm not that--I mean I don't do that
18 in my daily job responsibilities, but I'm aware of the
19 general requirements.

20 Q Okay. And are you aware of the general requirements
21 through your role at NCDOT?

22 A Yes, through my role at NCDOT.

23 Q Okay. And what are those requirements?

24 A It's my understanding that you have to have an
25 ordinance. It's also my understanding that the local

1 government, town or city, has to also have the same identical
2 ordinance and then that the section or roadway must be posted
3 with the new speed limit.

4 Q Okay. So you have to have a state law authorizing a
5 certain speed limit?

6 A And ordinance.

7 Q State ordinance authorizing a certain speed?

8 A Uh-huh.

9 Q Is that yes?

10 A Yes.

11 Q As well as a local government ordinance authorizing
12 that speed?

13 A That is my understanding.

14 Q And then finally, the section of the roadway has to
15 have--be posted?

16 A Be posted, yes.

17 Q And is it your understanding through your work with or
18 your position with NCDOT that all three things are required
19 in order to change a speed limit---

20 A (interposing) Yes, that is my understanding.

21 Q ---in a municipality?

22 A Yes.

23 Q Okay. I'm handing--if you take a look at Defendant's
24 Exhibit 1, do you recognize this document?

25 A Yes.

1 Q What is it?

2 A This is the traffic signal plan for Western Boulevard
3 Extension and Convention Drive in Cary.

4 Q What's the date of this plan?

5 A It's dated May 31, 1991.

6 Q Okay. And was this--to your understanding, is this
7 the plan that--was this the official NCDOT plan of record
8 back at the time Mr. Ceccarelli received his civil violation
9 in September 2009?

10 A Yes.

11 Q Okay. And do you know whether or not Western--the
12 signal plan, Defendant's Exhibit 1, the intersection between
13 Western--well, it says Western Boulevard and Convention
14 Drive. What--do you know what the current names of those
15 roads are?

16 A I think it's Cary Towne Boulevard.

17 Q Okay. So do you know whether or not this intersection
18 is a state owned intersection?

19 A This is a state owned intersection.

20 Q Okay. And who prepared the plan? Was this a NCDOT
21 engineer?

22 A At the time it was an NCDOT engineer, Troy Peoples.
23 He has since retired and is working in the private sector.

24 Q And have you looked--do you know what the official--
25 what the legal speed limit was on Cary Towne Boulevard at

1 Convention Center Drive in May of 1991?

2 A I do not know, but according to the plan it was 35
3 miles per hour.

4 Q Okay. And have you have the opportunity to take a
5 look at the clearance time sheet for this intersection?

6 A Yes, I have seen it. I do not have it in front of me.

7 Q I'm going to mark as Exhibit 2 to your deposition--

8 Ms. Martineau: This was an exhibit--I just have one
9 copy, but we can share it.

10 Mr. Stam: Okay.

11 (Defendant Exhibit 2 was marked
12 for identification.)

13 A And yes, I have reviewed that.

14 Q Okay. And can you tell when a NCDOT engineer or
15 engineer--any engineer creating a signal plan for NCDOT
16 owned--or excuse me, state owned roads back in 1991, is that
17 the document that they would use to help calculate the signal
18 plan? I mean the yellow times. Excuse me.

19 A In my conversation with--with some of the engineers
20 who were working at that time, yes, that is the clearance
21 time sheet that would be used.

22 Q Okay. When you say your conversation with some of the
23 engineers, you mean discussions with NCDOT engineers?

24 A Yes, discussions with NCDOT engineers who are still
25 working with NCDOT now.

1 Q Are these engineers that you currently supervise?

2 A Yes.

3 Q Okay. What is--if you--what was the practice back in
4 1991 for verifying the speed limit of the roadway where the
5 signal plan was going to be created?

6 A Of verifying the speed limit?

7 Q Correct.

8 A I--I can't answer that question.

9 Q Okay. You don't---

10 A I was not working--I was not working in this role in
11 1991, so I--I do not know what the signal designer---

12 Q Sure. From your investigation---

13 A (interposing) From---

14 Q ---and your role in looking into this 1991 signal
15 plan, did you talk with other NCDOT engineers to determine
16 what the practice was in 1991 to verify speed limits?

17 A I did. And they indicated to me that they would go
18 out and look at the speed limit that was posted on all
19 approaches.

20 Q Okay. And do you have an opinion whether or not the
21 yellow times that are shown on Defendant's Exhibit 1, which
22 is the 1991 signal plan at Cary Towne Boulevard and
23 Convention Drive--whether or not those yellow times were
24 calculated or sealed by a professional North Carolina
25 licensed engineer?

1 A Yes, they were. They were sealed by Troy Peoples.

2 Q Do you have an opinion of whether or not the yellow
3 times that were prepared by Mr. Peoples on this 1991 plan
4 complied with the MU--the *Manual of Uniform Traffic Control*
5 *Devices* that was in effect at the time?

6 A Yes, it--it appears it does--does apply with the
7 MUTCD, the 1988 edition.

8 Q Do you know what the 1988 edition required for the
9 length of yellow time?

10 A It said that it should be between 3 seconds and 6
11 seconds.

12 Q And do you know--do you have an opinion of whether or
13 not the yellow times that are shown on this 1991 plan
14 complied with general engineering practices?

15 A Yes. From my investigation, they do comply with
16 engineering practices and the NCDOT guidelines at that time.

17 (Defendant Exhibit 3 was marked
18 for identification.)

19 Q Mr. Fuller---

20 Ms. Martineau: Yes?

21 Mr. Stam: I assume that's the best copy we have
22 of that. Do we have anything better than that?

23 Ms. Martineau: I don't know. We got it---

24 Mr. Stam: (interposing) We can make a copy. I
25 mean---

1 Ms. Martineau: We already provided you a copy. That
2 was in Lisa Moon's document.

3 Mr. Stam: Oh, it was?

4 Ms. Martineau: Yeah.

5 Mr. Stam: Okay.

6 By Ms. Martineau:

7 Q Mr. Fuller, I'm going to hand you what I'm marking as
8 Exhibit 3 to your deposition. Do you recognize this
9 document?

10 A Yes, I do.

11 Q Okay. And what is it?

12 A It is the traffic signal design for Kildaire Farm Road
13 at Cary Parkway.

14 Q And what is the date of this design?

15 A April 28, 2009.

16 Q Okay. And is this signal plan of record--a copy of
17 the signal plan of record for Kildaire Farm Road and Cary
18 Parkway or an April '09 signal plan that's--as maintained by
19 NCDOT?

20 A Yes.

21 Q And is, to your knowledge, Kildaire--well, do you know
22 whether or not Kildaire Farm Road at Cary Parkway is a town
23 owned road or intersection or a state owned road or--and
24 intersection?

25 A It is a state owned intersection.

1 Q Okay. And who sealed this signal plan?

2 A Robert Ziemba.

3 Q Okay. And do you know, is he a NCDOT engineer?

4 A He is a NCDOT engineer.

5 Q And do you know when--at the time he sealed these
6 plans, Mr. Ziemba, in April '09 was he a licensed
7 professional North Carolina engineer?

8 A Yes.

9 Q Okay. And if you intend to look at the yellow time
10 for left turns? Do you see the left turn yellow time?

11 A Yes.

12 Q Okay. And have you reviewed this signal plan to see
13 whether or not yellow times for left turns on the signal plan
14 comply with the *Manual of Uniform Traffic Control Devices*?

15 A They do.

16 Q And what are the yellow times for the left-hand turns?

17 A The yellow times for the left-hand turns off of Cary
18 Parkway are 3 seconds. The yellow time for the left-hand
19 turn off of Kildaire Farm Road are also 3 seconds.

20 Q Okay. And what is the practice for using--for--is it
21 the practice of NCDOT--well, strike that. How long has it
22 been the practice of NCDOT to use 20 miles an hour as a
23 design speed when calculating yellow times for left turns?

24 A The best--the best I can tell, it's been the practice
25 since 1990. But each intersection is to be designed

1 specifically for the characteristics, so you could use a
2 higher or lower design speed.

3 Q And is that done at the judgment of the engineer?

4 A That's done at the judgment of the engineer sealing
5 the plan.

6 Q Back in 2009, was it the practice of North Carolina
7 traffic signal engineers--was it within the standard of
8 practice to use an assumed speed of 20 miles an hour for
9 calculating left turn---

10 A (interposing) Yes.

11 Q ---yellow times?

12 A Yes.

13 Q Okay. Does this plan also comply--strike that. Does
14 this plan also meet the standard of care for traffic signal
15 engineers for designing yellow times?

16 A Yes.

17 (Defendant Exhibit 4 was marked
18 for identification.)

19 Q I'm going to hand you what I'm marking as Exhibit 4.
20 Mr. Fuller, can you identify Exhibit 4?

21 A It is the traffic signal design for Southwest Maynard
22 Road and Kildaire Farm Road.

23 Q And what's the date of this design?

24 A June 7, 2006.

25 Q And who is the professional engineer that signed

1 this--that signed and sealed this design?

2 A Bret Gillis.

3 Q Okay. Is he an NCDOT engineer?

4 A No.

5 Q Okay. Do you know where he's employed or where he was
6 employed back in 2006?

7 A I do not.

8 Q Okay. How can--do you know whether or not Mr. Gillis
9 in '06 was a Town of Cary engineer?

10 A Repeat the question.

11 Q Do you know whether or not he was a Town of Cary
12 engineer?

13 A No, I do not.

14 Q Okay. Do you know how--do sometimes private North
15 Carolina licensed professional engineers sign and seal NCDOT
16 signal plans?

17 A Yes.

18 Q Can you tell me how that comes about?

19 A Generally a local government will hire a private
20 engineering firm to make some improvements or private
21 developers come in that are applying for an encroachment
22 agreement on the state highway system and the need will be
23 there for a new signal or a single revision. And they will
24 hire private engineering firms, and they are submitted to
25 NCDOT for review and approval.

1 Q Okay. So NCDOT, then, would--they would--NCDOT would
2 review the submitted signal plans and either approve them,
3 make other suggestions, or reject them?

4 A That is correct.

5 Q Okay. So is what has been marked as Exhibit 4 the
6 official signal plan on file with NCDOT for the intersection
7 of Southwest Maynard Road and Kildaire Farm Road from June
8 '06?

9 A Yes.

10 Q Okay. And looking at the left turn yellow times, do
11 those left-hand yellow times comply or were they calculated
12 in accordance with the *Manual of Uniform Traffic Control*
13 *Devices*?

14 A It appears so.

15 Q Okay. And do you base that on your professional
16 opinion as a signal--traffic signal engineer---

17 A (interposing) Yes.

18 Q ---and your familiarity with the standards outlined in
19 the *Manual of Uniform Traffic Control Devices*?

20 A That is correct.

21 Q Additionally, does--were the yellow times calculated
22 using engineering--well, do the yellow times meet North
23 Carolina engineering standards of care and standards of
24 practices?

25 A They appear to, yes.

1 Q Okay. And when you say they appear to, is it your
2 opinion that they do based on your education and training and
3 background as a North Carolina traffic signal engineer?

4 A Yes. I do have one--I just noticed it appears that
5 Mr. Gillis was employed with Stantec Consulting.

6 Q Okay. And do you say that because there's a Stantec--
7 I'm not---

8 A (interposing) Logo.

9 Q ---logo on this plan.

10 A That is correct.

11 Q Is Stantec a engineering firm that NCDOT uses to
12 complete NCDOT signal plans of record from time to time?

13 A Yes, we do.

14 (Defendant Exhibit 5 was marked
15 for identification.)

16 Q I'm going to hand you what I'm marking as Exhibit 5.
17 Mr. Fuller, do you recognize Exhibit 5?

18 A Yes, I do.

19 Q And what is Exhibit 5?

20 A It is the traffic signal design for Walnut Street at
21 Meeting Street in Cary.

22 Q What's the date of this traffic signal plan?

23 A October 26, 2009.

24 Q And was it sealed by a North Carolina professional
25 engineer?

1 A Yes, it is.

2 Q And who has sealed this?

3 A Hemang Surti.

4 Q Okay. And is Mr. Surti or Ms.--is he or she an
5 engineer with--or was he or she an engineer with Ramey Kemp
6 back in 10/09?

7 A It appears so because I see the logo on--on the signal
8 plan.

9 Q Okay. And is Walnut Street at Meeting Street, this
10 intersection that is depicted on Exhibit 5, Defense Exhibit
11 5, a state owned intersection or a Town of Cary owned
12 intersection?

13 A State owned intersection.

14 Q Okay. And is Exhibit 5 the official signal plan of
15 record for 10/09 for the intersection of Walnut Street and
16 Meeting Street kept by NCDOT?

17 A Yes.

18 Q Okay. And if you would take a look at the left turn
19 yellow times documented on the signal plan and tell me
20 whether it's your professional opinion as a licensed North
21 Carolina signals engineer whether the left-hand turn yellow
22 times comply or were done in accordance with the *Manual of*
23 *Uniform Traffic Control Devices*?

24 A Yes, it appears so.

25 Q And do you base that opinion--is that your opinion to

1 a reasonable degree of engineering certainty?

2 A Yes.

3 Q And have all your opinions regarding these signal
4 plans been done to a reasonable degree of engineering
5 certainty?

6 A Yes.

7 Q And do you have an opinion as to whether or not the
8 yellow times were--were calculated using standard North
9 Carolina engineering practices?

10 A From my review, yes, they were.

11 (Defendant Exhibit 6 was marked
12 for identification.)

13 Q Okay. I'm going to be handing you what I'm marking as
14 Exhibit 6 to your deposition. Mr. Fuller, what is Exhibit 6?

15 A It is the traffic signal design for Walnut Street at
16 Meeting Street. It appears to be the same plan.

17 Q What's the date of this plan?

18 A October 26, 2009.

19 Q So is this--and which one? Just to be clear because
20 we have so many floating around, which one did you just look
21 at for Exhibit 5?

22 Mr. Stam: It appears to be the same thing.

23 A Appears to be the same---

24 Q It's a different date, though.

25 A No, this one's October 26, 2009. This one's October

1 26, 2009.

2 Q Oh, did I give you that one first.

3 A That's what you gave me.

4 Mr. Stam: Okay. Just leave it. I'm sorry.

5 (Defendant Exhibit 7 was marked
6 for identification.)

7 Ms. Martineau: This is going to the Exhibit 7. I did
8 give him the same one twice.

9 Mr. Stam: So we have two--5 and 6 are the same
10 document---

11 Ms. Martineau: (interposing) Yeah.

12 Mr. Stam: ---for the record. Okay.

13 By Ms. Martineau:

14 Q Mr. Fuller, if you would take a look at Number 7?

15 A This is the signal design for Walnut Street at Meeting
16 Street.

17 Q What's the date of this signal plan?

18 A June 24, 2009.

19 Q Okay. And is this the--is Exhibit 7 the North
20 Carolina Department of Transportation's official signal plan
21 for the intersection of Walnut Street at Meeting Street in
22 June of 09?

23 A Yes.

24 Q Okay. And then it was later---

25 A Revised.

1 Q And substituted with Exhibit Number 5 from 10/09; is
2 that right?

3 A That's correct.

4 Q Okay. And then looking at the left turn yellow times
5 as documented on Exhibit Number 7, do you have--based on
6 your--based on your position as an NCDOT signal traffic
7 engineer for the North Carolina Department--well, North
8 Carolina Department of Transportation, do you have an opinion
9 as to whether or not these left turn yellow times comply with
10 the *Manual of Uniform Traffic Control Devices*?

11 A It appears they do.

12 Q Okay. And do they--do the left--are the calculated
13 yellow times for left turns on this signal plan done in
14 accordance with general engineering practices?

15 A Yes.

16 (Defendant Exhibit 8 was marked
17 for identification.)

18 Q I'm handing you what I'm marking as Exhibit 8. Mr.
19 Fuller, what is Exhibit 8?

20 A Traffic signal design for High House Road at Cary
21 Parkway.

22 Q Okay. Is the North Carolina Department of
23 Transportation's official signal plan of record for the
24 intersection of High House Road and Cary Parkway from October
25 '06?

1 A My records indicate there was a signal plan prepared
2 on February 17, 2011 by Mr. Robert Ziemba.

3 Q Right, but is this your--is this the signal plan from
4 October '06, the NCDOT official signal plan for this inter-
5 section?

6 A At that time, yes.

7 Q And it was later supplemented by a February 2011
8 signal plan for that intersection?

9 A That is correct.

10 Q And if you would take a look at the left turn yellow
11 times on this signal plan--first of all, let me back up. Are
12 you familiar with Lisa Moon?

13 A Yes.

14 Q Okay. And was this signal plan, 10/2006, signed and
15 sealed by Ms. Moon, who was a North Carolina professional
16 licensed engineer?

17 A Yes.

18 Q Okay. And do the left turn yellow times comply with
19 the *Manual of Uniform Traffic Control Devices*?

20 A Yes.

21 Q And were the left turn times calculated using standard
22 engineering practices for engineers in North Carolina?

23 A From my review, yes.

24 Q And are all of your opinions thus far based on your
25 role as a North Carolina licensed professional traffic

1 engineer and with your position with NCDOT?

2 A Yes.

3 (Defendant Exhibit 9 was marked
4 for identification.)

5 Q I'm handing to you what we're marking as Exhibit 9.

6 Mr. Fuller, do you recognize Exhibit 9?

7 A This is a traffic signal design for High House Road at
8 Cary Parkway dated February 17, 2011, sealed by Mr. Robert
9 Ziemba, who is a North Carolina DOT professional engineer.

10 Q Okay. And this February 2011 signal plan, is this the
11 official NCDOT signal plan for February 2011 for the inter-
12 section of High House Road at Cary Parkway?

13 A Yes.

14 Q And if you would look at the left turn yellow change
15 interval, are these yellow change intervals--were they done
16 in accordance with the *Manual of Uniform Traffic Control*
17 *Devices*?

18 A Yes.

19 Q And were they calculated using sound engineering
20 practices?

21 A From my review, yes, they were.

22 (Defendant Exhibit 10 was
23 marked for identification.)

24 Q I'm going to hand you what I'm marking as Exhibit 10
25 to your deposition. What is Exhibit 10, Mr. Fuller?

1 A This is the traffic signal design for Kildaire Farm
2 Road at Cary Parkway dated April 28, 2009, sealed by Mr.
3 Robert Ziemba, who is a North Carolina DOT professional
4 engineer.

5 Q Okay. And was--is this the official NCDOT signal plan
6 of record for Kildaire Farm Road and Cary Parkway dated April
7 2009?

8 A Yes.

9 Q Was it thereafter substituted by a new signal plan
10 dated June 2010?

11 A Dated June 23, 2010, yes.

12 Q Okay. And if you would look at the left turn yellow
13 times on Exhibit 10 and tell me, based upon your educational
14 training and background as well as your position with NCDOT
15 signals--as a signal engineer, are the left turn yellow times
16 done in accordance with the *Manual of Uniform Traffic Control*
17 *Devices*?

18 A Yes, it appears so.

19 Q Okay. And do you have an opinion as to whether or not
20 the left turn yellow times were calculated using sound
21 engineering practices?

22 A It appears they were.

23 Mr. Stam: Can I ask you something off the
24 record?

25 The Reporter: Off the record. 4:44 p.m.

1 (Discussion off the record.)
2 The Reporter: On the record. 4:45 p.m.
3 (Defendant Exhibit 11 was
4 marked for identification.)
5 By Ms. Martineau:
6 Q I'm handing you what I'm marking as Exhibit 11. Mr.
7 Fuller, what is Defendant's Exhibit 11?
8 A This is a traffic signal design for Kildaire Farm Road
9 at Cary Parkway in Cary dated June 23, 2010, sealed by Mr.
10 David Spencer, who--it is my understanding he is a Town of
11 Cary employee.
12 Q Okay. Do you know if Mr. Spencer is a--back in June
13 2010 was a licensed professional engineer?
14 A Yes, he was.
15 Q Okay. And if you look--do you see where it says "NC
16 Department of Transportation, Division of Highways, Final
17 Drawing Date 7/7/10"? And then there's a signature under
18 that. Do you know whose signature that is?
19 A Mr. Ryan Huff.
20 Q Who's Mr. Huff?
21 A He is an employee in the ITS and Signals Unit.
22 Q Of NCDOT?
23 A Of NCDOT.
24 Q Did NCDOT review Mr. Spencer's June 2010 signal plan?
25 A Yes.

1 Q Did they adopt it officially as their own?

2 A Yes.

3 Q Okay. If you would take a look at the left-turn
4 yellow times that are on Exhibit 11, do you have an opinion
5 whether or not the yellow times were calculated in accordance
6 with the *Manual of Uniform Traffic Control Devices*?

7 A Yes, it appears they were.

8 Q And do you have a professional opinion as to whether
9 or not the yellow times were calculated using standard
10 engineering practices?

11 A Yes, it appears they were.

12 (Pause.)

13 Ms. Martineau: Do you have a copy of Mr. Stam's
14 exhibits?

15 The Reporter: Yes.

16 Ms. Martineau: Can I take a look at them for just a
17 second?

18 (Reporter hands exhibits to Ms. Martineau.)

19 By Ms. Martineau:

20 Q Mr. Fuller, I'm going to ask you to take a look at
21 Exhibit H, if you would take a look at the second page of
22 Exhibit H.

23 (Witness complies.)

24 Q And what intersection is purported to be shown on
25 Exhibit--on the second page of Exhibit H?

1 A The intersection of Kildaire Farm Road and Cary
2 Parkway.

3 Q And do you recall in response to Mr. Stam's question
4 he asked you if--without any real context just looking at the
5 second page of Exhibit H whether it--whether you had any
6 reaction?

7 Mr. Stam: Objection.

8 Q Do you recall those questions or that question? You
9 can answer. He's allowed to object to my question.

10 A Yes, I do recall.

11 Q Okay. And do you recall saying that it caused you
12 some alarm?

13 A Yes.

14 Q Does looking at Plaintiffs Exhibit H change your
15 opinion as to whether or not the signals plans of record,
16 NCDOT signal plans of record for Kildaire Farm Road and Cary
17 Parkway from June 2010 and April 2009 as shown on Exhibits 10
18 and 11 of Defendant's exhibits to your deposition--does the
19 second page of Exhibit H change your opinion as to whether or
20 not either of those two signal plans were the yellow times
21 done in accordance with the *Manual of Uniform Traffic Control*
22 *Devices*?

23 A No.

24 Q And it's your opinion that they were? It's your
25 professional opinion that they were, correct?

1 A Yes, they were done in accordance with the MUTCD.

2 Q And does the second page of Exhibit H change your
3 opinion as to whether or not the signal plans shown on
4 Defendant's Exhibit 10 or 11, the yellow times reflected on
5 those plans for left turn lanes--whether or not they were
6 calculated using good engineering principles?

7 A Yes. From my review, they were calculated using sound
8 engineering practices.

9 Q Okay. And so your comments earlier related to the
10 second page of Exhibit H would not change that opinion?

11 A No.

12 Q And the fact that the second page of Exhibit H shows
13 an increase--you know, according to that page shows an
14 increase in violations would not change your opinion?

15 A No.

16 Q Is it part of your role with NCDOT signals to be
17 familiar with the standard of care accused by traffic
18 engineers in designing yellow times?

19 A Yes.

20 Q Is it part of your role with NCDOT signals to be
21 familiar with the standard of care used by traffic signal
22 engineers in designing yellow times?

23 A Yes.

24 Q And is it part of your role with NCDOT Signals Unit to
25 be familiar with the *Manual of Uniform Traffic Control*

1 *Devices* and what that manual requires for yellow times?

2 A Yes.

3 Q Are you also familiar with the North Carolina NCDOT
4 design manual that has calculations for yellow times?

5 A Yes.

6 Q Okay. And have you reviewed those calculations for
7 yellow times from 1999 to present?

8 A For the intersections in question, yes.

9 Q Okay. And do the intersections in question, the
10 calculations of the yellow times for those intersections, do
11 those comply with the NCDOT design manual for calculating
12 yellow times?

13 A Yes.

14 Q And do you know--I mean are you familiar with any
15 other jurisdictions other than the state of North Carolina
16 regarding calculations of yellow times?

17 A Can you reword the question or repeat it?

18 Q Sure. Other than North Carolina, do you know what
19 other jurisdictions use for a assumed speed in calculating
20 left turns for yellow times, for example?

21 A From our research, I know that a lot of agencies use
22 the IT formula.

23 Q And does the IT formula allow for using an assumed
24 speed of 20 miles an hour for left turns for determining
25 yellow times?

1 Mr. Stam: Objection to form.

2 A Yes, it allows for that.

3 Q Okay. And when North Carolina DOT asked the North
4 Carolina section of ITE to come together, form a task force,
5 and determine practices for NCDOT, that task force consisted
6 of North Carolina engineers from both private and public
7 sectors?

8 A That is correct, as well as a research student and an
9 individual from the Institute of Transportation Research and
10 Education.

11 Q And that task force, did it make a recommendation as
12 to what The North Carolina Department of Transportation
13 should use for an assumed speed for left turns for--when
14 determining yellow times?

15 Mr. Stam: Objection.

16 A It gave a range of 20 to 30 miles per hour, but it
17 also said that that speed could be higher or lower depending
18 on the site specific condition of the intersection.

19 Q Okay. And was then those times to be determined using
20 engineering practices?

21 A Uh-huh.

22 Q Is that yes?

23 A Yes. That's by the designing engineer.

24 Q In your review of all the signal plans at issue in
25 this case, did you come across anything regarding the yellow

1 times that were below what you would consider good
2 engineering practices?

3 A Can you reword the question?

4 Q Sure. Did all the yellow times that you reviewed on
5 the NCDOT signal plans of record that are at issue in this
6 case--did they all appear to have been calculated using good
7 engineering practices?

8 Mr. Stam: Objection.

9 A Based on the data that is on the signal design, yes.

10 Ms. Martineau: Thank you. Those are the questions I
11 have.

12 **REDIRECT EXAMINATION** 4:53 p.m.

13 By Mr. Stam:

14 Q Mr. Fuller, if you would look at Exhibit 11?

15 (Witness complies.)

16 Q I see three dates, and if you could tell me what each
17 one means?

18 Ms. Martineau: Which one?

19 Mr. Stam: 11 is the last one.

20 Q I see a plan date May of 2010. I see what appears to
21 be when the signature of the engineer was affixed June 23,
22 2010. And then I see what looks like a final drawing date of
23 July 7, 2010. What are the difference between those three
24 dates?

25 A Since this design was prepared by the Town of Cary,

1 I'm assuming the plan date is when Mr. Hayes completed the
2 design and turned it over to David Spencer.

3 Mr. Spencer sealed the plan on June 23, 2010,
4 indicating that it would be a final drawing ready for
5 construction. At that time, it was submitted to North
6 Carolina DOT for review, and a North Carolina DOT engineer
7 approved the final drawing on July 7, 2010.

8 Q Is there anything on this exhibit or any of the other
9 exhibits that tells us when the actual change was made on the
10 ground at that intersection?

11 A Not on a signal plan, no.

12 Q Is there a--is there a document for--in DOT's records
13 of when for example Defendant's 11 was actually effectuated
14 on the ground? When I say on the ground, I mean at the
15 intersection---

16 A (interposing) At the intersection control; I
17 understand.

18 Q ---where cars---

19 A (interposing) Not in NCDOT's records. That would--
20 the change would have been made by the Town of Cary staff,
21 and they would have documented the date the change was made.

22 Q All right. So these dates on these maps do not
23 purport to be the dates of the actual change?

24 A That's correct.

25 Q Okay. So DOT doesn't--does DOT keep a maintenance log

1 of any intersection, or is that only the Town of Cary?

2 Ms. Martineau: Objection to the form of the
3 question.

4 Q Or is that only kept by the Town of Cary. I'm sorry.

5 Ms. Martineau: Objection to the form of the
6 question. Answer if you can.

7 A DOT keeps a maintenance log of the intersections that
8 we maintain.

9 Q Okay. But if these were on state maintained roads and
10 the state---

11 A (interposing) Excuse me. State owned.

12 Q State owned roads, okay. If these are state owned
13 roads at controversy in this case and the state approves the
14 plans, and as you've testified before the Town of Cary is not
15 approved for doing its own signal plans without approval, do
16 you have any record anywhere at DOT of when the plans were
17 put into effect at the intersection?

18 A No, I don't.

19 Q So the Town of Cary never tells you. For all you
20 know, this plan never happened?

21 Ms. Martineau: Objection to the form of the
22 question.

23 Q Exhibit--I'm sorry. For all you know, the changes--
24 the changes, if any, for Exhibit 11, whatever the changes
25 were from the prior plan, never happened.

1 Ms. Martineau: Objection to the form of the
2 question.

3 A That's correct.

4 Q Okay. And the reason I ask that is not because of
5 Exhibit 11, but because of Cary Towne Boulevard and Cary
6 Parkway where it looks like the change in plan occurred many
7 months before the spike in citations. Exhibit 3--if you take
8 a look at Exhibit 3, Defendant's Exhibit 3, what are the
9 dates stated on Exhibit 3?

10 A Are we referring to Kildaire Farm Road at Cary
11 Parkway?

12 Q Right.

13 A April 28, 2009.

14 Q Was when it was signed by Mr. Robert---

15 A (interposing) Ziemba.

16 Q ---Ziemba. And maybe it's my bad old eyes, but I
17 can't see when DOT actually approved the map like it approved
18 some of the others.

19 A Well, Mr. Ziemba is a NCDOT engineer, so when he seals
20 it, it's approved.

21 Q Okay. But April 28 of '09 is some time before it was
22 put into effect by the Town of Cary. Is that your under-
23 standing?

24 Ms. Martineau: Objection to the form of question.
25 Answer if you know.

1 Q You don't know when it was, but would it be before?

2 A I don't know. I don't know when.

3 Q Okay. Well, could Cary have done it before--before
4 getting approval legally? I withdraw that question. The
5 answer is obvious. I'll withdraw it. Does Cary keep a log
6 of when they make the changes?

7 A I don't know.

8 Mr. Stam: Okay. One minute.

9 (Pause.)

10 Mr. Stam: No further. Thank you very much.

11 Ms. Martineau: No further questions. Thank you.

12 (The deposition was closed at 4:59 p.m.)

STATE OF NORTH CAROLINA

COUNTY OF WAKE

C E R T I F I C A T E

I, Cynthia W. Rice, Notary Public-Reporter, do hereby certify that **Greg Fuller** was duly sworn or affirmed by me prior to the taking of the foregoing deposition, that said deposition was taken by me and transcribed under my direction, that the foregoing pages 7 through 97 constitute a true and correct transcript of the testimony of the witness, and that the witness reserved the right to review his testimony.

I do further certify that I am not counsel for or in the employment of either of the parties to this action, nor am I interested in the results of this action.

I do further certify that the stipulations contained herein were entered into by counsel in my presence.

In witness whereof, I have hereunto set my hand, this 28th day of October, 2012.

/s/ Cynthia W. Rice

Cynthia W. Rice
Notary No. 200602400090

S I G N A T U R E

I have read the foregoing pages 6 through 97, which contain a correct transcript of the answers made by me to the questions herein recorded. My signature is subject to corrections on the attached errata sheet, if any.

(Signature of Greg Fuller, P.E.)

State of _____
County of _____

I certify that the following person personally appeared before me this day and I have personal knowledge of the identity of the principal or have seen satisfactory evidence of the principal's identity in the form of a _____ or a credible witness has sworn to the identity of the principal, acknowledging to me that he or she voluntarily signed the foregoing document for the purpose stated herein and in the capacity indicated: _____.

(Name of Principal)

Date _____

(Official signature of Notary)

(Official Seal)

_____, Notary Public
(Notary's printed or typed name)

My commission expires _____.

I, Cynthia W. Rice, the officer before whom the foregoing deposition was taken on October 15, 2012, certify that the foregoing transcript was delivered to the witness either directly or through the witness' attorney or through the attorney retaining the witness on _____ and that as of this date I have not received the executed signature page.

Therefore, more than 30 days having elapsed since receipt of the transcript by the witness, the sealed original transcript was filed with attorney for Plaintiffs on _____ by means of US Priority Mail, in accordance with Rule 30(e) of the North Carolina Rules of Civil Procedure.

Date

Cynthia W. Rice
Court Reporter