

## Memorandum

September 22, 2015

**From:** John Conforti  
NCDOT Project Development and Environmental Analysis Unit

**To:** Federal Highway Administration

**Subject:** R-1015 Havelock Bypass FEIS: Sensitivity Analysis of Travel Time Estimates along the Existing US 70 Corridor

This memorandum addresses the discussions from the July 29, 2015 meeting between NCDOT and FHWA, specific to the summary of estimated travel times presented in the Draft FEIS. The purpose of this memo is to expand on the travel time discussion and provide a sensitivity analysis for inclusion in the FEIS; showing travel times for three growth scenarios based on a range of potential forecasts. The revised discussion and tabular presentation include three growth rate scenarios (0%, 0.83%, and project traffic forecast). Pending review, the following discussions will be considered in the FEIS (Sections 1.3, 1.4, and 2.8 as applicable).

The travel time model runs and an associated floating car study were conducted for the segment of US 70 from the signalized intersection of US 70 and Chatham Street to the signalized intersection of US 70 with Hickman Hill Road / Pine Grove Road, a distance of 8.4 miles.

### ***Growth Scenarios***

In order to present a sensitivity analysis of forecasted travel times, three different growth scenarios were evaluated. Travel times were calculated by inputting the forecasted traffic volumes into a Synchro network and then running SimTraffic 9 for the existing US 70 corridor (approximately 8.4 miles) from Chatham Street (east end) to Hickman Hill Road / Pine Grove Road (west end) as shown on the attached exhibit. Simulation runs for the westbound and eastbound directions for both the AM and PM peak periods were run five times for each scenario and averaged.

The three growth scenarios are described below. Each of these scenarios is applied to the 2008 base year traffic volumes and carried to the design year 2035.

### ***0.0% Annual Growth Rate***

The first scenario assumes no growth and therefore uses a 0.0% growth factor applied to the 2008 traffic volumes. This scenario is not considered likely for planning purposes because state population projections show growth ranging from a minimum of 0.83% inside Havelock to higher ranges regionally and statewide. However, using 0.0% growth establishes a baseline or "floor" for the travel times.

### 0.83% Annual Growth Rate

The second scenario is a growth rate matching the population forecast used in the Water Quality ICI analysis was used. The Water Quality ICI population forecast (sourced from State of North Carolina population forecasts) is 0.83%. This growth rate applies to population growth within the Havelock study area. This rate represents local growth only and does not account for regional growth that could occur outside of the Havelock study area, and that would also be served by the bypass.

### Traffic Forecast (~2.0%) Annual Growth Rate

The third scenario matches the 2035 project traffic forecast as presented in the FEIS. The project traffic forecast has an approximate 2% annual growth rate; accounting for local growth (within the study area) and regional through traffic with origins and destinations beyond the study area.

**Floating Car Study** – In order to provide context for the simulated 2035 travel time estimates, NCDOT conducted a floating car study to gage current (2015) actual travel times. The floating car study involved driving through the corridor while attempting to match speeds of the surrounding traffic (e.g. the floating vehicle passes the same number of vehicles by which it is passed). The study was conducted on Tuesday August 4<sup>th</sup> and Wednesday 5<sup>th</sup>, 2015.

The floating car study was not conducted in coordination with any traffic data collection. So it provides a point-in-time reference for current travel times, but cannot be directly compared with model runs. The traffic volumes are not presumed to be the same for the model runs and the floating car study (and are not known for the days the floating car studies were conducted). The floating car study provides another data point for use in presenting the range of potential travel times for the corridor.

**Travel Time Comparison** – The following table shows the anticipated travel times (in minutes) required to traverse the approximately 8.4 mile corridor. Times are presented for the above-described annual growth rate scenarios: 0.0% growth, 0.83% growth, and traffic forecast (~2.0% growth). The table also shows the times observed from the floating car study. These estimates provide an anticipated range of travel times along US 70 for a no-build scenario in comparison to the projected travel times along US 70 if the proposed bypass is constructed.

For the level of microsimulation analysis used, it is more appropriate to focus on the change/difference in travel times between the No Build and Build alternatives in each growth scenario rather than the specific travel times reported for each scenario.

It is noted that the comparison of No-Build versus Build shows a travel time reduction for every growth scenario presented.

<b>Table 1: US 70 from Chatham Street to Hickman Hill / Pine Grove Road – Havelock</b>				
<b>Travel Time Results</b>				
<b>(minutes)</b>				
	<b>AM Peak Hour</b>		<b>PM Peak Hour</b>	
	<b>Westbound</b>	<b>Eastbound</b>	<b>Westbound</b>	<b>Eastbound</b>
<b>Floating Car Study</b>				
<b>August 2015 Travel Time Runs</b>	<b>12.1</b> <b>(42 mph)</b>	<b>11.0</b> <b>(47 mph)</b>	<b>10.9</b> <b>(47 mph)</b>	<b>11.6</b> <b>(44 mph)</b>
<b>0.0% (No Growth) Scenario</b>				
<b>No-Build, 2035 @ 0.0% (SimTraffic)</b>	<b>15.2</b> <b>(34 mph)</b>	<b>16.9</b> <b>(30 mph)</b>	<b>15.2</b> <b>(34 mph)</b>	<b>16.6</b> <b>(30 mph)</b>
<b>Build, 2035 @ 0.0% (SimTraffic)</b>	<b>14.1</b> <b>(35 mph)</b>	<b>14.8</b> <b>(34 mph)</b>	<b>14.1</b> <b>(35 mph)</b>	<b>15.0</b> <b>(34 mph)</b>
<b>Travel Time Reduction (%)</b>	<b>7%</b>	<b>12%</b>	<b>7%</b>	<b>10%</b>
<b>0.83% (Water Quality ICI) Growth Scenario</b>				
<b>No-Build, 2035 @ 0.83% (SimTraffic)</b>	<b>19.7</b> <b>(25 mph)</b>	<b>24.4</b> <b>(20 mph)</b>	<b>17.3</b> <b>(29 mph)</b>	<b>20.8</b> <b>(24 mph)</b>
<b>Build, 2035 @ 0.83% (SimTraffic)</b>	<b>15.1</b> <b>(34 mph)</b>	<b>15.8</b> <b>(32 mph)</b>	<b>15.1</b> <b>(34 mph)</b>	<b>16.1</b> <b>(31 mph)</b>
<b>Travel Time Reduction (%)</b>	<b>23%</b>	<b>35%</b>	<b>13%</b>	<b>23%</b>
<b>Project Traffic Forecast Scenario</b>				
<b>No-Build, 2035 @ ~2.0% (SimTraffic)</b>	<b>38.7</b> <b>(13 mph)</b>	<b>60.8</b> <b>(8 mph)</b>	<b>39.0</b> <b>(13 mph)</b>	<b>39.4</b> <b>(13 mph)</b>
<b>Build, 2035 @ ~2.0% (SimTraffic)</b>	<b>24.5</b> <b>(20 mph)</b>	<b>38.0</b> <b>(13 mph)</b>	<b>26.2</b> <b>(19 mph)</b>	<b>25.4</b> <b>(20 mph)</b>
<b>Travel Time Reduction (%)</b>	<b>37%</b>	<b>38%</b>	<b>33%</b>	<b>36%</b>

Table 1 shows that 2015 floating car study travel times are lower than those simulated for 2008. The floating car study provides context but is not a direct comparison to the SimTraffic runs. It is not a direct comparison because the floating car study was conducted for a point in time that does not coincide with the traffic volumes used in the model runs (traffic data was not collected during the floating car study).

Traffic may have been lower during the 2015 study than the average volumes included in the 2008 date due to an observed dip in traffic volumes in the study area since 2008. The 2008 volumes ranged from 22,000 to 34,800 per day after which staff reductions at Cherry Point Marine Corps Air Station have lowered traffic along the corridor. For 2014 (latest available NCDOT traffic maps) volumes range from 24,000 to 31,000 per day (Note: These are Average Daily Traffic Volumes as reported on NCDOT traffic maps for Craven County. Traffic counts were not collected as part of the floating car study.). So the average current traffic may be slightly lower than 2008 estimates.

The range of simulated travel times, combined with the floating car results, establishes parameters within which estimated travel durations should reasonably be expected. It should be noted that, regardless of the actual travel time experienced, construction of the bypass is expected to substantially reduce the time required to traverse the

corridor. In the case of the 2035 (traffic forecast, 2% growth) comparison shown, the bypass would reduce travel time by 33% to 38%.

**Projected Travel Time on Proposed Bypass** – The proposed US 70 Havelock Bypass is 10.3 miles long with a speed limit of 65 mph. The bypass ties into existing US 70 at Carolina Pines Road, approximately 2.1 miles west of Hickman Hill / Pine Grove Road where the signalized corridor analyzed in SimTraffic begins. The speed limit along this western unsignalized segment of existing US 70 is 55 mph. So an estimated 2.2 minutes of travel time on existing US 70 would be added to each scenario to reach the bypass terminus. The attached exhibit shows the segment used for the signalized corridor travel time study and the longer segment used for the bypass comparison.

With the inclusion of the 2.1 mile segment west of the signalized corridor, expected travel times for existing US 70 for all 2035 No-Build scenarios between the bypass termini range from 17.4 minutes to 63.0 minutes. The estimated travel time for the proposed freeway in the 2035 project traffic forecast at 2% growth (highest traffic volumes) is 9.5 minutes. So the estimated travel time on the bypass is lower than any of the simulated travel times on existing US 70 or those reported by the floating car study. Table 2 shows travel time savings anticipated for vehicles using the bypass versus existing US 70 for each of the growth scenarios. Note that the shortest time (peak hour, direction) was used for each growth scenario in this tabular comparison.

Table 2: Through-Traffic Time Savings Provided by Bypass vs. Use of Existing US 70, No-Build (Three Growth Scenarios)			
Growth Scenario (%)	Existing US 70 (min.)	Havelock Bypass (min.)	Time Savings (min.)
0.0%	17.4	9.5	7.9
0.83%	19.5	9.5	10.0
~2.0% (Traffic Forecast)	40.9	9.5	31.4



Note: Aerial photo from Google Earth Pro.



**US 70, Havelock Bypass**  
 Craven County, North Carolina  
 TIP No. R-1015

Segments for  
 Floating Car Study  
 and Model Runs  
 Not to Scale  
 Exhibit 1