

Gilliam, Amanda

From: Murr, Buddy
Sent: Tuesday, June 26, 2012 9:09 AM
To: Fuller, Gregory A
Subject: RE: Cary Red Light Lawsuit

On page 68 of the NCHRP 03-95 study, look at the last sentence of this bullet:

- Speed limit by itself was found to be an inaccurate estimate of 85th percentile speed. In lieu of field-measured speed data to determine 85th percentile approach speed, the findings of study suggest it is appropriate to estimate this value for through free-flowing vehicles by adding 7 mph to the approach speed limit. For left-turning vehicles, this study suggests that 85th percentile approach speed is appropriately estimated by subtracting 5 mph from the approach speed limit. When calculating the red clearance interval, the speed estimation is true for through free-flowing vehicles. However, for left-turning vehicles, this study suggests using 20 mph regardless of posted speed limit.

Buddy

G. G. Murr, Jr., PE
NCDOT - State Signals Engineer
office: 919-661-5953
main: 919-773-2800
fax: 919-771-2745
<http://www.ncdot.org/doh/preconstruct/traffic/ITSS/>

From: Rob Ziemba [<mailto:ncsurrboy@yahoo.com>]
Sent: Sunday, June 24, 2012 9:06 PM
To: Fuller, Gregory A; Murr, Buddy
Subject: Cary Red Light Lawsuit

I assume you saw these over the weekend:

<http://www.newsobserver.com/2012/06/22/2154364/class-action-ruling-could-add.html>

<http://www.newsobserver.com/2012/06/24/2155290/lawsuit-doesnt-stop-red-light.html>

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Gilliam, Amanda

From: Laura.Cove@townofcary.org
Sent: Monday, December 22, 2008 9:03 AM
To: Fuller, Gregory A
Subject: Re: Rosalind Ellwood complain about Red Light Cameras

Thanks Greg. I've asked Wesley to confirm what's in the field, again. You'll be happy to know that now your name is in Rosalind's little black book that she carries everywhere.

Merry Christmas to you too.

Lori Cove

From: "Fuller, Gregory A" [gfuller@ncdot.gov]
Sent: 12/22/2008 06:47 AM EST
To: Laura Cove
Subject: RE: Rosalind Ellwood complain about Red Light Cameras

This is the lady that called me. I pulled the signal plan at Harrison Avenue & Maynard Road. The Harrison Avenue phases have yellow clearance times of 4.2 and 4.9 seconds. She kept saying it was only 3 seconds. The left turns are 3 seconds of yellow. She was looking for me to intervene but I explained that NCDOT has no authority over the red light cameras. Have a Merry Christmas.

Greg Fuller
State ITS and Signals Engineer
NCDOT - Traffic Engineering
Phone: 919-661-5800

From: Laura.Cove@townofcary.org [<mailto:Laura.Cove@townofcary.org>]
Sent: Friday, December 19, 2008 11:04 AM
To: HUDSONS3@HOTMAIL.COM; Brad.Hudson@townofcary.org; Chris.Davis@TownofCary.org
Cc: David.Spencer@townofcary.org; Fuller, Gregory A; Wesley.Vo@townofcary.org; Tom.Reilly@townofcary.org; Bryan.Hayes@townofcary.org; Johnson, Steven J; Mckay, Andrew F
Subject: Rosalind Ellwood complain about Red Light Cameras

Heads up. Rosalind Ellwood has called DOT, David and me today about her strong concerns about red light cameras. I am sure that you remember her. She came by in August of 2007 to see me, called Steve at the Division and also talked to Chris in Police as well as a consultant who did the signal plans. She had received several tickets from RedFlex at that time and had finally decided to appeal. She lost her appeal and I haven't heard from her since until today.

She may have received another ticket recently or just saw the Road Warrior article this week, but she is on a mission again. She asked for the current appeal and citation data. We put that in the mail to her today (as she said she doesn't have e-mail). She also said in her message to me that she was writing me a letter stating that her previous appeal was illegal because it was supposed to be a panel of three people and only two were there. I am going to direct her to write that letter to Police since Engineering doesn't coordinate the appeal process.

Just wanted to keep everyone in loop.

Lori Cove, P.E.
Traffic Engineering Manager
Town of Cary
P.O. Box 8005
Cary, NC 27512-8005
(919)462-3937



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 15, 2005

Memorandum

To: Holders of the Traffic Management & Signal Systems Design Manual
Private Engineering Firms and Municipality Traffic Engineers

From: G. A. Fuller, PE *G. A. Fuller*
State ITS and Signals Engineer

Subject: Vehicle Clearance Interval Timing Calculations (Std. No. 5.2.2)

Please find attached revised pages on the subject matter for the Traffic Management & Signal Systems Design Manual. These revisions adopt practices recommended by a NCSITE Traffic Engineering Council Task Force and are effective August 1, 2005.

This design practice for the calculation of vehicle clearance interval timings at signalized intersections along the state highway system will supersede the practice implemented on December 15, 2004. Clearance intervals for existing signalized intersections and final traffic signal plans prior to August 1, 2005 do not need to be recalculated. Rather, clearance intervals will be recalculated upon the preparation of revised traffic signal plans for future improvements. As with any other design practice, engineering judgment must be used to ensure site specific needs are met.

Also attached is a copy of the memorandum from the NCSITE Task Force summarizing the recommendations.

The complete Traffic Management & Signal Systems Design Manual is available at the following web page: <http://www.doh.dot.state.nc.us/preconstruct/traffic/unssu/default.htm>

If I may be of any further assistance in this matter, please contact me at (919) 733-8021.

Attachments

GAF/REM

Cc: J. Kevin Laey, PE
Division Traffic Engineers
Regional Traffic Engineers

Greg A. Fuller, P.E.
State ITS and Signals Engineer
Intelligent Transportation Systems & Signals Unit
NC Department of Transportation
1561 Mail Service Center
Raleigh, NC 27699-1561

Dear Mr. Fuller;

The purpose of this memo is to summarize the work of the 2005 NCSITE Task Force for Yellow and Red Intervals. In light of input received upon the strict implementation of the ITE formula in North Carolina in July of 2004, this Task Force was charged with reviewing the NCDOT Signals & Geometrics practice for the calculations and recommending a standard practice statewide. Note: a general familiarity with the ITE formula and the current Signals and Geometrics Section Design Manual is assumed in this letter.

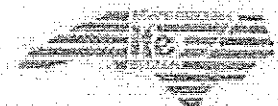
The Task Force was made up of 31 volunteers from NCDOT, municipalities, consultants and not-for-profit organizations. The Task Force met four times in the last five months; individual committees had additional meetings and teleconferences. The committees were charged with in-depth investigation of selected elements of the change/clearance time topic.

The committee chairpersons were:

Clearance Interval Constraints - Richard Mullinax (NCDOT)
Numerical Inputs to ITE Formula - Melissa Cooney (PBS&J)
General Clearance Issues - Bo Winstead (HNTB)
Speed Issues - Pam Alexander (NCDOT)

The following bullets summarize the conclusions of the Task Force:

- That calculation of the yellow change and red clearance intervals should not vary based on the presence or absence of enforcement devices;
- That a combination of NCDOT design practices and the realities of traffic congestion are producing larger, wider intersections that pose challenges for maintaining reasonable clearance times;
- That separate practices should not exist for
 - o different regions of the state;
 - o unique vehicle streams (e.g., high % heavy vehicles);
 - o left turning vehicles versus through vehicles;



- That the ITE formula for the calculation of the total clearance interval should be the basis for the NCDOT practice. The formula as published in the ITE Traffic Engineering Handbook is as follows, broken up into two terms:

$$Y = t + \frac{v}{2a + 2Gg} \quad AR = \frac{w + L}{v}$$

Yellow Change Interval formula ("1st Term")

- That the 2001 AASHTO constants for deceleration (11.2 ft/sec²), and perception/reaction time (1.5 sec) are sound;
- That the effect of positive grade should be factored into the yellow calculation;
- That 3.0 seconds should be a minimum value for Yellow;
- That the Signals and Geometrics Section's current practice for selection of vehicle speeds, "v", was reviewed and retained in this application (also applicable to the red clearance interval calculation);
- That the proposed implementation of a yellow change interval of longer than 6.0 seconds is cause for a "stakeholder discussion" to provide advance notification and involvement to stakeholders and to provide an opportunity to consider possible countermeasures.

Red Clearance Interval formula ("2nd Term")

- That 1.0 second should be a minimum value for Red;
- That the strict use of the ITE formula (when compared to past NCDOT practice) is likely to cause a significant shift in allocation of time from yellow to red that may cause motorists to disrespect the red interval;
 - o That, therefore, equal consideration should be given to clearing the vehicle through the intersection and limiting "excessive red time" (defined by the Task Force to be greater than 3.0 seconds), thus encouraging driver respect of indications;
- That certain revisions to this formula are recommended; they are:
 - o That the vehicle length, "L", be removed from the red formula; this yields:

$$AR = \frac{w}{v}$$

- o That, if the initial calculation results in an all red time greater than 3.0 seconds, the red time be recalculated as follows:

$$AR = \frac{1}{2} \left(\frac{w}{v} - 3 \right) + 3$$

- That certain other guidelines should be applied when using the formula; they are:
 - o That the clearance distance, "w" be taken to the far side of an exclusive right-turn lane, which is not a change from the current Signals and Geometrics Section practice.
 - o That, in the presence of a crosswalk with pedestrian signals, the clearance distance be taken to the near side of the crosswalk;

- That a crosswalk without pedestrian signals would not be considered when determining clearance distance
- That for a "shared clearance" phase (when a phase serves multiple movements needing different clearance intervals), the following procedure should be applied:
 - Calculate each movement's clearance interval as if it had a dedicated phase.
 - Use the largest calculated Yellow, then subtract this Yellow from the largest Total Clearance to determine the All Red.
- That the proposed implementation of a recalculated red clearance interval of longer than 4.0 seconds is cause for a "stakeholder discussion" to provide advance notification and involvement to stakeholders and to provide an opportunity to consider possible countermeasures.
- The Task Force recommends this practice regarding the Red interval for the following reasons:
 - The procedure gives equal weight to safety concerns caused by long red times and safety concerns caused by short red times.
 - The procedure offers a smooth transition between "nominal" and "excessive" All-Red calculations.
 - Longer clearance distances will still receive a longer All-Red interval.
 - The method is easy to understand and apply.

The Task Force believes this clearance interval calculation procedure, when applied consistently, and not withstanding sound engineering judgment, will provide an efficient yet safe operating environment at signals.

The committees and the Task Force as a whole looked at a wide range of strategies, issues and options above and beyond what is discussed here. For a full appreciation of this, please refer to the minutes of the individual meetings.

I would like to thank the following persons for their exceptional hard work and kind assistance: the committee chairs, Frances Vess (Stantec), Don Bennett (City of Wilmington), Lisa Moon (PBS&J) and especially Steven Click of NCDOT.

If you have any further issues or discussion of this matter, please feel free to contact me.

Kindest regards,



David L. Jones, P.E.
Task Force Co-Chairman
NCSTTE Traffic Engineering Council

Gilliam, Amanda

From: Will Garner, Jr. PE [wgarner@dot.state.nc.us]
Sent: Wednesday, March 09, 2005 8:26 AM
To: Pamela L. Alexander
Subject: Re: NCSITE Task Force - Speed Issues
Attachments: wgarner.vcf

Pam,

What happens on a cycle when the left turn phase does not run to max and in fact may have only a couple vehicles more than can be served during the minimum green time if we use the vehicle speeds from only the end of the queue? Do these slower vehicles get shorted on the time they need to clear the intersection because we have only considered the end of queue speeds? I know there is no "one size fits all" solution but it seems to me that using a speed closer to the mid queue and doing an 85th would result in a clearance interval for the left turn that would be more appropriate. Al and I were going to take some laser measurements in Moore County this morning but he has some broken pipes at home that he has to get repaired. We will try to get together next week and send you the data points that we collect.

Just some random thoughts.

"Pamela L. Alexander" wrote:

> My apologies for not getting in touch with you sooner, I have been out
> sick (along with about half the building). I think we are all starting
> to get well again.

>
> Please read the word document, 'clearance subgroup letter', first.

>
> --
> Pamela L. Alexander, PE
> S & G Special Projects Engineer
> 919-715-8333

>
> -----
>

> Subject:
> Date: Tue, 1 Mar 2005 18:04:50 -0500
> From: "MATT CARPENTER" <matthew.carpenter@highpointnc.gov>
> To: <palexander@dot.state.nc.us>

> Pam,

>
> We have done two studies so far - Lexington Ave at Westchester Dr,
> eastbound left turn, and Main St at Parkway Ave, eastbound left turn.
> Attached are adobe PDF and Excel files of the data my tech collected.
> Both studies covered period of approx. 30-35 minutes in the AM and PM
> at each intersection. "Middle and End of queue" data was used to
> calculate an 85th% speed. Based on our discussion of just needing
> data from the last part of the queue, I will change our method and
> just look at the end of the queue and try to collect at least 60 data
> points. I don't think 40 is enough. Let me know what you think.

>
> Matthew L. Carpenter, EIT
> Transportation Engineer



Greg A. Fuller, P.E.
State ITS and Signals Engineer
Intelligent Transportation Systems & Signals Unit
NC Department of Transportation
1561 Mail Service Center
Raleigh, NC 27699-1561

DRAFT

Dear Mr. Fuller;

The purpose of this memo is to summarize the work of the 2005 NCSITE Task Force for Yellow and Red Intervals. In light of input received upon the strict implementation of the ITE formula in July of 2004, this Task Force was charged with reviewing the NCDOT Signals & Geometrics practice for the calculations and recommending a standard practice statewide. Note: a general familiarity with the ITE formula and the current Signals and Geometrics Section Design Manual is assumed in this letter.

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If you have any further issues or discussion of this matter, please feel free to contact me.

Kindest regards,

David L. Jones, P.E.
Task Force Leader
NCSITE Traffic Engineering Council

Gilliam, Amanda

From: Pamela L. Alexander [palexander@dot.state.nc.us]
Sent: Friday, April 15, 2005 5:02 PM
To: Will Garner; Al Grandy; Charles Abel; Gary Faulkner; Greg Fuller; Matthew Carpenter; Rusty Thompson; bruce.friedman; Brian K. Mayhew, PE
Subject: Clearance Subworkgroup

Dear Speed Subworkgroup,

We need some additional speed information before the next meeting. We have broken the speeds into 2 categories: 1) Clearance Speed and 2) Approach Speed.

Clearance Speed

The clearance speed is the speed the vehicle travels while actually in the intersection. We have data for 5 intersections. At the last meeting, we determined that we need clearance speeds from larger intersections and intersections with obtuse angles. For those of you who have the means, please select a large intersection and one with a flatter curve than 90 degrees to measure. I would like to have data from 2 each, if feasible.

Approach Speed

The approach speed is the speed the vehicle travels as it approaches the stopbar. Charles Abel with the City of Charlotte sent in speed information taken at the stopbar at a variety of locations in Charlotte. I would consider these speeds as 'approach' speeds since they occur before the actual clearing of the intersection. Ideally, the speed would be measured over the 100' to 200' approaching the stopbar. But after discussions with several people, we determined getting the speeds approaching the intersection is difficult. If you have a method for getting this information, please let me know.

Another suggestion from the last meeting was to check with agencies across the nation about what speed they assume. If you will not be getting field data, please conduct research. Please email the group briefly letting us know who you get information from so we don't duplicate efforts.

I need the information by May 10th so I can compile it. I will be out of the office next week Monday - Wednesday. Thanks for your efforts.

"Jones, David L" wrote:

Dear Task Force Members:

We have set a tentative date for the next meeting: Tuesday May 17 at 10am in Raleigh at PBS&J.

If there are any major conflicts that we are unaware of, please let me know asap.

Further details when they become known.

Thanks!

Dave

David L. Jones, P.E.

ITS Division

PBS&J

1616 E. Millbrook Rd., Suite 310

Raleigh, NC26709

(919) 876-6888 x5249 (office)

(919) 876-6848 (fax)

(919) 522-9815 (cell)

--
Pamela L. Alexander, PE
S & G Special Projects Engineer
919-715-8333

Gilliam, Amanda

From: Mark McDonald [mark.mcdonald@ci.high-point.nc.us]
Sent: Wednesday, December 22, 2004 2:48 PM
To: Greg Fuller
Subject: clearance timing

Greg,

I have received your December 15 memo regarding calculation of clearance intervals and have some concerns. You state that there is no consistency across NC, but doesn't the old method (or the existing, since I doubt that many changes have occurred that conform to the newer calculation procedure) establish a statewide standard by setting yellow times based on approach speed (4.0, 4.7, and 5.1, for less than 40 mph, 45-50 mph, and 55 mph, respectively)? In High Point we try to make sure all of our signals -- both state-owned and city-owned -- conform as nearly as practicable to NCDOT guidelines and requirements, and having standardized yellow times 1) makes database management easier; 2) is consistent from location to location and is generally accepted by the motoring public as "normal"; and 3) seems to work for virtually all applications.

Furthermore, as a Red Light Camera city, we are very reluctant to make clearance changes since we are regularly questioned about this by those who oppose such safety and automated enforcement programs. Before we embark on such an endeavor that could potential be construed negatively (by both the public and the media), we'd like to see some justification for why the changes are necessary as well as some training on exactly how NCDOT wants clearance intervals calculated. I think many of my municipal colleagues may have similar concerns and questions and would agree that this would in fact be beneficial to them and their staffs as well. A half-day session would be adequate to address the issue, and High Point would be happy to serve as host.

Like many other municipalities, the state of our signal plans is not what it should be. Changes have occurred at numerous intersections over an extended period of time and very few installations really match the record plans or the current state standards. Making the clearance changes suggested by the new practice may seem at face value to be a minor task, but to do it correctly will in fact be a major undertaking requiring significant amounts of time and staff resources. Try as we may, we simply do not have the resources to bring these plans, and subsequently the intersections themselves, into full comppliance in a timely manner. Recognizing that we probably are not the only folks facing this dilemma, what is the possibility of the Department either 1) securing the services of a team of consultants to evaluate and develop the new timing for all intersections, statewide, or 2) providing municipalities with funding to secure similar services to address the needs of our individual jurisdictions?

High Point DOT has just in the last week announced the selection of 6 firms to perform a variety of on-call engineering and planning services (mostly related to our November 2 bond referendum and a few defined capital projects), so if funding is available, we are in a position to act upon this issue very quickly. The firms selected by the City are Stantec, PBS&J, Wilbur Smith, Kimley-Horn, Ralph Whitehead, and HNTB. I'm sure that you and your staff have worked with most if not all of these firms.

Thank you for allowing me to express my concerns on this matter. I look forward to hearing from you soon, and wish you and yours a Merry Christmas and Happy New Year!

- m

Mark V. McDonald, P.E.
Assistant Director of Transportation
City of High Point

March 4, 2005

MEMORANDUM

To: Steven Click, PE, Ph.D.; Bobby Croom; Will Garner, PE; Lisa Moon, PE; and Frances Vess

From: Richard E. Mullinax, PE

Subject: Minutes from Clearance Interval Constraints Work Group Meeting (3/3/05)

A meeting of the Clearance Interval Constraints Work Group was held on March 3, 2005 at PBS&J's Raleigh, NC office. The meeting was called to order at 10:00 am and adjourned at 12:15 pm. Present were: Steven Click, Lisa Moon, Frances Vess, and Richard Mullinax.

The meeting began by identifying the issues the work group was charged to investigate. They were:

- Should there be minimum / maximum values for Total Clear, Yellow, or All-Red?
- How should the Total Clear be divided into Yellow and All-Red?
- Should deviation be allowed in the All-Red?
- Can the safety impact of longer Yellows versus longer All-Reds be determined?
- How do drivers perceive / understand clearance intervals?

The Work Group initially discussed the purposes of the Yellow and All-Red. There was general consensus on the purpose of the Yellow which was to allow motorists the opportunity to come to a comfortable stop when the right-of-way is being terminated or to continue through the intersection if a stop was not practical. No consensus was reached on the purpose of the All-Red. The Work Group tabled further discussions specific to the All-Red until its next meeting.

The Work Group discussed the first bullet and concluded that there should be a minimum value for the Yellow. The Work Group did not feel there should be a maximum value for the Yellow and All-Red, but rather a threshold value that would alert the engineer on the need for further evaluation of their selected values. There was generally consensus that 3.0 seconds would be a reasonable minimum Yellow value primarily due to equipment limitations. However if 3.0 seconds is an acceptable minimum value, then the Work Group agreed that left turning speeds should be investigated closely to ensure they are reasonable and that a short Yellow interval does not occur. Further discussion was held on driver behavior and speed as they approach an intersection to make a left turn. Under current practice, the selected speed for the equation appears to be a "target speed" that we expect the motorist to be traveling when they reach the stop bar. However, in general the motorist is approaching the intersection at a speed higher than this target speed and is decelerating as they approach the intersection. As such, the traditional speed values may not be taking this into consideration and may be overly conservative.

This developed into a discussion on turning speeds (i.e. target speed at stop bar) and the possibility that these could be determined based on the curve radius. The Work Group decided these issues should be presented by the Clearance Interval Constraints Work Group Chairperson

to the Speed Issues Work Group Chairperson. *Subsequent to the meeting the two Chairpersons met and discussed these issues.*

The Work Group discussed how the Total Clear should be divided into the Yellow and All-Red. The Work Group elected to initially look at the two values separately with this meeting focusing on the Yellow. Work Group members concurred that the ITE formula should be utilized for determining the Yellow. Discussions were held on the impact of grade on motorists' behavior. Results of this discussion concluded that motorists may not be aware of slight grades, but they do subconsciously impact driver behavior. The possibility of using a fixed Yellow based on design speeds was also discussed. In general, motorists expect consistent values at closely spaced traffic signals. However if used correctly, the ITE formula should not result in significantly noticeable differences in Yellows for closely spaced traffic signals.

The Work Group discussed if the safety impact of longer Yellows and/or All-Reds could be determined. Available research seems to conclude that longer Yellows and/or All Reds can significantly reduce crash rates and severity. However, none of the research provides specific details on what exactly was changes (what were the initial clearance values and what did they become / was there an All-Red initially, etc.). The Work Group felt that the only way to gage these impacts would be for North Carolina to monitor some locations. However, this would be difficult due to the care that would be needed to ensure changing traffic conditions and/or roadway geometrics do not influence the results. In addition, the study would need to be long term. Work Group members will continue to monitor available research.

The next Work Group meeting was scheduled for 8:30 am on Friday, March 11, 2005 at Stantec's Raleigh, NC office. Frances Vess will be sending directions to Work Group members.

The meeting was adjourned.

cc: Dave Jones, PE, Committee Co-Chair
Greg Fuller, PE, Committee Co-Chair

Gilliam, Amanda

From: Jones, David L [DLJones@pbsj.com]
Sent: Thursday, February 10, 2005 12:07 PM
To: Agnieszka Nau; Al Grandy; <agrandy@dot.state.nc.us>; Bo Winstead; Charles Abel; Chris Cunningham; <cmcunnin@ncsu.edu>; Dale Privette; Don Bennett; Don Darity; <ddarity@rameykemp.com>; Frances Vess; Gary Faulkner; <gary.faulkner@rwhitehead.com>; Greg Fuller; Joe Milazzo; Joe Mullinax; <Joe.Mullinax@ci.greensboro.nc.us>; Jones, David L; Larry Walker; E-mail; <Matthew_Davis@URSCorp.com>; Matthew Carpenter; <Matthew.carpenter@highpointnc.gov>; Mike Kennon; <Mike.Kennon@ci.raleigh.nc.us>; Moon, Lisa M; Pam Alexander; Richard Mullinax; <rmullinax@dot.state.nc.us>; Rusty Thompson; Stephanie Privette; Steve Click; <smclick@dot.state.nc.us>; Tony Tagliaferri; Will Garner
Subject: Meeting Minutes, 2004 NCSITE Yellow & Red Clearance Task Force
Attachments: 2005-01-27 Sign In Sheet.xls; 2005-27-01 Clearance Interval Task Force Meeting Minutes - Final.doc

Task Force Members:

Attached are meeting minutes and group assignments.

We will be in touch soon with a proposed 2nd meeting date in March.

The investigation group leaders will also be in touch soon to discuss the approach to the group issue.

Please let me know if you have any issues with the meeting minutes or have any questions...

<<2005-01-27 Sign In Sheet.xls>> <<2005-27-01 Clearance Interval Task Force Meeting Minutes - Final.doc>> Regards, Dave

David L. Jones, P.E.
ITS Division
PBS&J
1616 E. Millbrook Rd., Suite 310
Raleigh, NC 26709
(919) 876-6888 x5249 (office)
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YELLOW & RED CLEARANCE TIME TASK FORCE - KICK-OFF MEETING

Kick-off Meeting Attendees

27-Jan-05

NAME	Organization	Title	Phone	E-mail
Adam Fisher	City of Greensboro	Tranpo Engr. Mgr	336-373-2861	adam.fischer@greensboro.nc.gov
Agnieszka Nau	MAB	Engineer	919-881-1243	agnieszkanau@mabtrans.com
Al Grandy	NCDOT	Regional Traffic Engineer	910-437-2614	agrandy@dot.state.nc.us
Bo Winstead	HNTB	ITS Manager	919-424-0473	bwinstead@hntb.com
Bobby Croom	City of Raleigh	Safe Light Engineer	909-890-3430	bobby.croom@ci.raleigh.nc.us
Brian Mayhew	NCDOT	Traffic Safety Engineer	919-715-7818	bmayhew@dot.state.nc.us
Bruce Friedman	Kimley-Horn& Assoc.	Vice President	919-653-2944	bruce.friedman@kimley-horn.com
Buddy Murr	NCDOT	ITS Engineer	919-733-5574	gmurr@dot.state.nc.us
Charles Abel	Charlotte DOT	Signal Systems Mngr	704-336-3945	Cabel@ci.charlotte.nc.us
Dale Privette	Town of Cary	Sr. Engineer	919-462-3833	dale.privette@townofcary.org
Dave Jones	PBS&J	Sr. Engineer	919-876-6888	dijones@pbsj.com
Dick Moore	Town of Cary	Traffic Sys. Manger	919-462-3937	dick.moore@townofcary.org
Don Bennett	City of Wilmington	Traffic Engineer	910-341-4696	don.bennett@ci.wilmington.nc.us
Frances Vess	Stantec	Traffic Designer	919-851-6866	fvess@stantec.com
Gary Faulkner	Ralph Whitehead	Traffic Services	919-791-0108	gary.faulkner@whitehead.com
Greg Fuller	NCDOT	State ITS Signals Eng	919-733-8021	gfuller@dot.state.nc.us
Joe Mullinax	City of Greensboro	Signal System Mgr	336-373-2860	joe.mullinax@greensboro.nc.gov
Larry Walker	Winston-Salem DOT	Signal Systems Mngr	336-727-2707	larryw@cityofws.org
Larry Young	NCDOT	Staff Engineer	919-733-5036	lyoung@dot.state.nc.us
Lisa Moon	PBS&J	Sr. Engineer	919-876-6888	lmmoon@pbsj.com
Matt Carpenter	City of High Point	Signal System Engineer	336-883-3229	matthew.carpenter@highpointnc.gov
Melissa Cooney	PBS&J	Sr. Engineer	919-876-6888	mrcooney@pbsj.com
Pam Alexander	NCDOT	S&G Special Projects	919-715-8333	palexander@dot.state.nc.us
Richard Mullinax	NCDOT	Signal & Geometrics	919-733-5569	rmullinax@dot.state.nc.us
Rusty Thompson	City of Fayetteville	City Traffic Engineer	910-433-1660	rthompson@ci.fay.nc.us
Stephanie Privette	Kimley-Horn& Assoc.	Traffic Engineer	919-677-2187	stephanie.privette@kimley-horn.com
Steven Click	Signal & Geometrics	Sr. Systems Engineer	919-733-3915	smclick@dot.state.nc.us
Tony Tagliaterri	NCSU	Grad Student	919-606-1756	aptaglia@unity.ncsu.edu
Will Garner	NCDOT Div. B	Div. Traffic Engineer	910-944-2344	wgarner@dot.state.nc.us
Others who have expressed interest but could not attend:				
Chris Cunningham	ITRE			cmcunnin@ncsu.edu
Don Darity	RK&A			ddarity@rameykemp.com
Joe Milazzo	RTA			Joe@the-chamber.org

NCSITE Vehicle Clearance Interval Task Force Meeting Minutes

January 27, 2005

- Notes
 - This was the first meeting of the task force.
 - Attendees and their organizations are attached .
 - The meeting took place at PBS&J's Raleigh Office.

- Opening
 - The co-chairs of the task force, Dave Jones and Greg Fuller, opened the meeting and thanked everyone for coming.
 - Dave then asked everyone to introduce themselves, giving their organization.

- Clearance Interval Calculation: An Introduction and History of NC Practice
 - This presentation was given by Steven Click.
 - A copy of the presentation slides is attached.
 - The intent was to bring everyone up to speed on basic calculation procedures and specific application in NC for the past 15 years, during which NCDOT has used 6 different methods for calculation of clearance intervals.
 - The task force was created because of adverse reaction to NCDOT's decision to use a strict application of the ITE formula to calculate clearance intervals. This change took effect in July 2004 with the release of the 3rd Edition Design Manual.
 - The presentation also included an example problem related to left turn clearance intervals. The problem demonstrated how similar the different NCDOT methods were in determining clearance intervals.
 - Engineering judgement was identified as essential in clearance interval calculation
 - The presentation concluded with a summary of the goal of the task force and the schedule it has to keep.
 - The Dream
 - A multi-agency, consensus-based, consistent statewide practice for determining clearance intervals which, when applied using sound engineering judgement, properly balances safety and efficiency at the intersection.
 - The Reality
 - NCDOT is seeking input to help develop a statewide practice
 - All aspects of clearance interval calculation are open topics
 - There are too many different opinions to reasonably expect to find a solution that is perfect to everyone
 - The work must be completed by July 1, 2005

- Immediately after the presentation, several comments regarding red light cameras were offered
 - Concerns were raised that red light cameras were even being mentioned. There was a suggestion made that cameras should not even come up as part of future discussions

- However, there were also strong beliefs that the task force needs to be aware of the potential public opinion that clearance times were changed in an effort to increase revenue / ticketing from red light cameras.
- All agreed that the determination of clearance intervals should not be dependent on the presence/absence of a red light camera.
 - Note that this preference matches current practice: NCDOT does not adjust the clearance interval calculation method based on the presence/absence of a red light camera.
- The discussion closed with clarification of the current general statute regarding clearance intervals at red light cameras.
 - The old statute said that the clearance intervals had to be in compliance with the current Design Manual.
 - The recent revision states that the clearance intervals have to be in compliance with the plan of record. This means that we no longer have to immediately revise clearance intervals at camera locations; rather they can continue to operate using the clearance intervals on the plan of record.
- The next discussion topic raised was overspeed design, but discussion of this topic was put on hold temporarily.
- Dave Jones redirected attention to the current methods used to calculate clearance intervals. Representatives for agencies other than NCDOT were asked to summarize their current practice.
 - Wilmington, Raleigh, High Point, Cary, and Fayetteville all indicated that their practice is to follow the current Design Manual method.
 - Greensboro currently uses the ITE formula to calculate Total Clear.
 - When strict ITE gives a Yellow < 4 , time is shifted from All Red to Yellow, otherwise strict ITE is used (Yellow based on first two terms, All Red based on last term).
 - Left turn speed is typically 20 mph
 - Charlotte uses the ITE formula to calculate Total Clear
 - A standard yellow time based on approach speed is used, with the remaining time given to All Red
 - Left turn speed is Approach Speed – 10 mph
 - Winston-Salem uses the ITE formula to calculate Total Clear
 - When strict ITE gives $3.5 \leq Y \leq 5.0$, strict ITE is used
 - Otherwise time is shifted from/to All Red to maintain $3.5 \leq Y \leq 5.0$
 - Left turn speed for smaller intersections is typically 20 mph
 - For larger intersections, speed studies are performed
 - Durham
 - At one point, preferred 4+2, call has been made to investigate
- The meeting then turned to a brainstorming session. The goal was to identify all the aspects of clearance interval calculation that the task force felt were important to investigate. For the most part, the topics were listed without discussion, though occasionally an item would be

discussed enough to determine if it should be in the list. The topics for consideration are listed below.

- Note: development of the topic list was a stream-of-consciousness process, but the list below already includes some gathering of similar topics as was used to facilitate note-taking.
 - What should the left turn speed be?
 - Where/when should the speed be measured?
 - Should there be two left turn speeds?
 - Start up delay for conflicting movements
 - Time to reach conflict points
 - How are clearance distances measured?
 - Should right turn lanes be cleared?
 - Do we include ped/bike paths?
 - Should we measure the path of a left turn vehicle instead of the diagonal?
 - What is an appropriate length of vehicle?
 - Should there be min/max values for Total Clear, Yellow, or All Red?
 - How do we divide Total Clear into Yellow and All Red?
 - Should we allow deviation in All Red ?
 - Drivers “see” yellow, so it seems logical they should be consistent given consistent conditions.
 - Drivers do not “see” All Red, so they can potentially vary under consistent conditions without impacting driver expectations
 - What is an appropriate design vehicle?
 - (Repeat) What is an appropriate length of vehicle?
 - What can be done to reduce intersection “size,” and by that reduce clearance?
 - How do we address overspeed design (design for speeds > posted speed)?
 - How do drivers perceive / how well do they understand clearance intervals?
 - What are appropriate perception/reaction times and deceleration rates?
 - Should we consider the benefits of + grade?
 - Can we determine the safety impact of longer yellow vs. longer red?
- In addition to the above list of topics to consider, the task force also noted some ideas which were immediately dropped from consideration by general consensus. These are:
 - Should we continue to use the ITE formula?
 - YES. The ITE formula will continue to play a key role in our calculations.
 - Should we investigate pedestrian clearance?
 - NO. The task force will be limited to vehicle clearance intervals.
 - Should we consider time-of-day variation in clearance intervals?
 - NO. We will continue with a single set of clearance intervals for each phase.
 - Should we analyzing accident data for guidance on clearance intervals?
 - NO. The data is too intensive, and unreliably ambiguous.
 - Should we look at phases that clear together sharing same clearance intervals?
 - NO. Current practice allows many phase combinations, controllers handle it well.
 - Should we be looking at REGIONAL clearance time practices?
 - NO. Discriminators already being looked at; need statewide guidance.

- Following the brainstorming session, the task force worked to “bundle” the different topics based on similarity, resulting in 4 general topic areas.
- After this, task force members volunteered to assist with investigation into one of the four topic areas and nominal leaders were selected for each of the 4 resulting groups.
- The topic areas, their “bundled topics,” the investigating group, and the group’s chosen leader are shown on a separate page below.

General Clearance Issues	
<ul style="list-style-type: none"> • Start up delay for conflicting movements <ul style="list-style-type: none"> • Time to reach conflict points • How are clearance distances measured <ul style="list-style-type: none"> • Should right turn lanes be cleared • Do we include ped/bike paths • Should we measure the path of a left turn vehicle instead of the diagonal • What is an appropriate length of vehicle • How should triple lefts be handled? • What is an appropriate design vehicle <ul style="list-style-type: none"> • (Repeat) What is an appropriate length of vehicle • What can be done to reduce intersection “size,” and by that reduce clearance 	<ul style="list-style-type: none"> • Bo Winstead • Dave Jones • Tony • Don • Larry • Stephanie
Clearance Interval Constraints	
<ul style="list-style-type: none"> • Should there be min/max values for Total Clear, Yellow, or All Red • How do we divide Total Clear into Yellow and All Red • Should we allow deviation in All Red <ul style="list-style-type: none"> • Drivers “see” yellow, so it seems logical they should be consistent given consistent conditions. • Drivers do not “see” All Red, so they can potentially vary under consistent conditions without impacting driver expectations • Can we determine the safety impact of longer yellow vs. longer red • How do drivers perceive / how well do they understand clearance intervals 	<ul style="list-style-type: none"> • Richard • Frances • Lisa • Will • Steven • Bobby
Speed Issues	
<ul style="list-style-type: none"> • What should the left turn speed be <ul style="list-style-type: none"> • Where/when should the speed be measured • Should there be two left turn speeds • Do we / How do we address overspeed design (design for speeds > posted speed) 	<ul style="list-style-type: none"> • Pam • Gary • Charles • Will • Rusty • Al • Greg • Bruce • Brian
Numerical Inputs to the ITE Formula	
<ul style="list-style-type: none"> • What are appropriate perception/reaction times and deceleration rates? • Should we consider the benefits of + grade 	<ul style="list-style-type: none"> • Melissa • Joe • Agnieszka • Dale

- Following the completion of the above list, the meeting wrapped up.
 - Dave Jones indicated that meeting minutes would be forward as soon as reasonable.
 - Group leaders were informed that some basic instruction regarding their group's task would also be sent out in the near future.
 - Group leaders were also asked to be sure their groups started into the work before the next meeting.
 - A date for the next meeting was discussed but not chosen. Dates will be sent out to all members, and the best overall date will be chosen based on responses.

Gilliam, Amanda

From: MATT CARPENTER [matthew.carpenter@highpointnc.gov]
Sent: Tuesday, March 01, 2005 6:05 PM
To: <palexander@dot.state.nc.us>
Attachments: Lexington Ave Westchester Dr AM EBLT.pdf; Lexington Ave Westchester Dr PM EBLT.pdf; LexWstEBLeftTurnrawdata.xls; MainPkwyEBLeftTurnrawdata.xls; Main St Parkway Ave EBLT PM.pdf; Main St Parkway Ave EBLT AM.pdf

Pam,

We have done two studies so far - Lexington Ave at Westchester Dr, eastbound left turn, and Main St at Parkway Ave, eastbound left turn. Attached are adobe PDF and Excel files of the data my tech collected. Both studies covered period of approx. 30-35 minutes in the AM and PM at each intersection. "Middle and End of queue" data was used to calculate an 85th% speed. Based on our discussion of just needing data from the last part of the queue, I will change our method and just look at the end of the queue and try to collect at least 60 data points. I don't think 40 is enough. Let me know what you think.

Matthew L. Carpenter, EIT
Transportation Engineer
City of High Point
Department of Transportation
PO Box 230
211 S. Hamilton Street
High Point, NC 27261
ph : 336-883-3229
fax : 336-883-8568
email: matthew.carpenter@ci.high-point.nc.us

Date: 2/9/2005

Time: 8:30 - 9:00 AM

Intersection: Lexington Ave./ Westchester Dr.

Direction: Eastbound Lexington Ave. Left Turn Movement

Study by: M Bunk

Method: Data was collected per cycle for 20 cycles. One car was targeted at the beginning of the queue, middle of the queue and at the end of the queue each cycle.

Speed Shown in MPH

Front-Queue	Mid-Queue	End-Queue
15	19	21
15	19	22
16	20	21
15	16	16
17	19	18
17	19	19
22	16	16
18	20	19
17	20	23
19	20	23
14	16	19
14	15	15
17	19	22
18	18	19
16	18	15
15	20	19
15	18	20
18	18	18
17	18	19
16	17	16

Date: 2/9/2005

Time: 3:30 - 4:00 PM

Intersection: Lexington Ave./ Westchester Dr.

Direction: Eastbound Lexington Ave. Left Turn Movement

Study by: M Bunk

Method: Data was collected per cycle for 20 cycles. One car was targeted at the beginning of the queue, middle of the queue and at the end of the queue each cycle.

Speed Shown in MPH

Front-Queue	Mid-Queue	End-Queue
15	20	23
17	18	18
16	17	20
17	20	21
18	17	18
22	19	19
17	17	20
19	19	16
17	18	18
21	20	18
18	21	22
16	17	16
16	17	17
17	22	18
17	21	18
16	19	17
15	16	16
16	19	19
14	19	22
18	17	19

Date: 2/10/2005

Time: 2:30 - 3:00 PM

Intersection: Main St. / Parkway Avenue

Direction: Eastbound Parkway Ave. Left Turn Movement

Study by: M Bunk

Method: Data was collected per cycle for 20 cycles. One car was targeted at the beginning of the queue, middle of the queue and at the end of the queue each cycle.

Speed Shown in MPH

Front-Queue	Mid-Queue	End-Queue
14	14	14
11	14	20
12	15	16
10	12	13
12	14	14
14	16	16
10	14	18
12	12	12
18	15	16
11	15	16
12	15	16
11	13	14
12	12	14
13	16	18
14	14	15
11	12	14
12	14	15
11	13	11
14	15	15
14	14	16

DATE: 2/10/2005
 TIME: 2:30 - 3:00 PM
 DIRECTION: EBLT

Location: EB Parkway Avenue and Main Street

SPEED (MPH)	1	5	10	15	20	25	30	35	40	TOTAL
35										0
34										0
33										0
32										0
31										0
30										0
29										0
28										0
27										0
26										0
25										0
24										0
23										0
22										0
21										0
20										0
19										1
18										0
17										2
16										0
15										8
14										8
13										12
12										3
11										5
10										1
9										0
8										0
7										0
6										0
5										0

VEHICULAR OBSERVATIONS

TOTAL OBSERVATIONS: 40
 85th % SPEED: 15.6 mph

DATE: 2/10/2005
 TIME: 8:30 - 9:00 AM
 DIRECTION: EBLT

Location: EB Parkway Avenue and Main Street

SPEED (MPH)	1	5	10	15	20	25	30	35	40	TOTAL
35										0
34										0
33										0
32										0
31										0
30										0
29										0
28										0
27										0
26										0
25										0
24										0
23										0
22										0
21										0
20										0
19					X			X		1
18										1
17										0
16										1
15										6
14										7
13										10
12										3
11										7
10										2
9										2
8										0
7										0
6										0
5										0

VEHICULAR OBSERVATIONS

TOTAL OBSERVATIONS: 40
 85th % SPEED: 15.5 mph

Dear Speed Issue Sub-Group Member,

The first meeting determined that our sub-group should handle these issues:

- What should the left turn speed be
 - Where/when should the speed be measured
 - Should there be two left turn speeds
- Do we / How do we address overspeed design (design for speeds > posted speed)

The attachments are preliminary results from Matt Carpenter with the City of High Point who is conducting speed studies at 2 locations in High Point. Also, I have attached page 1 of the signal plan for Lexington at Westchester. I believe this is the approach our sub-group should take to answer the first question.

- What should the left turn speed be
 - Where/when should the speed be measured
 - Should there be two left turn speeds
 1. Measure actual approach speeds at several intersections for different speed limits. One suggestion has been to mark the pavement at 200' and 100' in the left turn lane, then time the vehicles from 200' to 100' and then from 100' to the stopbar to calculate the speed. Or an average from 200' to the stopbar could be used. Or the length of the left-turn lane. Then pick the last vehicle in the queue to measure. Another method would be to use radar.
 - 55 mph
 - 45 mph
 - 35 mph
 - 25 mph
 2. Measure actual clearance speed. Same methods can be used here as in #1.
 - Small (single approach lanes) intersections
 - Medium (4 or 5 lanes, undivided) intersections
 - Large (multilanes, divided) intersections
 3. Research.
 - Look for research papers on the topic
 - Check with other states
- Do we / How do we address overspeed design (design for speeds > posted speed). *This is a completely different issue. What is the opinion of the sub-group members – is this an issue that we can tackle by July?*

I envision most members of the group gathering field data from several intersections and I would compile all the information. I can provide copies of signal plans. Members could submit suggested locations to me so that we are ensured of getting a variety of different scenarios. Please share your thoughts.

Our next meeting for the entire group is March 31.

Gilliam, Amanda

From: Gary Faulkner [gary.faulkner@whitehead.com]
Sent: Wednesday, March 09, 2005 10:19 AM
To: Pamela L. Alexander; Alfred L. Grandy; Brian K. Mayhew, PE; Greg A. Fuller;
<bruce.friedman@kimley-horn.com>; <Cabel@ci.charlotte.nc.us>;
<matthew.carpenter@highpointnc.gov>; <rthompson@ci.fay.nc.us>
Cc: Will Garner, Jr. PE
Subject: RE: [Fwd: NCSITE Task Force - Speed Issues]

Pam:

I had similar concerns. My first thought was to take a speed measurement at start-up (first vehicle or two and then another at the end of the left turn phase and then average them (getting an average speed for that phase and that turning movement). As I mentioned in our kick-off meeting, not only do we need to look at single lane movement speeds, but we also need to consider dual and even triple lane movement speeds. Because of our need to address congestion/LOS issues at signalized locations, we are going to dual and triple turn movements at a large number of locations, so these need to be assessed in this review also. Thanks.

GCF

-----Original Message-----

From: Pamela L. Alexander [<mailto:palexander@dot.state.nc.us>]
Sent: Wednesday, March 09, 2005 9:51 AM
To: Alfred L. Grandy; Brian K. Mayhew, PE; Greg A. Fuller; bruce.friedman@kimley-horn.com;
Cabel@ci.charlotte.nc.us; Gary Faulkner; matthew.carpenter@highpointnc.gov;
rthompson@ci.fay.nc.us
Cc: Will Garner, Jr. PE
Subject: [Fwd: NCSITE Task Force - Speed Issues]

Will brings up a very good point. I suggest that we measure both the middle of the queue and the end of the queue. Then we can see if there's much difference between the two.

Please feel free to send other suggestions to the group.

--

Pamela L. Alexander, PE
S & G Special Projects Engineer
919-715-8333

Gilliam, Amanda

From: Will Garner, Jr. PE [wgarner@dot.state.nc.us]
Sent: Wednesday, March 09, 2005 11:51 AM
To: Gary Faulkner
Cc: Pamela L. Alexander; Alfred L. Grandy; Brian K. Mayhew, PE; Greg A. Fuller; bruce.friedman; Cabel; matthew.carpenter; rthompson
Subject: Re: [Fwd: NCSITE Task Force - Speed Issues]
Attachments: wgarner.vcf

Gary,

One of my data sites was to be a dual left turn lanes on US #1 Northbound at US #15-501 on the north side of Aberdeen and on US #15-501 at WalMart. Al Grandy and I will be trying to do the data collection one day next week.

Thanks

Gary Faulkner wrote:

> Pam:

>

> I had similar concerns. My first thought was to take a speed measurement at start-up (first vehicle or two and then another at the end of the left turn phase and then average them (getting an average speed for that phase and that turning movement). As I mentioned in our kick-off meeting, not only do we need to look at single lane movement speeds, but we also need to consider dual and even triple lane movement speeds. Because of our need to address congestion/LOS issues at signalized locations, we are going to dual and triple turn movements at a large number of locations, so these need to be assessed in this review also. Thanks.

>

> GCF

>

> -----Original Message-----

> From: Pamela L. Alexander [mailto:palexander@dot.state.nc.us]

> Sent: Wednesday, March 09, 2005 9:51 AM

> To: Alfred L. Grandy; Brian K. Mayhew, PE; Greg A. Fuller;

> bruce.friedman@kimley-horn.com; Cabel@ci.charlotte.nc.us; Gary

> Faulkner; matthew.carpenter@highpointnc.gov; rthompson@ci.fay.nc.us

> Cc: Will Garner, Jr. PE

> Subject: [Fwd: NCSITE Task Force - Speed Issues]

>

> Will brings up a very good point. I suggest that we measure both the middle of the queue and the end of the queue. Then we can see if there's much difference between the two.

>

> Please feel free to send other suggestions to the group.

>

> --

> Pamela L. Alexander, PE

> S & G Special Projects Engineer

> 919-715-8333

Gilliam, Amanda

From: Richard E. Mullinax [rmullinax@dot.state.nc.us]
Sent: Wednesday, June 29, 2005 4:36 PM
To: Greg A. Fuller
Subject: Re: [Fwd: Y+R Task Force - Recommendation/Conclusion]
Attachments: FinalClearTimes.doc

Greg,
Attached is the draft letter for the design manual. Pam is almost finished with the design manual revision. I need to check with Steven on the status of the revised spreadsheet.

"Greg A. Fuller" wrote:

> FYI
>
> --
> Greg Fuller, PE
> State ITS & Signals Engineer
> phone - 919-733-8021
>
> -----
>
> Subject: Y+R Task Force - Recommendation/Conclusion
> Date: Wed, 29 Jun 2005 14:06:18 -0500
> From: "Jones, David L" <DLJones@pbsj.com>
> To: Agnieszka Nau <agnieszkanau@mabtrans.com>, Al Grandy
> <agrandy@dot.state.nc.us>, "Art Stegall (E-mail)"
> <astegall@ci.charlotte.nc.us>, Bo Winstead <BWinstead@HNTB.com>,
> "Bobby Croom (E-mail)" <Bobby.Croom@ci.raleigh.nc.us>,
> "Buddy Murr (E-mail)" <gmurr@dot.state.nc.us>, Charles Abel
> <cabel@ci.charlotte.nc.us>, Chris Cunningham <cmcunnin@ncsu.edu>;
> "Cooney, Melissa R" <MRCooney@pbsj.com>, Dale Privette
> <Dale.Privette@TownofCary.org>, Don Bennett
> <don.bennett@wilmingtonnc.gov>, Don Darity <ddarity@rameykemp.com>,
> Frances Vess <fvess@stantec.com>, Gary Faulkner
> <gary.faulkner@rwhitehead.com>, Greg Fuller <gfuller@dot.state.nc.us>,
> Joe Milazzo <Joe@the-chamber.org>, Joe Mullinax
> <Joe.Mullinax@ci.greensboro.nc.us>, "Jones, David L" <DLJones@pbsj.com>,
> Larry Walker <LARRYW@cityofws.org>, "Matt Davis (E-mail)"
> <Matthew.Davis@URSCorp.com>, Matthew Carpenter
> <Matthew.carpenter@highpointnc.gov>, Mike Kennon
> <Mike.Kennon@ci.raleigh.nc.us>, "Moon, Lisa M" <lmmoon@pbsj.com>,
> Pam Alexander <palexander@dot.state.nc.us>, Richard Mullinax
> <rmullinax@dot.state.nc.us>, Rusty Thompson <RThompson@ci.fay.nc.us>,
> Stephanie Privette <Stephanie.Privette@kimley-horn.com>, Steve Click
> <smclick@dot.state.nc.us>, "Sunny Nandagiri (E-mail)"
> <sreekanth.nandagiri@earthtech.com>, Tony Tagliaferri
> <tony.tagliaferri@ncsu.edu>, Will Garner
> <wgarner@dot.state.nc.us>
>
> Dear Task Force Members,
>
> Attached is the letter to Greg Fuller summarizing the Task Force's
> recommendation.
>

> I want to thank each of you for your hard work and unique
> contributions to this effort.
> I greatly appreciate it!

>
> Regards,
> Dave

> <<Letter to G Fuller FINAL.pdf>>

> -----
> Name: Letter to G Fuller FINAL.pdf
> Letter to G Fuller FINAL.pdf Type: Portable Document Format (application/pdf)
> Encoding: base64
> Download Status: Not downloaded with
> message

--
Richard Mullinax, PE
Signals and Geometrics Engineer

--
NCDOT - Traffic Engineering
122 North McDowell Street
Raleigh, NC 27603

--
phone 919-733-5569
email RMullinax@dot.state.nc.us



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 5, 2005

Memorandum

To: Holders of the Traffic Management & Signal Systems Design Manual
Private Engineering Firms and Municipality Traffic Engineers

From: G. A. Fuller, PE
State ITS and Signals Engineer

Subject: Final Practice - Vehicle Clearance Interval Timing Calculations (Std. No. 5.2.2)

Please find attached revised pages on the subject matter for the Traffic Management & Signal Systems Design Manual. These revisions adopt recommended practices developed by the NCSITE Traffic Engineering Council.

This is the finalized design practice for the calculation of clearance interval timings at signalized intersections along the state highway system and should be immediately implemented for all future design work. Note that clearance intervals for existing signalized intersections and final traffic signal plans do not need to be recalculated. Rather, clearance intervals will be recalculated upon the preparation of revised traffic signal plans for future improvements.

Also attached is a copy of the memorandum from the NCSITE Traffic Engineering Council detailing the Council's recommendations.

The complete Traffic Management & Signal Systems Design Manual is available at the following web page: <http://www.doh.dot.state.nc.us/preconstruct/traffic/tmssu/default.htm>

If I may be of any further assistance in this matter, please contact me at (919)733-8021.

w/ attachment

GAF/REM

Cc: J. Kevin Lacy, PE
Division Traffic Engineers
Regional Traffic Engineers

Gilliam, Amanda

From: Anthony D. Wyatt, PE [awyatt@dot.state.nc.us]
Sent: Tuesday, July 26, 2005 7:35 AM
To: Richard E. Mullinax
Cc: Terry M. Hopkins; Brian K. Mayhew, PE; Greg A. Fuller
Subject: Re: Clearance Interval Monitoring Process

Thanks for Pulling that together Richard,

As we discussed I'll defer to Mr. Mayhew on the frequency cycle and nature of the updates (especially Items 7&8). The tables will probably be similar to the late night flash tables. It will be approximately 6 months after the first Aug 1, 2005 signal plan is "installed/constructed" before there will be any available crash data. I still think that having a final checklist process (for all signal installations) that includes the Divisions notifying us (by some means and that notification going into the Signal File) of final installation is a logical loop back. Until that or something similar happens, we'll be the go between. On Newly Signalized locations there will not be a before period so we will primarily be tracking the installation day performance forward on those.

I will work on the table that will allow each Region to build (and track) the running location list. Once a location is installed (and we secure installation date), we need to allow Brian's folks to schedule the analysis - to get six months of after data we would be looking at one year after the installation is completed. I will get the form into the Regions hands before the Kick-Off Date August 1, 2005. It should be interesting to review the time from Plan completion/distribution until final installation is complete/reported. Sometime around April 2006 we should have our first month of available crash data for locations that we can get constructed by this fall.

Take Care,

Tony

Traffic Signal Clearance Interval Monitoring Program

- 1) Signals and Geometrics will generate the traffic signal plans.
- 2) Upon transmittal of the traffic signal plans to the division, the Regional Traffic Engineer and the Traffic Safety Programs Engineer will be either copied on the plan transmittal letter or copied on the electronic transmittal notification.
- 3) The Regional Traffic Engineer will maintain an inventory of signal plans transmitted after July 31, 2005 for their region.
- 4) When transmittal notifications are received for traffic signal plans, the Regional Traffic Engineer will add the traffic signal plan work to their inventory.
- 5) At the Spot Safety quarterly status report meeting with division representatives, the Regional Traffic Engineer will review their inventory with the division representative to ascertain status of the proposed traffic signal work.
- 6) If the traffic signal work has been completed, the Regional Traffic Engineer will forward the location and the date of completion to the Traffic Safety Systems Engineer.

7) The Traffic Safety Systems Engineer will monitor the location and obtain two years of crash data. After two years of crash data, the location may be removed from monitoring.

8) The Traffic Safety Systems Engineer will analysis the data on a quarterly basis to identify crash trends that may be associated with the traffic signal operations (in particular the clearance intervals).

9) If a crash trend is identified, the Traffic Safety Systems Engineer will contact and coordinate with stakeholders to determine an appropriate resolution.

"Richard E. Mullinax" wrote:

> To All:

>

> Tony and I met this afternoon to discuss a process for monitoring the
> impact of our new clearance interval practice. I have developed the
> attached draft document which I hope accurately reflects most of what
> Tony and I discussed (let me know if otherwise Tony!!).

>

> Given that this process will need to start next week and in the
> interests of getting everyone's input, I am taking the liberty of
> soliciting your comments and feedback so that we can get this process
> in place on time. Please send me any comments you may have by close
> of business on Wednesday, July 17, 2005.

>

> Thanks.

>

> Brian,

>

> Let me know if you need any details on what is going on.

>

> --

> Richard Mullinax, PE
> Signals and Geometrics Engineer

> --

> NCDOT - Traffic Engineering
> 122 North McDowell Street
> Raleigh, NC 27603

> --

> phone 919-733-5569
> email RMullinax@dot.state.nc.us

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Clearance Interval Monitoring Program.doc

Name: Traffic Signal

> Traffic Signal Clearance Interval Monitoring Program.doc
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Gilliam, Amanda

From: Greg A. Fuller [gfuller@dot.state.nc.us]
Sent: Thursday, December 23, 2004 6:50 AM
To: Mark McDonald
Cc: Richard E. Mullinax; Pamela L. Alexander; Vickie Embry
Subject: Re: clearance timing

Mark: I share your concerns about changing clearance times at red light enforcement intersections. That is why I implemented an interim measure until we could get a NCSITE task force together to review and recommend a practice for NC. High Point may try to adhere to NCDOT standards but other municipalities have different views. As you know, motorists don't care where a City system ends and the State system begins. As for recalculating clearance times, we are not suggesting you update all intersections to our current design criteria. The clearance times should be as shown on the plan of record which would reflect the design standards at that time. One of the things we must consider is the timings at adjacent intersections along a corridor when we install a new signal or upgrade an existing one.

I have already discussed the task force with David Jones (PBS&J) and we anticipate the kick-off meeting in mid to late January. We may ask you to host a meeting at some point. Thanks for your comments and if you have some locations you want us to evaluate, send me a list. I hope you have a Merry Christmas also.

Mark McDonald wrote:

Greg, I have received your December 15 memo regarding calculation of clearance intervals and have some concerns. You state that there is no consistency across NC, but doesn't the old method (or the existing, since I doubt that many changes have occurred that conform to the newer calculation procedure) establish a statewide standard by setting yellow times based on approach speed (4.0, 4.7, and 5.1, for less than 40 mph, 45-50 mph, and 55 mph, respectively)? In High Point we try to make sure all of our signals -- both state-owned and city-owned -- conform as nearly as practicable to NCDOT guidelines and requirements, and having standardized yellow times 1) makes database management easier; 2) is consistent from location to location and is generally accepted by the motoring public as "normal"; and 3) seems to work for virtually all applications. Furthermore, as a Red Light Camera city, we are very reluctant to make clearance changes since we are regularly questioned about this by those who oppose such safety and automated enforcement programs. Before we embark on such an endeavor that could potential be construed negatively (by both the public and the media), we'd like to see some justification for why the changes are necessary as well as some training on exactly how NCDOT wants clearance intervals calculated. I think many of my municipal colleagues may have similar concerns and questions and would agree that this would in fact be beneficial to them and their staffs as well. A half-day session would be adequate to address the issue, and High Point would be happy to serve as host. Like many other municipalities, the state of our signal plans is not what it should be. Changes have occurred at numerous intersections over an extended period of time and very few installations really match the record plans or the current state standards. Making the clearance changes suggested by the new practice may seem at face value to be a minor task, but to do it correctly will in fact be a major undertaking requiring significant amounts of time and staff resources. Try as we may, we simply do not have the resources to bring these plans, and subsequently the intersections themselves, into full compliance in a timely manner. Recognizing that we probably are not the only folks facing this dilemma, what is the possibility of the Department either 1) securing the services of a team of consultants to evaluate and develop the new timing for all intersections, statewide, or 2) providing municipalities with funding to secure similar services to address the needs of our individual jurisdictions? High Point DOT has just in the last week announced the selection of 6 firms to perform a variety of on-call engineering and planning services (mostly related to our November 2 bond referendum and a few defined capital projects), so if funding is available, we are in a position to act upon this issue very quickly. The firms selected by the City are Stantec, PBS&J, Wilbur Smith, Kimley-Horn, Ralph Whitehead, and HNTB. I'm sure that you and your staff have worked with most if not all of these firms. Thank you for allowing me to

express my concerns on this matter. I look forward to hearing from you soon, and wish you and yours a Merry Christmas and Happy New Year! - mMark V. McDonald, P.E. Assistant Director of Transportation City of High Point

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Greg Fuller, PE
State ITS & Signals Engineer
phone - 919-733-8021

Gilliam, Amanda

From: Steven M. Click, PE, PhD [smclick@dot.state.nc.us]
Sent: Tuesday, March 29, 2005 3:10 PM
To: Richard E. Mullinax
Cc: Bobby Croom; Mike Kennon; Moon, Lisa M; Frances Vess; Greg A. Fuller; David Jones
Subject: Re: NCSITE Meeting Minutes
Attachments: smclick.vcf

Richard-

I know you identified these as our "finalized" minutes, but other tasks had prevented me from reviewing them before today. My comments are as follows:

Paragraph 7, bullet 1 discusses the red philosophy of clearing a vehicle all the way through the conflict zone at the intersection. I think it is important to note that the consensus of the group is that this is the preferred operation, provided that it does not result in excessive red times.

Paragraph 9, lines 3-4 discusses a red threshold of 3.5 or 3.0 seconds. I thought the consensus in the meeting was that we would recommend a threshold, but that we could not put a value on that threshold until seeing the results from other groups. I also feel that the statement "with 80% of the Work Group supporting a lower threshold" is inappropriate - I suggest that we remove the statement from the minutes and continue to work until a consensus is achieved.

Paragraph 9, lines 5-6. I do not recall a group consensus that red should be less than yellow. While our discussion did indicate that use of a higher left turn speed would more frequently result in yellow > red, that typical result is not the same as agreement that red should always be less than yellow - in fact, I believe the group was generally open to red > yellow if the situation warranted it. I would suggest that we at least remove this from the minutes until our next meeting when we can re-address the subject.

smc

"Richard E. Mullinax" wrote:

> Attached are the finalized minutes from our second meeting.

>

> --

> Richard Mullinax, PE

> Signals and Geometrics Engineer

> --

> NCDOT - Traffic Engineering

> 122 North McDowell Street

> Raleigh, NC 27603

> --

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> Name: NCSITE Minutes2.doc

> NCSITE Minutes2.doc Type: Microsoft Word Document (application/msword)

> Encoding: base64

> Download Status: Not downloaded with message

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Gilliam, Amanda

From: Jones, David L [DLJones@pbsj.com]
Sent: Wednesday, June 22, 2005 9:42 AM
To: sreekanth.nandagiri@earthtech.com; <sreekanth.nandagiri@earthtech.com>; Art Stegall (astegall@ci.charlotte.nc.us); Bobby.Croom@ci.raleigh.nc.us; <Bobby.Croom@ci.raleigh.nc.us>; gmurr@dot.state.nc.us; <gmurr@dot.state.nc.us>; Matthew_Davis@URSCorp.com; <Matthew_Davis@URSCorp.com>; Will Garner; Agnieszka Nau; Al Grandy; <agrandy@dot.state.nc.us>; Bo Winstead; Charles Abel; Chris Cunningham; <cmcunnin@ncsu.edu>; Cooney, Melissa R; Dale Privette; Jones, David L; <DLJones@pbsj.com>; Don Bennett; Don Darity; Frances Vess; Gary Faulkner; Greg Fuller; <gfuller@dot.state.nc.us>; Joe Milazzo; Joe Mullinax; Larry Walker; <LARRYW@cityofws.org>; Moon, Lisa M; Matthew Carpenter; Mike Kennon; <Mike.Kennon@ci.raleigh.nc.us>; Pam Alexander; <palexander@dot.state.nc.us>; Richard Mullinax; <rmullinax@dot.state.nc.us>; Rusty Thompson; Stephanie Privette; Steve Click; <smclick@dot.state.nc.us>; Tony Tagliaferri
Subject: Minutes, Meeting Info for Yellow & Red Task Force - Mtg 1pm 6/23/05
Attachments: 2005-05-17 Clearance Interval TF Mtg Minutes v2.doc; 2005-05-17 SubGroup Presentation - Recommended Yellow and Red Calculations.ppt; TRTMC.bmp

Folks,

This reminder is the last meeting of the Task Force, tomorrow at 1pm at the Triangle RTMC on Trenton Rd in Raleigh. The meeting will be in the large conference room.

Attached are:

- Minutes from the last meeting
- The .ppt file presenting a proposed policy by Richard Mullinax's group that was discussed at last meeting
- Map to the TRTMC
-

The agenda is as follows:

- 1) Review presentation of proposed policy
- 2) Review NCSITE proposed policy memo (to NCDOT S&G)
- 3) Discuss any proposed revisions to this policy
- 4) Discussion of implementation issues
- 5) Preparation for anticipated questions regarding the policy
- 6) Discussion of possible paper and group documentation

Directions to the TRTMC are listed below:

From west:

Take I-40 East to NC-54/Chapel Hill Rd. exit in Cary.
Take right-hand exit to NC 54 WEST; make right at top of ramp
Take first right onto Trenton Rd.
Stay straight on Trenton Rd as road curves sharply to right and becomes Blue Ridge Rd.
Cross I-40 bridge
TRTMC is on right at corner of Roscoe Trail and Trenton

From east:

Take I-40 West past Raleigh to NC-54/Chapel Hill Rd. exit in Cary.
Take right-hand exit to NC 54 WEST; make left at top of ramp
Take first right after next signal onto Trenton Rd.
Stay straight on Trenton Rd as road curves sharply to right and becomes Blue Ridge Rd.
Cross I-40 bridge
TRTMC is on right at corner of Roscoe Trail and Trenton

Please let me know if you have any questions.

Dave

David L. Jones, P.E.

ITS Division

PBS&J

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