

**Reply to Response to Comments,  
“Review of Traffic Forecasting: Monroe Connector/Bypass, DFSEIS,  
December 26, 2013”**

By

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June 9, 2014

In its Response to Comments, May 1, 2014, the NCDOT’s consultant (called the Respondent below) prepared a detailed response to my 72 original Comments dated December 26, 2013. I thank the Respondent and the NCDOT for timely preparation of explanatory material, in a readily usable format, regarding my earlier comments. This memo and its detailed tabular attachment are intended to reply to those responses and state my continued concerns.

**Summary of Reply**

**Reply to Responses to Comments, May 1, 2014**

The expanded Responses provide additional clarification of the methods used to prepare the traffic forecasts. While I find some of the Responses to be sufficient, and find that others in fact tend to agree with my own comments, unfortunately the expanded Responses raise additional concerns regarding the traffic forecasts, and also do not alleviate my initial concerns. Therefore, I am reluctantly compelled to stand by my original overall assessment, that “the traffic forecasts presented . . . are too uncertain and insufficiently supported to be the basis of decision-making regarding the Monroe Connector/Bypass.” (*D. Hartgen, Review of Traffic Forecasting: Monroe Connector/Bypass Draft Supplemental Final EIS, November 2013*” (December 26, 2013)).

My reply regarding additional and remaining concerns is summarized here. The detailed attachment provides specific replies.

**1. The stated Purpose and Need remains narrow.**

The Responses to Comments 13-20 indicate that under NEPA, statements of “purpose and need” should be revisited when new major information becomes available. The Responses now admit that the primary objective of the proposed Bypass is to relieve local (rather than long-distance) congestion on U.S. 74. The Responses also show that average speeds have increased substantially (10-15 mph increase) since 2008 when the traffic modeling was conducted, and that large sections of the corridor now operate at or near 50 mph. Yet in spite of this progress, the Responses incredulously assert that only a tolled (not free) bypass on new alignment would satisfy this arbitrary speed standard.

**2. The alternatives studied remain narrow.**

The Responses to Comments 21-29 indicate that some alternatives were considered but rejected, but also that other alternatives were not seriously considered. The bulk of this consideration was conducted in 2007. These potential treatments to existing U.S. 74 include further “superstreet” treatments, widening to 6-lanes, upgrading to freeway status with frontage roads, consolidation and progression of signals, and localized “flex-time” for major nearby employers. Other “new alignment” options such as “partial” new-alignment radials ending at intermediate roads, or even an *un-tolled* bypass were not studied, even though a ‘partial’ bypass ending at U.S. 601 was included in air quality tests in 2005. Instead, NCDOT continues to reject all these options and studies based on an outdated analysis, and fails to consider the alternatives based on the current data. The Department doggedly clings to just one alternative: a new 4-6 lane tolled Bypass. This appears to violate NEPA.

**3. Recent road improvements not accounted for on U.S. 74.**

Responses to Comments 30-36 indicate that recent improvements to U.S. 74, including signal improvements at 23 locations, have yielded huge increases in average operating speed from 2008 to 2014. Additionally, more improvements are planned, such as a series of “superstreet” installations through one of the most congested segments of U.S. 74 in Indian Trail. All these improvements, and the improved speed, post-date NCDOT’s modeling effort and therefore were not factored into the traffic forecasts.

**4. Traffic on U.S. 74 has shown ZERO growth since 2000 and is inconsistent with Study Area population growth.**

Regarding perhaps the most significant issue, the Responses to Comments 37-48 agree with my earlier statement that the traffic trends for U.S. 74 have shown *zero* growth since 2000 and are inconsistent with the population trends for the Study Area for 2000-2010. This major inconsistency has still not been satisfactorily explained. Further, the NCDOT’s own consultant has noted an 8.7% reduction in population forecasts for Union County, and the MPO has recently adopted a 16% and a 21% reduction in population and job forecasts, respectively. In the eastern end of the Corridor, where the Bypass would re-join U.S. 74, the future population reduction is 34%. These are huge changes in the growth projections for the Corridor likely to result in significant impacts on area traffic and growth patterns, and should therefore be specifically considered in a revised assessment.

**5. The Metrolina Regional Model (“MRM”) used for traffic forecasting appears to have been insufficiently calibrated.**

Responses to Comments 49-54 indicate that the MRM used for traffic forecasting was calibrated to a regional, not a corridor, level using data that is now 7-8 years old. Details of the calibration show that the MRM reports very high relative errors, particularly in areas affecting study of the Bypass. For example, details show calibration errors to the order of 34%-80% for Union County roads, significantly above federal standards. An updated MRM, forecasting to 2040, has recently been developed. This MRM could be refined and sufficiently calibrated further for a more accurate study of the Bypass.

**6. Questions remain regarding induced travel.**

Responses to Comments 55-59 are inconsistent, which at one point indicate that the MRM was used for distributing the “induced” growth, but at another point, indicate that the MRM was not used.

**7. Traffic forecasting details reveal that traffic forecasts were made by “averaging” growth rates and other key issues that were not addressed.**

Responses to Comments 60-68 indicate that the MRM was not used for estimating the effect of induced travel on future trip distribution or assignment to networks. Instead, in a surprising new detail first revealed in Response 43, the traffic forecasts were apparently developed by “averaging” raw-model/base year growth rates with historical (pre-2000) traffic count growth rates. How this apples-and-oranges comparison accounts for balanced traffic or numerous other issues is not explained. This post-model step is fundamentally arbitrary and is presented without justification. The Responses also reveal that truck percentages were assumed to be constant in spite of the intervening recession; that no analysis of time-shifting to avoid congestion was made; that reliability of travel time was not accounted for; that road capacities were not updated to 2010 rates; and that diversion rates for various road sections averaged 31% - and were as high as 54% for some road sections - possibly caused by an assumed very high value of time inside the model. All of these features should have been updated with appropriate new information available since 2008.

**8. Project cost and cost-effectiveness is not addressed.**

Our reply to Comment 69 concludes that, while NEPA does not require a cost-effectiveness or benefit-cost assessment of project alternatives, virtually all EISs for major projects contain them. Further, the Bypass would be likely to score very poorly under North Carolina’s new merit-based project scoring method. While the Bypass is not subject to the new scoring system, this state-wide shift toward funding the most meritorious transportation projects indicates that NCDOT should provide taxpayers with this basic information.

**9. External traffic remains un-documented.**

The Response to Comment 70 indicates that the data used to estimate current external traffic is 11 years old and that no estimation method for future external traffic is described. Given the substantial changes in the economy since 2008, this data must be updated, particularly given the fact that a new MRM update has recently been completed for the region’s 2040 Long Range Plan.

**10. Inherent uncertainty in traffic forecasting has not been addressed.**

We provide new information from two sources indicating that transportation professionals reasonably expect 20-year traffic forecasts to be, on average, within approximately 24% of actual counts. The large recent changes in the corridor’s growth rates, traffic growth rates, other road improvements and numerous large unexplained adjustments to model forecasts, all suggest that NCDOT’s forecast of Bypass traffic is likely to be significantly overstated.

## Review of FHWA Documents

The Federal Highway Administration has prepared two documents, in memo form, responding to our prior comments. I have reviewed these responses and have the following reply:

1. The FHWA analysis of the revised changes in population and employment forecasts (B. Gardner to J. Sullivan, *Review of forecasting and analysis in support of the Monroe Connector/Bypass, Federal Highway Administration*, May 14, 2014) does not actually state the magnitude of the changes in forecasts (-16% for population, -21% for employment), but agrees with me that the effect is to lower projections in the far eastern and central portion of the Study Area, and raise them in the western portion. Elsewhere in my detailed reply I note that the reduction in growth is -34% in the far eastern edge of the corridor. These findings fundamentally undercut the whole need for a Monroe “bypass” and at the least, call for a new assessment and revisiting of the Purpose and Need. Instead of addressing this issue, the FHWA memo reviews the reasonableness of the estimates of induced travel, which has a much smaller impact in the range of 3-4%. I am therefore at a loss to explain how the FHWA then concludes that the changes in the demographic forecasts should not be now incorporated into a revised traffic forecast.
2. The FHWA memo does not comment on my critical concerns that traffic in the corridor has been flat in growth and inconsistent with population forecasts.
3. Nor does the FHWA mention that the Model Reasonableness and Checking Manual guidelines have been revised from 1997 to 2010 and that numerous calibration criteria within the MRM do not pass the guidelines.
4. The FHWA memo does not mention that 2010 capacities were NOT used in traffic forecasting, instead being only used on a comparison of current volumes on U.S. 74.
5. In its “Prior Concurrence” memo (*J. Sullivan to G. Solomon, Prior Concurrence on Combined ESFEIS/ROD Monroe Connector/Bypass, Federal Highway Administration, April 24, 2014*), FHWA does not mention that the proposed Bypass ends at the far eastern edge of the MRM study area, and thus connects to long-distance travel from outside the region, so long-distance travel must be served by the project.
6. Nor does the FHWA memo mention that corridor speeds have increased 10-15 mph, due apparently to modest signalization improvements, but that these higher speeds are NOT considered in the traffic forecasts which assumed lower speeds on existing U.S. 74, thus overstating diversion to the Bypass.
7. The FHWA ‘Prior Concurrence’ memo essentially agrees with the MPO and me that 2030 population forecasts were 9-16% too high, and employment forecasts 20-21% too high. Why these are not ‘significant’ changes is not clear to me, therefore I am also at a loss to understand how such large changes in demographic forecasts, apparent errors in calibration, inconsistencies in traffic count trends versus population trends, and numerous other issues cannot constitute “significant new circumstances” under NEPA.

## **What To Do Now**

- Rescind the Record of Decision as unresponsive to the requirements of NEPA and require the agencies to address both the age of the analysis and changes in the region.
- Re-visit the Purpose and Need based on updated information and changes in traffic count trends and demographic trends.
- Re-calibrate the MRM for the study corridor, starting with the most recent version, using all the available data (roads, demographic, traffic counts, external, etc.) that have been developed since 2008. Prepare a detailed sub-regional traffic model for the Study Area.
- Expand the analysis of alternatives to consider upgrades to U.S. 74, of a variety of types and combinations of those alternatives.
- Expand the analysis to consider the whole east side of Charlotte, including access from the Ballantyne area, AND include with this consideration the need for radials in northwest Union County.
- Re-forecast traffic using the most recent growth estimates and other changes, and re-forecast anticipated future changes to roads, traffic characteristics, capacity and speeds.
- Score various alternatives using the new STI scoring method.

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3	P&N	1	The stated Purpose and Need for the Bypass appear to have been written narrowly so that only alternatives on new alignment satisfy the stated Purpose and Need.	See response to <b>Comment #s 12 through 20.</b>	See Replies to Comments 12-20.
3	Alternatives	2	The alternatives considered appear to be inappropriately biased against upgrades to U.S. 74.	See response to <b>Comment #s 21 through 29.</b>	See Replies to Comments 21-29.
3	Traffic forecasts	3	Traffic forecasts for 2035 were not re-computed for some alternatives, thus possibly over-stating future Bypass traffic and under-stating traffic improvements for some alternatives. Some of the recently completed and planned future improvements to U.S. 74 and their effect on traffic forecasts have not been included in the traffic forecasts, and their effect on Bypass traffic therefore appears to be understated.	See response to <b>Comment #s 30 through 36.</b>	See Replies to Comments 30-36.

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3	Traffic forecasts	4	<p>Traffic growth on U.S. 74 has been flat from 2000 to 2012 and is inconsistent with population growth trends. The DSFEIS simply ignores these inconsistencies. Moreover, the forecast of population, which drives the traffic forecast, is based on a pre-Recession projection; recent population growth has slowed markedly. Essentially the entire justification for the project rests on traffic forecasts that ignore 12 years of recent history, recent economic upheaval, and slower population growth.</p>	See response to <b>Comment #s 37 through 48.</b>	See Replies to Comments 37-48.
3	Travel demand modeling	5	<p>The regional travel demand model (used to forecast Bypass traffic) and the traffic operations simulation model (used to study traffic flow on U.S. 74) both appear to have been insufficiently</p>	See response to <b>Comment #s 49 through 54.</b>	See Replies to Comments 49-54.

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			calibrated.		
3	Induced traffic	6	The DSFEIS attempts to address the directive of the 4th Circuit Court, but leaves key questions regarding induced traffic unanswered.	See response to <b>Comment #s 55 through 59.</b>	See Replies to Comments 55-59.
3	Traffic forecasts	7	Questions remain concerning details of the traffic forecasts. The three key assumptions of the traffic forecasts (growth of the area population, percentage diversion, and magnitude of long-distance travel) all appear to be overly optimistic.	See response to <b>Comment #s 60 through 68.</b>	See Replies to Comments 60-68.
3	Project costs	8	Project costs and cost-effectiveness are not sufficiently detailed.	See response to <b>Comment # 69.</b>	See Reply to Comment 69.
3	Traffic forecasts	9	External traffic forecasts are undocumented.	See response to <b>Comment # 70.</b>	See Reply to Comment 70.
3	Traffic forecasts	10	Inherent uncertainty in traffic forecasts has not been sufficiently considered.	See response to <b>Comment #s 71 and 72.</b>	See Replies to Comments 71-72.
4	Traffic	11	In summary, based on these and other issues described below, my	This comment/response table provides a thorough response to all individual comments and arguments raised in the	It is heartening to see that the Respondent agrees that traffic forecasts are subject to uncertainty.

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	forecasts		review finds that the traffic forecasts presented in the DSFEIS are too uncertain and insufficiently supported to be the basis for decision-making regarding the Monroe Connector/Bypass.	<p>Hartgen Report. The traffic forecast results and conclusions made for this project are the product of a detailed, approved methodology and standard process used for project-level traffic forecasting and analysis in North Carolina, and meet the requirements under 40 CFR 1502.24. Because the traffic forecasts attempt to predict the future, they are subject to uncertainty. The results and conclusions have gone through a detailed review and update process to ensure that uncertainty was considered and accounted for, as deemed reasonable and necessary, using the latest available data.</p> <p>Also, see responses to <b>Comment #s 12 through 72.</b></p>	<p>That recognition, placed at the end of the DSFEIS, should drive the whole assessment. Instead, future traffic is presented as known, forecastable, and sufficiently reliable for decision-making.</p> <p>I disagree with this characterization. As noted below, the more recent demographic forecasts, although available, were NOT used to update the traffic forecasts, and an even more recent demographic update can now be used. The most recent regional network was NOT used. The most recent traffic counts were NOT used for calibration. The recent improvements to U.S. 74 were NOT included in the forecasts.</p>
4	P&N	12	<p><b>The stated Purpose and Need for the Bypass appear to have been written narrowly.</b> According to the DSFEIS, the purpose of the project is to: <i>“improve mobility and capacity within the project study area by providing a facility for the U.S. 74 corridor from near I-485 in Mecklenburg County to</i></p>	<p>We disagree with the commenter's suggested interpretation that the project's purpose and need statement is too narrow. We also disagree with the commenter's interpretation that the purpose and need suggests that congestion within the study area is long distance in character. We have responded previously to comments suggesting that the purpose and need is too narrow in the Final EIS Section 3.3.1 (Responses to Generalized Comments on Purpose and Need) and responses to comments 1 and 2 from the SELC letter dated June 15, 2009 in Final EIS Appendix</p>	<p>I appreciate the Respondent's clarifications. However, it is not the “constancy” of the project's purpose and need that is the issue, but its appropriateness and translation into alternatives. Reviews of projects sometimes change Purpose and Need statements as times change, regions grow differently than expected, and priorities shift. Even in North Carolina, the stated “Purpose and Need” for Appalachian Regional Commission Corridor K was changed to accommodate changed</p>

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			<p><i>between the towns of Wingate and Marshville in Union County that allows for high-speed regional travel consistent with the designations of the North Carolina SHC program and the North Carolina Intrastate System, while <u>maintaining access to properties along existing U.S. 74.</u></i>” This statement implies that congestion within the study area is long-distance in character, that a high-speed long-distance facility will increase study-area mobility, and that the system designations of the Legislature are inviolate. None of these assumptions are the case. Indeed, the North Carolina General Assembly has recently (2013) repealed the Intrastate System legislation.</p>	<p>B (pages B3-25 through B3-26), particularly in regards to providing for high-speed regional travel.</p> <p>In summary, the term “high speed” as used in the EIS does not unduly narrow alternatives nor preordains any one particular alternative. The term “high speed” is defined as 50 miles per hour, and this travel speed might be achieved by several different types of facilities on any number of new location alignments or along existing roadways, for example: controlled- access freeways, superstreets, or even public transportation on dedicated right of way.</p> <p>Section 2.2.1 of the <i>Draft EIS</i> explains the criteria used to determine the ability of alternative concepts to meet purpose and need. These included the ability to enhance mobility and increase capacity, serve high-speed regional travel, and ability to maintain access to properties along US 74. All three criteria were considered in the evaluation of alternatives. Table 2-1 of the <i>Draft EIS</i> shows that three alternative concepts met qualitative first screening criteria: 1) Improve Existing US 74 Controlled Access Highway, 2) New Location Highway, and 3) New Location/Improve Existing Roadways Hybrid.</p>	<p>circumstances, and I understand the NCDOT is working to change the purpose and need for the Raleigh-area Triangle Expressway. The “constancy” of the Monroe Bypass’s Purpose and Need is, in my view, an indicator of NCDOT’s unwillingness to address new information which clearly shows that the circumstances have changed.</p> <p>It is not my opinion, but the data in the DSFEIS (showing high levels of diversion to the proposed Bypass at the far eastern edge of the study area, and showing generally equal speeds by time of day throughout the corridor) that suggest long-distance travel as the presumed source of congestion.</p> <p>Nevertheless, I am pleased that the Respondent now agrees that the source of the congestion is largely local traffic. This means that local treatments, not a distant bypass, are needed to address it.</p> <p>The Respondent refers to the Strategic Highway Corridor (“SHC”) program as the justification for “high speed” access, but avoids addressing whether the specific “high speed” recommended here, &gt; 50 mph, is</p>

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				<p>The project's purpose and need has remained consistent throughout the EIS process and has been clearly stated in the NEPA documents and public meeting materials. As stated in the introduction to the <i>Draft Supplemental Final EIS</i> Section 1, "based upon a review of new information and public and agency comments received to date, the purpose and need for the project remain unchanged."</p> <p>As stated in Section 1.1.2 of the <i>Draft Supplemental Final EIS</i>, the purpose of the project is "to improve mobility and capacity within the project study area by providing a facility for the US 74 corridor from near I-485 in Mecklenburg County to between the towns of Wingate and Marshville in Union County that allows for high-speed regional travel consistent with the designations of the North Carolina SHC program and the North Carolina Intrastate System, while maintaining access to properties along existing US 74." (SEE NOTE BELOW)</p> <p>The use of regional travel clearly delineates that the project purpose and need is not specifically long-distance travel.</p>	<p>required. The SHC does not require an overall average speed level, or require that speeds <u>within</u> a project be uniform throughout the project.</p> <p>New evidence from the Respondent (<i>Memo, Reynolds to Harris, April 1, 2014</i>), using comprehensive INRIX data for the years 2011-13, show that:</p> <p>(1) Eastbound, peak period speeds averaging 42-47 mph through the corridor, and low speeds are concentrated in and around Monroe and near I-485, and</p> <p>(2) Westbound, speeds averaging 43-44 mph, with the lowest speed also concentrated around Monroe and near I-485. I am pleased that the Respondent agrees with me that speeds now on U.S. 74 are in the 43-44 mph range (on average, through the section), and have increased 10-15 mph since 2007-08. Therefore, even if one accepts the "&gt;50 mph" standard as the criterion for route operation, the opportunity to "find" an additional 6 mph through additional local treatments on U.S. 74 should have been thoroughly explored as an alternative to the Bypass.</p> <p>The concentration of lower speeds in</p>

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				<p>NOTE: The State legislation regarding the Intrastate System was recently repealed by the State Legislature in Session Law 2013-183, signed by the Governor on June 26, 2013. The <i>Final Supplemental Final EIS</i> includes an errata section (Appendix D) updating the project purpose to remove reference to the NC Intrastate System. High speed travel is still designated for the corridor in the NC Strategic Highway Corridor (SHC) program, so the substantive statements of the project purpose remain unchanged.</p>	<p>short sections of the corridor suggest that local treatments might yield a 6-mph increase in speed. Certainly the proposed widening of the route to 6 lanes, as recommended by NCDOT itself, should be tested. Also, partial freeway treatment with frontage roads, signal coordination, so-called additional “superstreet” treatment, should have been explored, for both speed increase, impact, cost, and cost-effectiveness.</p> <p>Another set of options that NCDOT apparently did not explore were “partial” radials feeding I-485 from intermediate points such as U.S. 601 or Fowler Secret Road. These options (essentially cutting out the eastern half of the Bypass) would presumably be cheaper but carry more traffic and have less environmental impact. And, they could probably be implemented without tolls.</p> <p>The ability to “maintain access to properties along U.S. 74” is also arbitrary. There are numerous “partial” actions for the existing U.S. 74 — for instance, purchase of some right of way, or consolidated access with frontage roads along with some consolidation of signals — that</p>

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					<p>would likely increase speeds substantially while balancing access to properties. Further, the present right-of-way along the current 4-lane section of U.S. 74 is probably wide enough so few, if any, properties would be negatively affected. Review of the 4-lane section of the corridor suggests that a “high-speed” (&gt;50 mph) 6-lane alternative, with consolidated frontage roads and reduced signals using a “jersey barrier” design with narrow median, could be built within the current right-of-way.</p> <p>In short, while I agree that the data continues to support the need to do something, the need to build this more than \$800 million Bypass has in no way been established.</p>
	P&N	13	<p><b>The DSFEIS focuses on the second and third stated purposes, not the first.</b></p> <p>Focusing on the second and third purposes, and not the first, leads to the consideration of alternatives that are largely on new</p>	<p>Consistent with 23 CFR 771.111 – Environmental Impact and Related Procedures, the purpose and need for the project was developed with input from local officials, agencies and the public as described throughout the EIS. The project’s purpose and need is consistent with 40 CFR 1502.23, which states that “The statement shall briefly specify the underlying purpose and need to which the</p>	<p>I agree with the Respondent that NEPA requires periodic review and updates of the Purpose and Need. Both the age of the analysis here (based on pre-2008 recession demographic forecasts, flat traffic since 2000, and incomplete addressing of recent treatments on the existing U.S. 74) and the changed financial circumstances (a new rating method for projects in NC, increasingly limited transportation</p>

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			<p>alignment, that is, off existing U.S. 74's current location. This is inconsistent with the requirements of the National Environmental Policy Act ("NEPA") and virtually all of transportation economics, in which the objective is to evaluate proposed projects by their benefits versus their costs.</p>	<p>agency is responding in proposing the alternatives including the proposed action." The purpose and need statement also is consistent with the FHWA guidelines <i>NEPA and Transportation Decision making</i> (FHWA, Sept 1990), which lists three key points relative to a purpose and need section of an EIS, which are: 1) justification of why the improvement must be implemented, 2) as comprehensive and specific as possible, and 3) reexamined and updated as appropriate throughout the project development process.</p> <p>Neither NEPA nor the transportation planning requirements under title 23, U.S.C. requires proposed projects to be evaluated by their benefits versus cost.</p> <p>The commenter's assertion that the stated purpose element, "improve mobility and capacity within the project study area", was not adequately considered in the evaluation of alternatives is not correct. A multi-step, objective screening process was used to evaluate alternatives to identify those to move forward for detailed study. Section 2 of the <i>Draft Supplemental Final EIS</i> summarizes the extensive multi-step alternatives development process carried</p>	<p>funding statewide, and repeal of the Intrastate system legislation) all mean that circumstances have radically changed. If such major changes do not require a re-statement of the Purpose and Need, what could?</p> <p>The Respondent is correct that NEPA does not require benefit-cost assessment. But most EISs have such an assessment, if for no other reason than to show that the project expenditure is wise relative to other actions. Such assessments typically are based on traffic assignment output, primarily VMT, VHT and network speeds with and without the proposal. This data is then used to estimate savings in travel time, improved travel time reliability, accident reduction and operating cost savings, for both diverting and non-diverting traffic. These savings are then converted to dollars using a "value of time," "value of a statistical life," and "operating cost per mile" calculation. These are standard measures with which the Respondent is surely familiar. The whole calculation, while complex, requires only four numbers from the traffic assignments:</p>

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				<p>out during the preparation of the <i>Draft EIS</i>, additional analyses conducted and documented in the <i>Final EIS</i> as a result of public and agency comments, and updates and analyses conducted after the <i>Final EIS</i>.</p> <p>The alternatives screening process is described in Section 2 of the <i>Draft EIS</i> and Section 2 of the <i>Draft Supplemental Final EIS</i>. As discussed in Section 2.2.1 of the <i>Draft EIS</i>, for the first qualitative screening of alternatives:</p> <p>“Each Alternative Concept was considered for its potential to meet the purpose and need for this project. The screening criteria listed below were applied.</p> <ul style="list-style-type: none"> <li>• Does the alternative address the need to improve mobility and capacity in the US 74 corridor?</li> <li>• Is the alternative consistent with the NC Strategic Highway Corridor (SHC) program and NC Intrastate System (i.e., does it allow for high-speed regional travel)?</li> <li>• Does the alternative maintain access to properties along existing US 74?”</li> </ul>	<ul style="list-style-type: none"> <li>• Future network VMT, build;</li> <li>• Future network VMT, no-build;</li> <li>• Future network VHT, build;</li> <li>• Future network VHT, no-build.</li> </ul> <p>These statistics, which are standard traffic assignment outputs, are available to the Respondent. The fact that this major project, over \$800 million, does not have such a statement is disquieting, to say the least. Basically, the Respondent is stating that a more than \$800 million proposal to bring travel speeds up from 44 mph to “high speed” (above 50 mph) is worth the high price. Prudence dictates that this should be demonstrated. Why has the Respondent not disclosed this basic information?</p> <p>Regarding the Respondent's response below to the need to maintain access to properties, see Reply above to Comment 12.</p>

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				<p>The conclusion of the first qualitative screening of alternatives, which considered <u>all three</u> screening criteria, is summarized in Section 2.2.3 and Table 2-1 of the <i>Draft EIS</i>. The second and third screenings, summarized in Section 2 of the <i>Draft EIS</i>, qualitatively and quantitatively compared the benefits and impacts (including costs) of preliminary alternatives to identify the Detailed Study Alternatives.</p> <p>The use of all three screening criteria does not result in an undue narrowing of alternatives. This is explained in detail in <i>Final EIS</i> Section 3.3.1 (Responses to Generalized Comments on Purpose and Need) and responses to comments 1 and 2 from the SELC letter dated June 15, 2009 in <i>Final EIS</i> Appendix B (pages B3-25 through B3-26), particularly relating to the inclusion of providing high-speed regional travel in the project purpose.</p> <p>Support for the high-speed component of the screening criteria is provided in Section II.8 of 23 CFR 450 Appendix A (Linking the Transportation Planning and NEPA Processes) which states, "The statement of purpose and need shall include a clear statement of the objectives that the</p>	

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				<p>proposed action is intended to achieved, which may include: (a) Achieving a transportation objective identified in an applicable statewide or metropolitan transportation plan; (b) supporting land use, economic development, or growth objectives established in applicable Federal, State, local, or Tribal plans; and (c) serving national defense, national security, or other national objectives, as established in Federal laws, plans, or policies.”</p> <p>On page 3-10 of the <i>Final EIS</i>, it is explained that, “Maintaining access to properties along existing U.S. 74 was included because numerous industries, office, retail businesses, and institutions are located along the corridor, many of which have U.S. 74 as their only access. U.S. 74 is a critical commercial corridor for the economic vitality of Union County.”</p>	
4-5	Congestion	14	<p><b>Congestion on U.S. 74 is largely locally-based, not long-distance.</b></p> <p>The DSFEIS says that congestion on U.S. 74 is uniform throughout</p>	<p>We disagree with the commenter's interpretation that the DSFEIS says that congestion on U.S. 74 is uniform throughout the day and by direction. The DSFEIS Table 1-2 (page1-7) summarized congestion for the morning peak hour, the lunch peak hour and the afternoon peak</p>	<p>Many studies nationwide show that “commuting” trips are about 30% of daily trips, and declining as a share. But regardless, the share of trips that are commuting (as say, school, social, serve passenger, or shopping) is irrelevant.</p>

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			<p>the day and by direction: “<i>Based on these field travel time runs, corridor average travel speeds are approximately 40 mph eastbound and westbound during all three peak periods.</i>”</p> <p>The NCDOT travel time runs and recent INRIX data show that travel speeds are essentially uniform by direction and AM peak- lunch-PM peak (DOT 40 mph, INRIX 43-44 mph). This suggests that most of the traffic on U.S. 74 is locally-based traffic (otherwise the congestion would be more severe in peaks and nearer to Charlotte, where traffic volumes are higher). A further observation is that there is a <i>reduction</i> in traffic</p>	<p>hour. An evaluation of INRIX average travel speeds by hour shows that congestion varies throughout the day and is not uniform.</p> <p>Congestion on U.S. 74 during the morning and afternoon peaks is largely affected by commuter traffic. Congestion throughout the day is a result of the combination of long-distance regional trips, local commuter trips, and local access trips – including trips utilizing numerous crossing facilities. Regardless of trip type being local or regional, existing traffic congestion along the corridor currently impairs the U.S. 74 corridor from operating at 50 mph or its posted speed limits for much of the day.</p> <p>Continued growth, both locally and regionally will further exacerbate existing congestion along the corridor for all types of trips.</p> <p>Travel time information presented in Section 1.2.4 of the <i>Draft Supplemental Final EIS</i> was updated for the <i>Final Supplemental Final EIS</i> in Section 1.1.1 to include a review of INRIX data for all of 2013, as well as 2011 and 2012 (see Tables 1-2 and 1-3 in the <i>Final Supplemental Final EIS</i>). The updated data resulted in</p>	<p>The original quote regarding speed uniformity is from the DSFEIS. I agree that some variation in speed exists by direction and by time of day, but this is first of all, minor, being no more than about 5 mph, and second, this suggests further that treatments of the corridor as three separate “regimes” (I-485-Fowler Secret Road, Secret-U.S. 601, and U.S. 601-Anson Line) would allow localized solutions to be generated for each section. For the first section (4 lanes), cruising speeds are generally at or above the speed limit and are often &gt;50 mph, but signals slow the overall average speed. Therefore a variety of capacity increases and signal treatments (including removal of some signals) should be considered. For the middle section around Monroe (generally 6 lanes), more specialized treatment is likely needed, but the need to travel at &gt;50 mph cannot be established as a goal. For the third section, limited treatment is needed since the section now operates close to or above the speed limit.</p> <p>I am pleased that the Respondent agrees with me that the reduced traffic volume on U.S. 74 between Monroe and I-485 suggests that</p>

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			<p>volume on U.S. 74 between Monroe and the Mecklenburg County line, also suggesting that the traffic congestion around Monroe is locally-based, and is not headed to Charlotte. A third point is that the location of the facility, about 2 miles north of U.S. 74, means that local traffic on U.S. 74 would be unlikely to use the proposed Bypass as such use would require driving farther and out of the way for many local short trips, <i>and</i> paying a toll, to save (or perhaps even lose) travel time by using the Connector.</p>	<p>the same conclusions as presented in the <i>Draft Supplemental Final EIS</i>. Table 1-2 and Table 1-3 show that the U.S. 74 corridor from I-485 to US 601 (Pageland Highway), which makes up 60 percent of the studied corridor, operates substantially below 50 mph and posted speed limits, both eastbound and westbound, during all peak periods. For the portion of the corridor east of US 601 (Pageland Highway), average peak hour speeds are at or slightly above the weighted average posted speed limit, both eastbound and westbound. All speeds are still below the desired 50 mph for a high-speed corridor. Also as presented in the tables, contrary to the statement in this comment, congestion is more pronounced nearer to Charlotte, where differences between posted speed limits and INRIX average speeds are greater for the segment from I-485 to Fowler Secret Road, indicating more congestion.</p> <p>The commenter states that there is a reduction in traffic volume on U.S. 74 between Monroe and the Mecklenburg County line. A review of NCDOT 2012 traffic count maps show that existing volumes along U.S. 74 from Monroe to I-</p>	<p>congestion is local. Therefore, the congestion at that location should be treated with local treatments rather than long-distance solutions.</p>

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				<p>485 show higher volumes near Monroe and similar or higher volumes near I-485, compared with lower volumes in areas in between. However, average speeds throughout the corridor from I-485 to US 601 just east of Monroe show average speeds 4-14 mph below the speed limits in the eastbound direction and 6-16 mph below the speed limits in the westbound direction.</p> <p>All projections of land use, employment, and population growth incorporated into the MRM models utilized in developing project-level traffic forecasts indicate that growth will continue to occur in Union County and throughout the project study area in the future. Thus, the MRM models predict increased traffic growth along the U.S. 74 corridor and facilities accessing it with the result being increased traffic congestion in the future.</p> <p>The fact that MRM model results show that future traffic assignments utilize both the existing corridor and the proposed Bypass indicates that local trips would still utilize the existing U.S. 74 corridor, depending on specific trip origin and destination, as well as use the Bypass for trips where the value of time would indicate a trip made using the</p>	

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				Bypass is more desirable than using the existing corridor.									
5	Traffic Volumes	15	<p><b>Long-distance traffic is low in volume.</b></p> <p>Traffic volumes on U.S. 74 fall off sharply at the eastern edge of Monroe, from about 38,000 ADT in the vicinity of the Medical Center, to just 24,000 ADT at eastern edge of the study area, and about 19,000 ADT at Forest Hill Road, where the proposed Connector would rejoin U.S. 74. Although no data on external traffic (leaving the study area) is provided, probably only 1/3 of the 19,000 ADT at the study area's eastern edge is long-distance traffic (the ADT at the Anson County line, further east, is just 13,000 and some of that is local).</p>	<p>A project purpose is to improve mobility and capacity within the project study by providing a facility for the U.S. 74 corridor from near I-485 in Mecklenburg County to between the towns of Wingate and Marshville in Union County that allows for high-speed regional travel. Facilitating long-distance travel is not a primary purpose of the project nor a criterion used to screen alternatives. Nowhere in the project documentation is the primary justification for the Bypass noted as being "for long distance traffic." The Bypass is expected to provide a high speed option for all trip types – local, regional, and long-distance. Traffic forecasts for the Bypass show variation between proposed interchanges, owing to the fact that varying levels of all three trip types described are expected to occur depending on relative location between project termini. Speculation on anticipated trip diversion to the Bypass using existing daily traffic data neglects any effects of increased future growth in the area and increased congestion along the existing U.S. 74 facility.</p>	<p>I am again pleased that the Respondent agrees with me that long-distance traffic is low in volume. This supports the argument for local treatments, not a long-distance "high speed" bypass.</p> <p>Regarding estimates of long-distance diversion, the data from the NEPA documents show the following:</p> <p><b>2035 Traffic Forecast for U.S. 74, Forest Hills Rd-Bypass</b></p> <table border="1" data-bbox="1539 768 1965 992"> <thead> <tr> <th>No-build</th> <th>Build</th> <th>Change</th> <th>Pct Change</th> </tr> </thead> <tbody> <tr> <td>31,600</td> <td>20,700</td> <td>-10,900</td> <td>-34%</td> </tr> </tbody> </table> <p>The stated estimated diversion at the far eastern end of the corridor is 34% (Table 8, 5/1/15 Memo Traffic Forecasts). The overall reduction in traffic (VMT) on U.S. 74 is 31%, with estimated reductions as high as -54% between Rolling Hills Drive and Hanover Drive. As noted elsewhere, I find these estimates implausible (see Hartgen Report at 11).</p>	No-build	Build	Change	Pct Change	31,600	20,700	-10,900	-34%
No-build	Build	Change	Pct Change										
31,600	20,700	-10,900	-34%										

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			<p>Even if 1/2 of the 19000 ADT were to divert to the Bypass (an optimistic assumption), the resulting drop in traffic on U.S. 74 (about 8500) would be about 6-7%, less than the typical daily variation in traffic volume. Therefore the primary justification for the Bypass, long-distance traffic, is also relatively low in volume.</p>		<p>Moreover, as the FSFEIS notes, expected population growth is now anticipated to be much less than previously thought. NCDOT has not performed any analysis of this major change.</p>
5	Congestion	16	<p><b>The proposed Bypass is unlikely to reduce congestion on U.S. 74.</b></p> <p>The above two factors — most traffic on U.S. 74 is local, and long-distance traffic is quite low and might not divert — suggest that it is almost entirely local traffic, not long distance traffic or the lack of a high-speed</p>	<p>We do not agree with the bulleted comment that the proposed bypass is unlikely to reduce congestion on U.S. 74. We also don't agree that it is unlikely that the proposed connector would improve mobility in the study area. These qualitative comments offer little data or analysis in support of its conclusion. However, as described in Section 2.5.2 of <i>the Draft Supplemental EIS</i> (under the heading Question 6 – How would the Monroe Connector/Bypass affect traffic volumes on the U.S. 74 Corridor?), the</p>	<p>Once again, I agree with the Respondent that the future traffic volumes on U.S. 74 will likely be “less,” if the Bypass is built. The question is, how much, and could other less expensive and destructive routes produce comparable or better outcomes.</p> <p>The Respondent's own data indicate that corridor VMT will fall 31-34%, depending on the statistic used, even though the corridor VMT is only about 11% of the entire county VMT (<i>Table 8 and Table 13, 5/1/14 traffic</i></p>

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			<p>bypass, that causes the present congestion on U.S. 74. If most congestion is locally-based, then provision of a bypass will not alleviate it. It is therefore not likely that the proposed Connector would significantly reduce congestion on U.S. 74 or improve mobility in the study area.</p>	<p>project's traffic forecasts estimate that traffic volumes would be less along the existing U.S. 74 corridor with the Monroe Connector/Bypass in place, thereby improving traffic flow conditions along existing U.S. 74 compared to the No-Build scenario.</p>	<p><i>memo</i>). Given the Respondent's admission that most traffic using U.S. 74 is local, not long-distance, and that congestion is concentrated in and around Monroe, and also, that most traffic at the Corridor's far western end would not be reduced by the Bypass, which ends 1 mile east of I-485, I find the overall 31% diversion estimate incredible.</p> <p>A further missing element of the Respondent's analysis is the second-order diversion of local traffic <i>back to</i> U.S. 74, to take the place of the diverted traffic to the Bypass. As the Respondent has demonstrated, congestion on U.S. 74 has had the effect of shifting much local traffic to parallel routes. <i>See</i> FSFEIS at E4-46 – 47. Certainly, this observed pattern should suggest that diverted local traffic would shift back to U.S. 74 as any corridor through-traffic is diverted to the Bypass. Although traffic assignment models are supposed to handle this second-order diversion (through improved travel times), they often fall short of accurate estimates due to missing roads in the computer model as well as failure to account for time-of-day shifts back to previously congested routes. The MRM used for these</p>

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					forecasts is missing local streets and does not have time-of-day adjustments.
5	Funding	17	<p><b>The DSFEIS misrepresents the availability of “sufficient” funds.”</b>  The DSFEIS states that “<i>Similar to previous state and local TIPs and the conclusion in the Final EIS, current fiscally constrained planning documents do not have sufficient funds available from traditional sources in the foreseeable future to construct all priority projects in the state.</i>”<sup>6</sup>  This statement ignores the Governor’s new Strategic Transportation Investment (“STI”) Plan (2013), an effort to prioritize and fund highway projects by worthiness. The statement therefore pre-</p>	<p>This comment consists of the author’s opinion that the Monroe Connector/Bypass would not be a “worthy” project under the new Strategic Transportation Investments (STI) Law (House Bill 817). However, the STI law clearly excludes the Project and therefore it is not subject to STI scoring. Specifically, the STI law is scheduled to be fully implemented after July 1, 2015. Projects funded for construction before then will proceed as scheduled and are excluded from the STI law. The Monroe Connector/Bypass project was funded for construction in 2011, therefore it is not subject to STI scoring. Additionally, the STI Law expressly excludes the twenty-four million dollars (\$24,000,000) that has been allocated to the Monroe Connector/Bypass to be used to pay debt service or related financing expenses on revenue bonds or notes issued for construction. The <i>Final Supplemental Final EIS Section 2.4</i> includes current cost estimates for the Project.</p>	<p>Of course this is an “opinion,” but an informed one. Virtually all new road projects in NC are now required to be evaluated on merits through the new Strategic Transportation Investments (“STI”) program. As noted, the Monroe Bypass was exempted, partially due to its being funded for construction before July 1, 2015, but also due to the fact that legislators mistakenly believed that bonds issued for the project could not be spent elsewhere.</p> <p>The Bypass remains the only unbuilt project to have a legislatively mandated earmark to help cover the cost of its construction.</p> <p>But if scored today, given the Bypass’s high cost, low travel time benefit, and purportedly low contribution to area economic development, the project would likely receive a relatively low score in the STI process. It is worth noting that another similar toll highway, the Garden Parkway, was also previously scheduled for construction at a similar time to the Monroe Bypass.</p>

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			<p>judges that the Monroe Bypass would not “pass muster” under the new statewide transportation prioritization formula, and therefore needs more funds in the form of tolls. But elementary transportation economics teaches that a project’s worthiness should be determined WITHOUT regard to its funding sources. The Monroe Bypass should be subjected to the same worthiness criteria as virtually all other projects in the state, and if found sufficiently worthy it could then be funded without tolls. But no data on the project’s cost-effectiveness is provided.</p> <p>The Monroe Connector/Bypass is</p>		<p>Because this project was not exempted from having to compete in the STI, it was subject to the scoring process. Its low score means it is now unlikely to be built. Yet NCDOT continues to pursue the Monroe Bypass, essentially arguing that project “worthiness” doesn’t matter for just this one road project in NC.</p>

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			<p>the only yet-to-be-built road project presently authorized to be directly funded by the NC General Assembly through the NC Turnpike Authority; other projects previously permitted (the Garden Parkway, the Cape Fear Skyway, and the Mid-Currituck Bridge) have been removed from toll-authorized funding.</p>		
6	Project termini	18	<p><b>The DSFEIS misstates the end point of the project.</b> The DSFEIS states that <i>“On the western end, the project would begin at I-485, another controlled- access facility.”</i> This is factually not the case (it ends on U.S. 74, about 1 mile from the present I-485). Though the Draft recognizes the</p>	<p>The western project terminus is I-485. As noted in Section 3.1.1 of the <i>Draft Supplemental Final EIS</i>, the Preferred Alternative (DSA D) follows existing U.S. 74 for approximately one mile from just east of I-485 to east of Stallings Road (SR 1365). As shown in Figures 3-4a and 3-4b in the <i>Draft Supplemental Final EIS</i>, the Preferred Alternative upgrades this approximately one-mile segment of existing U.S. 74 to a controlled-access highway facility with frontage roads to access adjacent properties.</p>	<p>I appreciate the Respondent correcting this statement to show the correct end of the project.</p> <p>Regarding frontage roads, if the project can provide frontage roads to a portion of the project, why not to other sections on U.S. 74? This is yet another indication of NCDOT's failure to evaluate local options and improvements to U.S. 74.</p>

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			<p>facility's true end point elsewhere, this inaccurate statement at the beginning of the document, in the summary of its purpose and need, wrongly implies that the project extends the Interstate system by providing for long- distance travel, whereas the project's asserted justification is the reduction of congestion.</p>		
6	Miscellaneous	19	<p><b>The DSFEIS inappropriately introduces the issue of fairness.</b>  The DSFEIS states:  <i>“Although Union County is the fastest growing county in the State, it is the only county adjacent to Mecklenburg County that does not have a high-speed interstate-type facility connecting it to Mecklenburg</i></p>	<p>According to the North Carolina State Demographic Unit and ACS estimates, Union County is still among the fastest growing counties in the region and is growing at a faster rate than the majority of counties in North Carolina. The quote in this comment has been clarified with minor corrections included in the Errata section of the <i>Final Supplemental Final EIS</i> (Appendix D). The quoted text, which comes from Section 1.1.1 of the <i>Draft Supplemental Final EIS</i>, should read: “Although Union County is <u>one of the fastest growing counties</u> in the State, it is</p>	<p>I appreciate the Respondent's corrections to the DSFEIS. Misstatements such as this one in a major public decisionmaking document should not occur.</p> <p>However, the corrected statement improperly implies that problems regarding both county growth rate and “high-speed” proximity to a major urban county need to be addressed by significant public investment. That is an issue for the Legislature, which does not specify either criterion in allocating road funds.</p>

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			<p><i>County.</i>” This statement is factually incorrect. Union County is no longer the fastest growing county in North Carolina. At least 10 counties, led by Onslow, reported faster growth rates between 2010 and 2012 than Union County’s 3.3%, or 1.7%/year. Also, Lancaster County, SC, adjacent to Mecklenburg County, has no high-speed connection to Mecklenburg County.</p> <p>The statement further implies wrongly that all “adjacent” counties to metropolitan areas somehow deserve a high-speed “interstate-type” connection to the metropolitan county. This criterion is not one used by the STI program to evaluate</p>	<p>the only county <u>having a major border with</u> Mecklenburg County that does not have a high-speed interstate-type facility connecting it to Mecklenburg County.”</p> <p>We do not agree with the commenter’s interpretation. This statement was not intended to imply anything other than a statement of existing conditions regarding the region’s transportation network. This statement was not used as a criterion to evaluate the Monroe Connector/Bypass alternatives. The criteria used to evaluate the ability of alternatives to meet the project’s purpose and need are stated in Section 2.2.1 of the <i>Draft Supplemental Final EIS</i>.</p>	

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			<p>projects. The STI criteria require that all highway projects be evaluated by cost-effectiveness and congestion reduction, among other factors, but not by geographic proximity or design level. Further, NCDOT is already upgrading existing U.S. 74 in Mecklenburg County to high-speed design standards, and this upgrade could be continued into Union County. If this criterion were added to the STI, then counties adjacent to Wake, Guilford, Forsythe, Cumberland, Buncombe, New Hanover, and Durham should also have their connections upgraded and raised to "interstate-type."</p>		
Facts are	Weekend	20	<p><b>Neither beach access nor weekend traffic is mentioned in the document.</b></p>	<p>Alternatives studied in the NEPA process were analyzed for their ability to meet purpose and need, as explained in Section 2.2.1 of the <i>Draft Supplemental Final EIS</i>.</p>	

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	d Travel		<p>It is commonly thought that travel times from Charlotte to the North Carolina beaches are hampered by congestion on U.S. 74, and that as a result, beach-going weekend traffic is often stuck in congestion between Charlotte and Monroe. Yet the DSFEIS does not study, review or even mention local or long-distance <i>weekend</i> traffic. The proposed Monroe Bypass might serve an additional <i>unmentioned</i> purpose of providing faster access across Union County for Charlotte-area beachgoers — in other words, a major unmentioned beneficiary of the Bypass would be the occasional (largely weekend) users from an adjacent county! If</p>	<p>Long-distance travel associated with beach and weekend travel was not part of the project purpose and need. Therefore, this information was not needed to evaluate proposed alternatives for the project. Although improving weekend travel to the beach is not a purpose of the project, some of these trips likely would benefit from the construction of the proposed Monroe Connector/Bypass.</p>	<p>I appreciate the Respondent's admission of this second-order benefit, but disagree with the implication (by absence) that it is minor. Indeed, the possible benefits of the alternatives to weekend travel, both longer-distance and local, should be an important element of the analysis.</p>

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			<p>these factors are part of the project's justification, they must be spelled out and evaluated on their merits using appropriate traffic analysis methods. This oversight demonstrates either unfamiliarity with an unstated key "purpose and need" of the project, or (worse) implies that stating this additional purpose would reduce the project's political support.</p>		
7	Alternatives	21	<p><b>The alternatives considered appear to be inappropriately biased against U.S. 74 upgrades.</b> NEPA requires that the alternatives considered for road projects include the "no- build" alternative, a TSM/TDM alternative, and a variety of</p>	<p>We disagree with the commenter's suggestion that we did not appropriately evaluate alternatives as required under NEPA. Section 2 of the <i>Draft Supplemental Final EIS</i> summarizes the extensive multi-step alternatives development process for a wide range of alternatives carried out during the preparation of the <i>Draft EIS</i>, additional analyses conducted and documented in the <i>Final EIS</i> as a result of public and</p>	<p>The Respondent's response simply points to the sections of the DSFEIS containing their discussion of alternatives, but it does not address my concern. I stand by my statement that the alternatives considered were not carried forward to the same level of detail as the "preferred alternative." Treatment of TSM options, particularly the use of flextime for key locations/employment centers (e.g. Hospital) is summarily dismissed.</p>

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			<p>“build” alternatives. While the ranges of alternatives to be considered vary widely from project to project, the intent of NEPA is to ensure that a wide range is considered. Alternatives found to be viable must then be evaluated to equivalent levels of detail in terms of benefits, impacts and costs. This does not appear to be the case for the Monroe Connector/Bypass.</p>	<p>agency comment, and updates and analyses conducted after the <i>Final EIS</i>. Figure 2-1a-b in the <i>Draft Supplemental Final EIS</i> is a graphic summary of the alternatives evaluations conducted. Alternatives evaluated included transportation demand management (includes measures such as flex-time, staggered work hours, and ridesharing), mass transit/multi-modal, improve existing U.S. 74, new location, and combinations of improve existing roadways and new location.</p>	<p>Failure to consider in detail various “build” alternatives that improve U.S. 74 (including 6-laning, signal coordination, signal consolidation, partial use of frontage roads, superstreet treatment, and other options such as “partial” bypasses) is a major process oversight. This is particularly disappointing as the Respondent now admits that the primary purpose of the Bypass is to address local congestion on U.S. 74.</p> <p>Moreover, the analysis pointed to Section 2 of the DSFEIS which took place in 2008. As I have stated repeatedly, much has changed since that initial analysis. Traffic on U.S. 74 has not grown at the rate anticipated, traffic speeds have increased, and expected levels of socio-economic growth have likewise decreased. Despite this new information there has been no additional analysis of these project alternatives, nor any analysis of a combination of these alternatives with other new proposed solutions.</p>
7	Alternati	22	<p><b>The DSFEIS limits the alternatives to those that were judged to fit a biased Purpose and Need.</b></p>	<p><i>See responses to Comment #s 12, 13, and 21.</i></p>	<p>See my Replies above to Comments 12, 13, and 21.</p>

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	ves & Purpose and Need		<p>The DSFEIS describes the three-stage winnowing process used to identify feasible alternatives. In the first step, a wide range of alternatives were considered, including:</p> <ul style="list-style-type: none"> <li>. <i>No-Build or No-Action Alternative</i></li> <li>. <i>Transportation Demand Management Alternative</i></li> <li>. <i>Transportation System Management Alternative</i></li> <li>. <i>Mass Transit and Multi-Modal Alternatives</i></li> <li>. <i>"Build" Alternatives, including Upgrading Existing Roadways and New Location Alternatives</i></li> </ul> <p>The DSFEIS then states that three criteria, based on the purpose and need, were applied to each alternative:</p> <ul style="list-style-type: none"> <li>. <i>Does the alternative address the need to <u>enhance mobility and increase capacity in the U.S. 74 corridor?</u></i></li> </ul>		

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			<p><i>.Is the alternative consistent with the NC Strategic Highway Corridor program and the NC Intrastate System (i.e. does it allow for high-speed regional travel)?</i></p> <p><i>.Does the alternative maintain access to properties along existing U.S 74</i></p> <p>But as detailed above, because the stated "Purpose and Need" is biased toward inappropriate criteria, the alternatives developed to meet those criteria are not judged on the right set of criteria.</p>		
8	Alternatives &	23	<p><b>Elimination of "frontage road" and "not maintaining property access" alternatives arbitrarily restricts the options.</b></p> <p>The DSFEIS eliminates</p>	<p>As discussed in Section 2 of the <i>Draft Supplemental Final EIS</i>, and shown in Figure 2-1b of the <i>Draft Supplemental Final EIS</i>, NCDOT thoroughly studied many improve existing U.S. 74 alternatives, including Transportation</p>	<p>The Respondent's remarks simply assert that its prior work "thoroughly studied" the many alternatives. But, the Respondent fails to note that the</p>

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	Purpose and Need		<p>several alternatives based on their asserted failure to provide access to existing U.S. 74 properties. It notes that <i>"However, as part of the purpose and need criteria for the project, there is a need to maintain access to existing properties along existing U.S. 74, so frontage roads would be needed for the Upgrade Existing U.S. 74 Alternatives under either a toll or non-toll scenario to provide property access."</i> But the alternatives apparently do not include various "frontage road" options, either separately or in combination with other features such as Superstreets, reversible lanes, or signal optimization. Essentially, by restricting the review to those alternatives that are asserted to <i>strictly</i> meet the biased Purpose and Need, the</p>	<p>System Management (TSM), Superstreets, Standard Arterial Widening, Controlled Access Highway, and New Location/Improve Existing Hybrid. Figure 2-1b of the <i>Draft Supplemental Final EIS</i> summarizes the alternative concepts and decision points for improve existing U.S. 74 alternatives. Figure 2-1b also lists other types of improve existing U.S. 74 alternatives considered, including TSM Alternative, superstreets, standard arterial widening, and new location hybrids. As listed in Figure 2-1b, Preliminary Study Alternative G (PSA G) would improve existing U.S. 74 to a 6-lane freeway with one-way frontage roads on either side to maintain access to adjacent properties.</p> <p>PSA G was determined in the <i>Draft EIS</i> to have significant human environment impacts (including relocations of businesses), substantial disruption during construction, and more impacts to streams compared to new location PSAs.</p> <p>In response to agency comments requesting further study of PSA G, NCDOT developed Revised PSA G to reduce impact and costs and improve operations. Additional evaluation of PSA G and Revised PSA G in the <i>Draft EIS</i></p>	<p>NCDOT's own staff has recommended the widening of U.S. 74 to 6 lanes, and that NCDOT implemented some "superstreet" improvements in a heavily trafficked portion of the corridor.</p> <p>NCDOT's fundamental error in this analysis is that the Monroe area needs a "bypass" that by necessity must stretch 20+ miles around the city and connect to I-485. This assumption flies in the face of the Respondent's own evidence that corridor speeds vary by location and time of day, and are lowest near I-485 and near Monroe; that the corridor does not primarily serve long-distance travel; and that local congestion reduction should be the primary objective. Rather than being "led" objectively by its data to prudent and reasonable alternatives, as NEPA requires, the EIS essentially "locks in" just one alternative — a 4-lane bypass funded partially by tolls.</p>

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			<p>DSFEIS arbitrarily eliminates a wide range of other feasible options. Partial frontage roads for some sections and not others are also not explored fully. Partial freeway upgrades along with partial upgraded arterial treatment is another option that is clearly possible but is not explored. Neither do the alternatives apparently consider options that take a minimal, or minor, number of existing properties along existing U.S. 74, while the proposed Bypass would take 95 households, 47 businesses and 499 acres of active agricultural land. Failure to adequately consider "on- current-alignment" options is also surprising as upgrades to U.S. 74 in Mecklenburg County include on-current-alignment upgrades. If</p>	<p>determined neither would be reasonable or practicable and were eliminated from further consideration.</p>	

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			<p>NCDOT could pursue this alternative to improve U.S. 74 in one county, then why not in the adjacent county?</p>		
8-9	Tolling	24	<p><b>Tolling availability further restricts the options to those off U.S. 74.</b>  Tolling options are not permitted in North Carolina without the express approval of the Legislature. As of this writing, only one un-built road, the Monroe Connector/Bypass, is presently approved for tolling. The presence of the tolling option for the Monroe Connector/Bypass, not permitted for other projects in the state, biases the review of alternatives towards those that rely on additional traffic-generated revenue, rather than on the usual funding options. Although the DSFEIS states that “<i>the tolling</i></p>	<p>The purpose of the two statements noted by the commenter is to underscore the fact that conventional toll plazas and their associated impacts were not considered because the NCDOT will operate the facility in an open road tolling configuration utilizing electronic collecting not cash collection in the lane. As documented in Section 2 of the Draft Supplemental Final EIS, a range of alternatives were rigorously considered for the project, including mass transit, upgrading existing roadways and combinations of upgrading existing roads with new location segments, and multi-modal alternatives. Existing corridors considered for upgrading were U.S. 74 (in its entirety or in part), Old Monroe Road/Old Charlotte Highway, and Secrest Shortcut Road. These alternatives were found to not to meet the project purpose and need, regardless of their ability or inability to be toll facilities, as reaffirmed in the <i>Draft Supplemental Final EIS</i>.</p>	<p>The Respondent misinterprets our comment, which is not about electronic versus toll-gate tolls, but about tolling options versus non-tolled options. Particularly, our concern is that neither an <i>untolled Bypass</i> nor a <i>tolled U.S. 74</i> was evaluated.</p>

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			<p><i>aspect of the project had no influence on the concepts identified for detailed study and little influence on the roadway preliminary design,” the screening process nevertheless eliminated all options except tolling options: “All [25] PSAs [preliminary screening alternatives] assumed that toll collection would be made using an open road tolling technology, which allows for tolls to be collected at highway speeds and eliminates the need for conventional toll plazas.” This is either a remarkable coincidence, or a result of a process that pre-judges the range of feasible options.</i></p>		
9	Legislation	25	<p><b>The DSFEIS ignores MAP-21’s focus on projects “within operational right-of-way.”</b></p>	<p>The project development process considered improvements within the operational right-of-way throughout the alternatives development and screening projects, as shown in Table 2-1 of the <i>Draft</i></p>	<p>This provision in MAP-21 is a major effort to streamline road improvements by reducing the need for extensive environmental assessment. It is inconceivable that</p>

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			<p>The new federal highway act, MAP-21, passed in August 2012, specifically streamlines the environmental review process for projects “within the operational right-of-way.” This new law, not mentioned in the DSFEIS, is intended to rapidly progress projects that have minimal or little environment impact, speeding their construction. By ignoring this opportunity, the DSFEIS eliminates a wide variety of options that could be progressed faster, and possibly cheaper, than the proposed Monroe Connector/Bypass.</p>	<p><i>EIS</i> and Section 2 of the <i>Draft Supplemental Final EIS</i> (as referenced above in <b>Comment #s 21 to 23</b>).</p>	<p>such an important option would not have been mentioned, let alone seriously considered, in the DSFEIS.</p> <p>Since the analysis was completed before the passage of MAP-21, it could not possibly have addressed the additional streamlining opportunities by using alternatives within the “operational right-of-way.” But this opportunity could easily have been addressed in the DSFEIS itself, through a re-analysis of the corridor traffic. Ironically, if the project had been broken into three sections (each dealing with local congestion), each section probably could have been treated within the “operational right-of-way” at a lower overall cost, and the improvement could have been underway by now. So, NCDOT’s insistence on the need for a “bypass” to solve local congestion problems has actually extended those problems though inaction.</p>
			<p><b>Other alternatives, particularly upgrading U.S. 74 using “Superstreets,” providing frontage roads while upgrading U.S. 74 to</b></p>	<p>See responses to <b>Comment #s 21, 23, and 40</b> in this table.</p> <p>The DSFEIS summarized the U.S. 74 Corridor Study’s Appendix IV estimated travel speed and time results for the 12.5-mile segment of U.S. 74 from its</p>	

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9-10	Alternatives	26	<p><b>freeway status, and/or consolidating intersections should have been evaluated.</b></p> <p>The DSFEIS discusses the effectiveness of one lately-added alternative, "TSM Alternative Concept 2" that would improve traffic flow on U.S. 74 over the short term (to 2015). The DSFEIS concludes that <i>"by implementing the improvements listed in Table 3-5 of the Final EIS, an overall Level-of-Service D in 2015 could be attained at the intersections along the U.S. 74 study corridor, except for the intersection of U.S. 74 at Rocky River Road (SR1514)."</i> The DSFEIS relies on 2007 estimates projecting that implementing these improvements would result in an average 2015 peak travel speed of between 29-30 mph. However, after</p>	<p>intersection with US 601 South to Stallings Road. It appears that the commenter is comparing those estimated speeds to INRIX average travel speeds collected in 2011, 2012 and August 2013, shown for an 8.2-mile segment of the corridor from I-485 to Fowler Secrest Road shown in DSFEIS Tables 1-2 and 1-3. We don't believe that comparing predicted speeds to real-time travel speeds for segments of roads with differing lengths and termini is appropriate.</p> <p>A superstreet concept was considered at various stages of the EIS process. NCDOT's analysis showed that the concept would not meet the purpose and need of the project. No further analysis is needed to determine how much the improvements might reduce the need. The NCDOT has implemented and plans to implement the superstreet concept throughout the U.S. 74 corridor in an effort to provide short-term improvements to mobility that, based on analyses conducted for this project, will not provide long-term solutions to meet the Monroe Connector/Bypass's stated purpose and need due to future forecasted traffic growth along U.S. 74.</p>	<p>As noted above, Respondent's own data, drawing from INRIX 2011-2013, now shows travel speeds averaging 42-47 mph, depending on direction and location.</p> <p>Tying the rejection of Superstreet treatments to an artificial "need," then dismissing the option without considering local treatments, is illogical.</p> <p>Since traffic growth is flat and U.S. 74 has not been widened, the improvements to intersections are</p>

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			<p>implementing just some of these solutions, NCDOT has observed average peak travel speeds well above these projections, as high as 45 mph. This finding is then dismissed because the alternative does not meet the need for “high speed travel” through the corridor, even though it is estimated to result in improved operation (LOS D) on U.S. 74.</p> <p>The DSFEIS also states that assuming the 2035 traffic volumes, the option is not feasible: “<i>A comparison of the year 2015 traffic volumes used in the U.S. 74 Corridor Study to the year 2035 No-Build volumes developed in Revised Monroe Connector/Bypass No-Build Traffic Forecast Memo (HNTB, March 2010), shows that the volumes in 2035 along</i></p>	<p>As discussed in Section 2.4 of the <i>Draft Supplemental Final EIS</i>, numerous TSM measures have been implemented along existing U.S. 74 by NCDOT as funds have become available and by developers of adjacent properties as they improve their properties. Overall, improvements have been implemented at all 23 intersections along existing U.S. 74 that were mentioned for improvement in the <i>U.S. 74 Corridor Study</i>. As presented in Section 1.2.4 of the <i>Draft Supplemental Final EIS</i> and updated in <b>Section 1.1.1</b> of the <i>Final Supplemental Final EIS</i>, existing average travel speeds along U.S. 74 within the project corridor are less than 50 mph during peak travel periods, even with implementation of the TSM measures described in Section 2.4. TSM improvements, while providing some short term benefits, would be overwhelmed by projected 2035 traffic in the corridor, and would not provide long-term benefit nor meet the purpose and need for the Monroe Connector/Bypass project.</p>	<p>undoubtedly the reason for the improved speeds compared with 2007-08. Further improvements, along with intersection consolidation, frontage roads, and signal coordination, would undoubtedly improve speeds even more in those sections left untreated by recent upgrades.</p> <p>By focusing on the fact that current traffic average operating speeds remain under 50 mph, NCDOT is limiting its consideration only to those improvements that have been implemented already. I do not disagree that additional solutions are still needed, I simply request that NCDOT consider a range of reasonable alternatives. Furthermore, I request that NCDOT take into account the impact that existing improvements have had as well as the likely impacts of the many planned area traffic improvements already funded — or are certain to be funded — in the near future.</p>

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			<p><i>U.S. 74 would generally be significantly higher. Therefore, the levels of service at the intersections in 2035 would be expected to degrade to below LOS D and travel speeds based on the computer model also would decrease.” However, given the admitted success of the recent improvements in improving LOS, the highly uncertain traffic forecasts (see below) and the flat recent traffic counts (discussed below), this is clearly a premature conclusion.”</i></p>		
10-11	Alternatives	27	<p><b>An additional option, widening U.S. 74 without tolls, was also eliminated prematurely.</b></p> <p>The DSFEIS also notes that based on questions raised by the Corps of Engineers, the option of an “on- current location” was revisited. The review concluded</p>	See response to <b>Comment 26</b> in this table.	See Reply # 26 above.

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			<p>that “[I]n the design year 2035, U.S. 74 under all four scenarios is expected to exceed LOS D in the majority of the corridor.... The Superstreet 6-Lane scenario option provided the highest corridor capacity compared to the other three scenarios.” This statement finds that U.S. 74’s level of service will be unsatisfactory (LOS D is the NCDOT standard for operation) with any of these options, but (in apparent conflict with its own recommendation for a Bypass) NCDOT has moved to implement a “Superstreet” improvement along a 2.7 mile section of the existing U.S. 74 through Indian Trail. Therefore it is unclear, to say the least, why a “Superstreet” option was eliminated from the feasible alternatives. This appears to be a</p>		

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			violation of NEPA which requires comparable evaluation of viable options. At the least, prudence would dictate that the "Superstreet" option now being implemented on a portion of U.S. 74 should be reviewed for effectiveness, and additional Superstreet improvements be considered in combination with other improvements in the corridor, BEFORE a decision to build the Bypass is made.		
11	Alternatives	28	<p><b>No discussion of "flexible work schedules" or "work-at-home" as an alternative.</b></p> <p>Even though NCDOT's own data show no large variations in travel time by time of day or direction, and that most of the traffic using the facility is local, there is no discussion of other</p>	<p>See response to <b>Comment 14</b>.</p> <p>Figure 2-1a-b in the <i>Draft Supplemental Final EIS</i> is a graphic summary of the alternatives evaluations conducted throughout the NEPA process. Alternatives evaluated included Transportation Demand Management, which (includes measures such as flex-time, staggered work hours, and ridesharing.</p> <p>TDM Alternatives were evaluated in the <i>Draft EIS</i> and determined to not meet the</p>	<p>The DSFEIS does not contain any information regarding how effective a significant flex-time program might be. If locally concentrated, these programs often have large impacts on local signal operation, particularly for major employers such as the hospital. It is inappropriate for the DSFEIS to simply take the option off the table without any analysis.</p> <p>Again, I do not suggest that this concept standing alone could solve all traffic problems on U.S. 74, but</p>

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			<p>alternatives such as staggered work schedules, increased work-at-home, or other similar options for reducing traffic loads at specific intersections. The percentage of Union County residents working at home <i>doubled</i> from 3.4% in 2000, to 6.9% in 2012. The TDM alternatives considered did not significantly explore this issue.</p>	<p>project's purpose and need. Additional discussion of the Qualitative First Screening for the TDM Alternative is provided in <i>Final EIS</i> Section 3.3.2 under Comment 3.</p>	<p>rather, that such strategies could be employed in combination with other alternatives for a comprehensive solution.</p>
11	Alternatives	29	<p><b>The DSFEIS does not contain key comparative data for all alternatives.</b></p> <p>Most EISs contain detailed comparative data, by impact, for all viable alternatives, INCLUDING the no-build and other "improve existing road" alternatives. This information is missing</p>	<p>See response to <b>Comment #21</b> in this table.</p> <p>The <i>Draft Supplemental Final EIS</i> follows FHWA guidance for content of supplemental EISs. As explained in Section P.3 of the <i>Draft Supplemental Final EIS</i>, the FHWA Technical Advisory T6640.8A (<i>Guidance for Preparing and Processing Environmental and Section 4(f) Documents</i>) states:</p> <p><i>"There is no required format for a supplemental EIS. The supplemental EIS</i></p>	<p>For reported changes of this magnitude (large changes in demographic forecasts, flat traffic, a recession, slowed growth, and a new</p>

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			<p>from the DSFEIS, raising the question of whether it violates NEPA requirements that all alternatives be investigated and described to an equivalent level of detail.</p>	<p><i>should provide sufficient information to briefly describe the proposed action, the reason(s) why a supplement is being prepared, and the status of the previous draft or final EIS. The supplemental EIS needs to address only those changes or new information that are the basis for preparing the supplement and were not addressed in the previous EIS (23 CFR 771.130(a)).</i></p> <p>As explained in the Preface, the <i>Draft Supplemental Final EIS</i> addresses current environmental conditions and focuses on any changes that have occurred with regards to the project the alternatives analysis, the affected environment and impacts, and any new issues or information identifies since the <i>Final EIS</i> was published. The results of this analysis did not necessitate any changes to the proposed action.</p>	<p>travel model), a re-comparison of alternatives on numerous dimensions is needed.</p>
11	Travel time and traffic forecasts	30	<p><b>Travel time improvements on U.S. 74 and their effect on traffic forecasts for the Monroe Connector/Bypass appear to be underestimated.</b></p> <p>For a variety of reasons</p>	<p>We disagree with the commenter's suggestion that the impacts of recent improvements along existing U.S. 74 have been underestimated and that this likely overstates the expected diversion of traffic to a future Monroe Connector/Bypass. The commenter does not support his statements with any data for consideration.</p>	<p>The Respondent's own data is the evidence. It shows major</p>

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			<p>detailed below, the impacts of improvements to U.S. 74 on traffic flow appear to have been underestimated. This likely over-states the expected diversion to a future Bypass.</p>	<p>The DSFEIS listed all the operational improvements that have been on U.S. 74 within the project study area. We collected real-time traffic information from INRIX. We have also collected information now for the entire 2013. We conducted speed studies to verify the appropriate use of the INRIX data. The speed studies showed that INRIX reported speeds slightly higher than our speed studies. However, we used the INRIX data and its higher reported speeds to show the effect of the operational improvements on U.S. 74, so that we would not under-estimate the impact of those improvements.</p>	<p>improvements in speed since 2007-08, confirmed by recent INRIX speed data. Since these improvements were largely confined to the western end of the corridor, it is likely that more improvements, such as those mentioned above, would continue to yield higher speeds.</p>
11	Travel speeds	31	<p><b>The DSFEIS uses the wrong speed criterion for setting road performance.</b>  There is no <i>requirement</i> that Interstate, NCSTI or STRAHNET routes have operational travel speeds that are equal to the posted speeds. If that were the case then virtually all of state-owned urban arterials in North Carolina would need upgrades, widenings or bypasses.</p>	<p>We disagree with this comment. The alternatives screening and development process does not use speed limits or level of service as criteria. Rather, a screening criterion of 50 mph was used to define a high-speed facility. As summarized in Section 1.2.4 of the <i>Draft Supplemental Final EIS</i> and updated in Section 1.1.1 of the <i>Final Supplemental Final EIS</i>, the INRIX data was compared to posted speed limits on existing U.S. 74 to provide the public an indication of the degree of congestion on existing U.S. 74.  The travel time comparison document</p>	<p>The Respondent ignores the thrust of this comment, that specific speed criteria are NOT a standard for various networks or road classes, or a requirement for use in evaluating alternatives. By using &gt;50 mph as the definition of "high speed," the analysis arbitrarily limits the alternatives to those that are "off-current location."  A 10% error in speed estimation translates into a much larger error in traffic flow, as traffic congestion increases exponentially as speeds decline. If the modeled speeds are</p>

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			<p>NCDOT standards for LOS D (moderate congestion) typically have traffic operating speeds 5-15 miles below the posted speed.</p> <p>Even if speeds are accepted for a criterion, the standard for speed study is the 85th percentile, not the average speed. As, according to the INRIX data, the reported average (close to 50th percentile) operating speed on U.S. 74 is 44 mph, using the 85th percentile would raise the current operating speeds on U.S. 74 even further, probably to the 48-50 mph range. This reduces the need for the project and the potential time savings.</p>	<p>shows field-collected data and INRIX data produce similar results over the length of the corridor, with field-collected average travel speeds ranging between 39 and 44 mph, approximately 6 to 10 percent lower than INRIX data for the exact time period that the field data was collected. The commenter's analysis incorrectly uses an 85th percentile speed calculation of INRIX data and, as a result, incorrectly inflates INRIX travel speeds and concludes/implies that current operating speeds are "probably to the 48-50 mph range. This reduces the need for the project..." The commenter's incorrect analysis fails to account for the fact that field-collected travel speeds were collected and are available for comparison. The 85th percentile speed is primarily used for establishing regulatory speed zones when adequate speed samples are available for free-flowing traffic. The commenter's analysis incorrectly estimates a U.S. 74 corridor 85th percentile speed based the SDFEIS summary of average travel speeds for only three peak hours during the day instead of using field-collected speed data for all periods throughout the day to develop a speed distribution curve along</p>	<p>too low on U.S. 74, then the diverted traffic will be too high and the Bypass traffic will be over-estimated.</p> <p>The Respondent's own tables now show operating "average" speeds (from INRIX) to be 42-47 mph, which is very close to the self-imposed standard of 50 mph. What will the DOT do when new 2014 INRIX data show operation even closer to 50 mph? Raise the standard to 55 mph?</p>

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				<p>U.S. 74. In reality, the U.S. 74 corridor is an interrupted flow, arterial facility consisting of 30 signalized intersections over 22.5 miles with stop-and-go conditions that generally “progresses” traffic in platoons from signal to signal. The INRIX data clearly show multiple segments currently operating at speeds far below the commenter’s estimates of “48-50 mph”.</p> <p>Also, see <b>Comment #32</b> in this table.</p>	
12	Travel speeds	32	<p><b>Possible misuse of speed measurement data.</b></p> <p>The 2013 INRIX data show an average travel speed through the corridor of 44 mph, 10% (4 mph) higher than the NCDOT’s travel time runs. In other words, drivers now are averaging faster speeds than the DOT speed-run tests. This 10% difference is so large that it calls into question the accuracy of the travel time savings from the model. Later it is noted that the speed runs appear to be based</p>	<p>See <b>Comment #31</b> in this table.</p> <p>The 2013 speed study was not conducted to calibrate the traffic simulation computer models (SimTraffic) used to predict travel speeds in 2007 for the draft EIS. Instead, the 2013 travel speed study was used to determine if it was appropriate to use INRIX data to represent average week day travel speeds on U.S.74 in 2011, 2012 and 2013. Since there was only 10% (4 mph) difference between the speed study and the INRIX data; and the INRIX data reported higher speeds, we used INRIX data to represent average travel speeds on U.S. 74 during peak hours after implementation of operational improvements on the road.</p> <p>Regarding how speed data may affect the traffic forecasting process, link speed data</p>	<p>As the operational improvements post-date the modeling completed in 2010, the MRM could not possibly have used the 2011-13 INRIX speeds. Therefore, the MRM likely has speeds that are too low for U.S. 74.</p> <p>I am pleased that the Respondent now agrees that the spot</p>

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			<p>on just three runs in each direction/time period which is a very small sample. The INRIX data, on the other hand, are based on observed speeds of hundreds (perhaps thousands) of actual drivers over a 2-month period, 24 hours a day, Tues-Thurs. This is a huge amount of data that is a much more realistic description of actual corridor operation than just a few speed runs.</p> <p>Therefore, the INRIX actual operating speeds, not the travel time runs or posted speeds, should be used as the basis for the traffic forecasts on U.S. 74. Without this correction, estimates of future traffic speeds on U.S. 74 (build and no-build) will continue to be too low, and diversion to the proposed Bypass will continue to be overstated.</p>	<p>used in the Metrolina Regional Model (MRM) includes posted and estimated free flow speeds and produces estimated peak period travel speeds as an output. While recent spot intersection and signal timing improvements on U.S. 74 may have improved local operations and increased travel speeds in the local vicinity of these improvements and these localized intersection improvements would not change the traffic assignments in the model. No data is provided by the commenter that directly shows the need to update travel time inputs in the MRM used for traffic forecasting or what effect that might have in the form of changes to traffic assignments from the model.</p> <p>Ultimately, a project-level traffic forecast is forecasting the demand on a given facility, not the operations of that facility. AM and PM peak hour operating speeds are not used as direct inputs into the MRM. The MRM uses comprehensive capacity settings that estimate the link capacity through the model based on the link attributes" as part of the standard, approved modeling procedures (MRM User's Guide, July 11, 2008). These link attributes include: number of lanes, speed</p>	<p>improvements on U.S. 74 increased speeds.</p> <p>The assertion that the MRM was not affected by spot improvements is illogical as the MRM was not updated and so the tests cannot be reviewed. But a 10-15 mph improvement in overall speeds from 2007-08 to 2013 cannot be ignored and must be due to some cause. Better drivers? Less traffic? Fewer trucks? What is the true cause? The DSFEIS provides no clues as to this remarkable achievement, nor does it attempt such an evaluation.</p>

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				limit, functional classification, intersection control, median type, area type and functional classification of crossing streets. Travel speeds are inherently calculated in this process to compute model demand and vehicle paths within the network.	
12-13	Value Of Time	33	<p><b>The suggested diversion to the Bypass (40-50%) would require a very high value of time.</b></p> <p>Traffic diversion (assignment) models operate by assigning traffic to the path with the shortest “generalized cost,” considering travel time, reliability, congestion, and tolls. The fundamental principle underlying most modeling systems is that users choose that path which has the lowest generalized cost, spreading out by route (and time-of-day in advanced models) such that no traveler can improve his generalized cost by changing paths.</p>	<p>The commenter suggests that the estimated diversion of traffic to the Monroe Connector/Bypass is 40-50 percent, but does not provide a reference for these values. The traffic forecasts used in the <i>Draft Supplemental Final EIS</i> predict a lower rate of traffic diversion. Table 2-8 in the <i>Draft Supplemental EIS</i> shows that diversion from existing U.S. 74 is estimated to be approximately 30 percent based on the 2035 traffic forecasts, and 19-30 percent based on raw output from various MRM model versions.</p> <p>All information and comparisons made by the commenter regarding trip diversion and value of time are <b>simplified calculations</b> for existing year conditions and assumptions about current travel speeds. No information is provided by the commenter that addresses travel time savings in future scenarios, where congestion is expected to increase on U.S. 74, increasing the likelihood of diversion</p>	<p>The data supporting the diversion estimates are in the Respondent's own analysis (<i>Table 8, Traffic Memo, 5/1/14</i>) which show diversions averaging -31%, 6 sections of U.S. 74 shows estimated diversions of -40% or larger, and 4 show diversions greater than -50%. I believe that these very high diversions are caused by inaccurate or incomplete network coding, possibly an inordinately assumed high value of time as demonstrated by our “simple calculation” (the higher the value of time, the greater the diversion), and possibly unreasonably low travel speeds on U.S. 74 (see above).</p> <p>Instead of being a “simplified calculation,” the straightforward calculations demonstrate just how unreasonable some of the hidden assumptions in the forecast are. The question is not what the preference surveys show (actually I agree with the Respondent that the overall average value of time is about ½ the</p>

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			<p>To estimate total generalized cost, tolls must be converted into time units using a traveler value of time, which is generally assumed to vary by location, trip purpose and vehicle class. Values of time vary by region, but most <i>value-of-time studies put it at about 1/2 the average wage rate, or about \$9/hr.</i> That is about 1/2 the prevailing median wage rate for Union County, \$18.48/hr. Using the reported INRIX actual speeds for U.S. 74, the average 44- mph travel time through the 19.7-mile U.S. 74 section (between the approximate end points of the proposed Bypass) is now about 26.9 minutes, and at 65 mph the average travel time between the same points using the Bypass, would be 18.2 minutes. To be worth paying the</p>	<p>onto the Monroe Connector/Bypass. The <i>Final Report Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study</i> (Wilbur Smith Associates, October 2010) was conducted at a level of detail sufficient for use in support of project financing and incorporated a comprehensive methodology, as described in the report. As discussed in the <i>Final Report Proposed Monroe Connector/Bypass Comprehensive Traffic and Revenue Study</i>, surveys were conducted to provide value-of-time data for use in the toll diversion modeling. Three methods of obtaining information were used. Interactive, notepad-based interviews were held at various employment centers, shopping areas, and government offices. Interactive, internet-based surveys were also conducted along with an OD (origin-destination) study. Finally, individuals were contacted to participate in a detailed stated preference survey.</p>	<p>average wage rate), but what value of time is hidden inside the MRM. My “simplified calculation” suggests that it may be too high if the diversion from some segments is -40-50%. This is an example of the many “reasonableness checks” that should have been performed on the model forecasts.</p> <p>Finally, the Respondent fails to address the possibility of <i>infrequent use</i> of the Bypass (as opposed to daily use, as the Model implies). High implied values-of-time can also mean that use of the Bypass will be restricted to those trips for which reliable travel time is important and/or for which the value of time is very high (for instance, medical appointments, airport departures, child pick-up, plumber-handyman service, participatory sporting event starts, etc.).</p>

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			<p>proposed \$2.58 average toll, the average savings in time (8.7 minutes) would have to be worth about \$17.80/hour. This is a high value of time for traffic modeling, almost twice the commonly used rate, and about twice the value of time that the NCDOT found in its own stated preference survey. This means that, if local residents value their travel time at less than \$17.80/hour, the traffic estimate for the Bypass is likely to be significantly overstated. Another implication is that Bypass use might be <i>infrequent</i> rather than regular, for trips when time is valued highly, but not for most trips.</p>		
13	Forecast	34	<p><b>The DSFEIS downplays the effectiveness of prior and planned actions</b></p>	<p>See response to <b>Comment #32</b> in this table. While superstreet (or similar) type improvements may improve travel speed on U.S. 74 in the short-term, the 2012 NCDOT Superstreet Analysis Results</p>	<p>This response rests on the assumption that traffic will grow substantially in the future. This analysis is clearly incorrect. Respondent is predicting, based on</p>

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			<p><b>on U.S. 74.</b></p> <p>The DSFEIS notes that some improvements to U.S. 74 have been implemented. But these improvements have not been incorporated into the 2035 traffic forecasts, which were created in 2007 and have not been updated in the DSFEIS. In fact these improvements post-date the 2035 forecasts — occurring mostly between 2010 and the present — and so have of course not been included.</p> <p>Additionally, the 2035 forecasts do not factor in additional improvements such as the four Superstreets that are now planned in the next couple of years. It is likely that the improvements made so far helped to improve</p>	<p>(Reese, November 5, 2012) demonstrates that the planned superstreet improvements for a five intersection segment of U.S. 74 near Indian Trail (which represents two miles of the 20-mile corridor) may only provide travel speeds in this vicinity in the range of 25-35 mph, using 2007 traffic volume data, far below 45 mph posted speeds. The NCDOT analysis also states the need for additional corridor improvements (six-lane widening) to preserve mobility in this area – with no assumption that the Bypass will be built. This memo is included in Appendix C and referenced in Appendix A on Slides 2 thru 5 with an intersection study area map and level of service reference table.</p>	<p>traffic forecasts shown to be incorrect, that implementing targeted spot improvements will decrease travel speeds in the corridor.</p> <p>The 2007 analysis has been shown to be significantly outdated, and should not be used to justify any new conclusions. As the Respondent admits, traffic on U.S. 74 has been FLAT since 2007 to 2013: <i>“Over the five year period from 2007 to 2012, average volumes along the U.S. 74 corridor cumulatively grew approximately zero percent, based on available AADT data. Based on historical AADT growth trends, it is reasonable to conclude that an updated base year forecast (i.e. 2013) would generally be equal to the 2007 No-Build Forecast”</i> (revised traffic forecast memo, p. 6, 5/1/14).</p> <p>Actually, the traffic on U.S. 74 has been flat since 2000. Only by arbitrarily using data going back to 1990 can the Respondent show an increasing traffic trend. These earlier trends are from a different growth and economic era.</p> <p>If the spot signal improvements in</p>

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			<p>the current operating speeds in the 44- mph range, given that traffic volumes have not increased and INRIX speeds show an increase over time. Additional future improvements (e.g. partial Superstreet treatment, shutting off some access, better signal timing, or even upgrading more of U.S. 74 to freeway status) might also be equally effective. But at the very least, the planned improvements should be coded into the regional network and used as the basis for all forecasts.</p>		<p>the corridor are not the cause of the on-the-ground 10-15 mph increase in speeds between 2007-08 and 2013, then <i>what is the cause?</i> This analysis must be revisited.</p>
13	Operations	35	<p><b>An inappropriate traffic forecast was used for the operations simulation model.</b></p> <p>Instead of using just one traffic forecast predicted to use U.S. 74 in the local simulation model</p>	<p>As discussed in Section 1.8.2 of the <i>Draft EIS</i>, travel times along the existing U.S. 74 corridor were estimated using a computer model (SimTraffic). INRIX data was not available at the time of the <i>Draft EIS</i>, nor is data for 2007 currently available from INRIX. However, the EIS analysis is no longer relying on a traffic simulation</p>	<p>I am pleased to see now that the traffic simulation model has been discarded in favor of the INRIX data. I did not believe its calibration anyhow.</p> <p>I remain concerned, however, that much of the analysis of alternatives was based on the SimTraffic model</p>

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			<p>(SIMTraffic, which estimates future driving speeds based on a forecast of traffic), the consultant should have also tested the operation of U.S. 74 with lower more-realistic future traffic volumes, as discussed below.</p>	<p>computer model to predict speeds on existing U.S. 74, as INRIX data is available to provide an estimate of real-time speeds.</p> <p>As described in Section 1.2.4 of the <i>Draft Supplemental Final EIS</i>, NCDOT collected travel time information to update travel performance along the existing corridor. Based on this data, which is from actual travel speeds as reported by INRIX, average travel speeds along the U.S. 74 corridor are still below 50 mph, Updated travel speed information for all of 2013 is included in Section 1.1.1 and Appendix E of the <i>Final Supplemental Final EIS</i> and continues to show that current average travel speeds along the U.S. 74 corridor are below 50 mph, even with the improvements made to the existing U.S. 74 corridor.</p> <p>See also response to <b>Comment #30</b> in this table.</p>	<p>and that analysis has not been revisited.</p> <p>Corridor-wide <i>average</i> operating travel speeds are still below 50 mph, but they have been substantially improved in the corridor since 2007-08 through relatively minor actions and are near or above 50 mph for some sections. I remain convinced that persistent focus on spot improvements on existing U.S. 74, in conjunction with the treatments mentioned above, will continue to yield additional speed improvements in the future, at a substantially lower cost than the over \$800 million Bypass. I am concerned that NCDOT has failed to analyze these alternatives with the updated data.</p>
13-14	Forecast	36	<p><b>Inconsistent traffic forecasts for U.S. 74 WEST of the project.</b></p> <p>The DSFEIS asserts that “<i>Year 2035 traffic volumes on U.S. 74 west of I-485 are projected to be lower with the proposed project than</i></p>	<p>We do not agree with the commenter’s suggested difference of 7 percent between 2035 No-Build and Build scenarios forecast volumes west of I-485. The difference is forecasted to be less than 2 percent west of I-485; <math>((98,000-96,100)/98,000) = 2\%</math>, which would be within the tolerance range of the model</p>	<p>Travel demand models are deterministic, that is they show the same results for each run of the model, given a specific set of assumptions. Therefore, the suggested “error” of 2% is nonsensical, regardless of its value. This is not a “tolerance range” difference but a deterministic</p>

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			<p><i>under the No-Build alternative.”</i> The difference is about 7% lower, quite a large amount. This finding is inconsistent with traffic modeling theory which predicts that improvements in travel time caused by new roads will also result in INCREASED traffic on major feeder roads leading to the project, such as U.S. 74 just west of I-485.</p> <p>The NCDOT team found a similar inconsistency in reviewing the Wilbur Smith forecasts made in 2008. No explanation is given for this new finding, but it may be due to the hidden assumptions regarding induced land use or trip distribution.</p>	<p>and could be considered equivalent.</p> <p>The commenter also mischaracterizes the interoffice memorandum cited as reference 42 in the commenter's document (<i>Draft Monroe Bypass No-Build Traffic Forecasts Summary</i>, interoffice memo to Spencer Franklin, HNTB, May 6, 2013 [draft finalized November 8, 2013 with no changes]). This memorandum documents the discrepancies found in the No-Build scenario forecasts reported in the <i>Traffic Forecast for TIP Projects R-3329 &amp; R-2559 Monroe Connector/Bypass</i> (Wilbur Smith Associates, September 2008) that led to the corrected No-Build scenario forecasts documented in <i>NCDOT STIP Project R-3329 &amp; R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum</i> (HNTB, March 2010). The memorandum cited in reference 42 does not specifically discuss traffic volumes west of I-485.</p> <p>The fact that the No-Build scenario forecasts prepared by Wilbur Smith Associates were corrected in a later document prepared by HNTB is not a new finding. The correction is explained in <i>Final EIS Appendix A – Errata</i>. A related correction to the <i>Final Air Quality</i></p>	<p>inconsistency in the model. The real issue — why the volume on U.S. 74 West of the project is lower under a “build” forecast, than a “no-build” forecast — is avoided by the Respondent. I believe that this difference is indicative of possible coding or distribution problems in the model itself.</p> <p>Once again, the presence of such inconsistencies in the earlier forecasts by WSA suggests problems with the modeling. The Respondent's response does not explain the inconsistency in the current traffic estimates for U.S. 74 WEST of the project.</p> <p>I stand by my concerns.</p>

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				<p><i>Technical Memorandum</i> (PBS&amp;J, 2009) is explained in <i>Draft Supplemental Final EIS</i> Appendix F – Errata, which did not change the discussion or conclusions presented in the <i>Final Air Quality Technical Memorandum</i>.</p>	
14-16	Growth	37	<p><b>Traffic growth on U.S. 74 has been flat from 2000 to 2012, and is inconsistent with population growth.</b>  Two central issues regarding the need for the Bypass is whether the traffic on U.S.74 has been growing historically, and is likely to continue to grow in the future.  Careful review of the statistics for growth and traffic in the corridor suggest that neither is the case.  <b>The DSFEIS reports incorrect population growth statistics for Union County and selectively reports</b></p>	<p>The commenter argues that the <i>Draft Supplemental Final EIS</i> incorrectly reports population growth statistics and selectively reports growth rates for Union County. The commenter suggests that the <i>Draft Supplemental Final EIS</i> (pp.1-2 and 4-1) incorrectly states the growth rates for all of Union County versus the growth rates for the study area (Demographic Study Area). However, a review of the <i>Draft Supplemental Final EIS</i> (pp. 1-4 and 4-1) shows that all growth statistics and references are accurately (sic?). The commenter then proceeds to argue that the majority of growth in Union County has occurred outside the study corridor, in the southwest quadrant of the county, and that this growth spurt is largely attributable to the one-time growth spurt of jobs in the Ballantyne area of Mecklenburg County. The commenter cites the growth rates for Union County, the Union County portion of the DSA, the Mecklenburg County</p>	

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			<p><b>Union County growth rates.</b> The DSFEIS asserts that Union County is the fastest growing county in the state: 49% from 2000 to 2010, or 4.9%/year. This is factually incorrect. The growth rate for Union County for 2000-2010 was 62.8%, but the growth rate for the <i>study area</i> was 49.3%.<sup>45</sup> Further, Union County is no longer the fastest growing North Carolina county: As noted above, at least 10 other NC counties have registered more rapid growth from 2010 to 2012, while the Union County's growth rate has fallen sharply, to just 1.7%/year. It is not uncommon for counties near larger metropolitan areas to experience high "surges" of growth as the</p>	<p>portion of the DSA, the entire DSA and the portions of Union County outside the DSA. His conclusion is that the non-DSA portions of Union County have grown twice as fast as the entire DSA (87.9% versus 49.3%, table pg. 15) and that this growth is concentrated in the southwest corner of Union County, cited in the figure on page 16.</p> <p>First, the commenter erroneously calculates the DSA-Union County part of the population for 2000 and the Union County NON-DSA part in his table and this leads to errors in comparing the growth rates. Correct values for all are shown in the table below, which mimics the table on page 15 of the commenter's document.</p> <p style="text-align: center;"><small>Table 2: Comparison of Population Growth (2000 to 2010) and Size of DSA and Union County</small></p> <table border="1" data-bbox="951 995 1507 1089"> <thead> <tr> <th>Geographic area</th> <th>Area in Sq Miles</th> <th>% of Total Area</th> <th>2000 Population</th> <th>2010 Population</th> <th>% of Population Growth Captured 2000 to 2010</th> </tr> </thead> <tbody> <tr> <td>Union County</td> <td>699.3</td> <td>100%</td> <td>123,677</td> <td>201,292</td> <td>-</td> </tr> <tr> <td>DSA-Union Co. part</td> <td>176.6</td> <td>26%</td> <td>66,376</td> <td>102,357</td> <td>46%</td> </tr> <tr> <td>Union NON-DSA part</td> <td>482.7</td> <td>72%</td> <td>57,301</td> <td>98,935</td> <td>54%</td> </tr> <tr> <td>Ratio of NON-DSA to DSA part</td> <td>2.62</td> <td>2.62</td> <td>0.86</td> <td>0.97</td> <td>1.17</td> </tr> </tbody> </table> <p><small>Source: DSFEIS, Appendix D, Census Tables</small></p> <p>Source: DSFEIS, Appendix D, Census Tables</p> <p>The main error is overestimating the Union NON-DSA part growth from 2000 to 2010. Instead of being 87.9 percent as the commenter calculates, it is actually 73.3 percent.</p>	Geographic area	Area in Sq Miles	% of Total Area	2000 Population	2010 Population	% of Population Growth Captured 2000 to 2010	Union County	699.3	100%	123,677	201,292	-	DSA-Union Co. part	176.6	26%	66,376	102,357	46%	Union NON-DSA part	482.7	72%	57,301	98,935	54%	Ratio of NON-DSA to DSA part	2.62	2.62	0.86	0.97	1.17	<p>The Respondent fails to note this error in the original DSFEIS, but shows (below) the correct value, 62.8%.</p> <p>I thank the Respondent for providing the corrected table. The Union County non-DSA population growth rate between 2000 and 2010 is 73.3%.</p>
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			<p>metropolitan county growth spreads out, then to decline in growth rate as growth moves elsewhere.</p> <p>The DSFEIS notes that <i>“According to the CRTPO [Charlotte area] 2035 Long-range Transportation Plan, the southern and eastern portions of Mecklenburg County, which is the area along the Union County line, is expected to be one of the most rapidly growing areas in the region.”</i> But the DSFEIS fails to mention that almost half of Union County’s growth has been in the <i>southwestern</i> edge of the county, <i>substantially south of U.S. 74 and mostly outside</i> of the Bypass corridor. The following table</p>	<p>Furthermore, in his report, the commenter compares this growth rate to the overall DSA growth rate, instead of comparing it to the DSA-Union County part, which would be a fairer comparison of how growth has been spread across Union County. Comparing growth within the DSA in Union County to growth outside the DSA in Union County shows that those areas outside the DSA have growth faster (73.3% versus 53.7%) but not exceptionally so. Additionally, the raw growth in population outside the DSA portion of Union County has outpaced the portion within the DSA by only 6,000 people from 2000 to 2010.</p> <p>Furthermore, the commenter fails to consider the different sizes of these areas. A more reasonable comparison of growth rates and change would have considered the widely variable differences in size of these two areas. The portion of Union County within the DSA is about 176 square miles (28 percent of the entire county) while the portion outside is 463 square miles (72 percent of the entire county). What is remarkable is that this relatively small part of the county within the DSA has captured 46 percent of the</p>	<p>The Study Area is the geography used throughout the DSFEIS, so I use it in this explanation. If the Respondent thinks another geography is more appropriate here, then the document should be re-written to reflect that.</p>

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			<p>demonstrates this growth pattern, using the DSFEIS data from Appendix D (Updated Census Tables).</p> <p style="text-align: center;">Population Growth, 2006-2010, Union County and Study Area<sup>49</sup></p> <table border="1" data-bbox="600 500 936 686"> <thead> <tr> <th>Geographic area</th> <th>2000 Population</th> <th>2010 Population</th> <th>Difference</th> <th>Percent Change from 2000-10</th> </tr> </thead> <tbody> <tr> <td>Union County</td> <td>123,677</td> <td>201,292</td> <td>77,615</td> <td>62.8</td> </tr> <tr> <td>DSA-Union Co. part</td> <td>66,603</td> <td>102,357</td> <td>35,745</td> <td>53.7</td> </tr> <tr> <td>DSA-Mecklenburg Co part</td> <td>13,867</td> <td>17,746</td> <td>3,879</td> <td>28.0</td> </tr> <tr> <td>Total DSA</td> <td>80,470</td> <td>120,103</td> <td>39,633</td> <td>49.3</td> </tr> <tr> <td>Union NON DSA part</td> <td>43,207</td> <td>81,189</td> <td>37,982</td> <td>87.9</td> </tr> </tbody> </table> <p>The table shows that the <i>portion of Union County outside the DSA actually grew at almost twice the growth rate of the study area, almost 90% in just 10 years.</i> The following figure (from the DSFEIS) shows the present Union County road system and the proposed future land use. Note that the <i>growth in the southwest corner, between Indian Trail and Marvin, is on the</i></p>	Geographic area	2000 Population	2010 Population	Difference	Percent Change from 2000-10	Union County	123,677	201,292	77,615	62.8	DSA-Union Co. part	66,603	102,357	35,745	53.7	DSA-Mecklenburg Co part	13,867	17,746	3,879	28.0	Total DSA	80,470	120,103	39,633	49.3	Union NON DSA part	43,207	81,189	37,982	87.9	<p>growth from 2000 to 2010 or nearly twice the amount one might expect based on its area relative to the rest of the county. As noted in the table below, despite being 2.6 times bigger, the NON-DSA portion of Union County only captured 17 percent more population growth from 2000 to 2010 compared to the portion of Union County within the DSA.</p> <p style="text-align: center;">Table 2: Comparison of Population Growth (2000 to 2010) and Size of DSA and Union County</p> <table border="1" data-bbox="961 613 1499 703"> <thead> <tr> <th>Geographic area</th> <th>Area in Sq Miles</th> <th>% of Total Area</th> <th>2000 Population</th> <th>2010 Population</th> <th>% of Population Growth Captured 2000 to 2010</th> </tr> </thead> <tbody> <tr> <td>Union County</td> <td>639.3</td> <td>100%</td> <td>123,677</td> <td>201,292</td> <td>-</td> </tr> <tr> <td>DSA-Union Co. part</td> <td>176.6</td> <td>28%</td> <td>66,576</td> <td>102,357</td> <td>46%</td> </tr> <tr> <td>Union NON-DSA part</td> <td>462.7</td> <td>72%</td> <td>57,101</td> <td>98,935</td> <td>54%</td> </tr> <tr> <td>Ratio of NON-DSA to DSA part</td> <td>2.62</td> <td>2.62</td> <td>0.86</td> <td>0.97</td> <td>1.17</td> </tr> </tbody> </table> <p><small>Source: DSFEIS, Appendix D, Census Tables</small></p>	Geographic area	Area in Sq Miles	% of Total Area	2000 Population	2010 Population	% of Population Growth Captured 2000 to 2010	Union County	639.3	100%	123,677	201,292	-	DSA-Union Co. part	176.6	28%	66,576	102,357	46%	Union NON-DSA part	462.7	72%	57,101	98,935	54%	Ratio of NON-DSA to DSA part	2.62	2.62	0.86	0.97	1.17	<p>While a “density” analysis might be used for discussion, it was not in the DSFEIS.</p> <p>By omission, the Respondent seems to agree with our main points that:</p> <ol style="list-style-type: none"> <li>1. The NON-DSA portion of Union County is growing faster than the DSA portion;</li> <li>2. The 2000-10 <i>population</i> growth of the Study Area (49.3%) is <b>HIGHLY INCONSISTENT</b> with the <i>flat</i> growth of the <i>traffic</i> on U.S. 74; and</li> <li>3. The primary location of Union County growth is <i>south</i> of U.S. 74, and <i>outside</i> the Study area, and would not use the Bypass.</li> </ol>
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			<p><i>south side of U.S. 74, and is mostly OUTSIDE the Bypass study area.</i></p> <p>Most of this growth took place in the area south of Ballantyne (in Mecklenburg County) over 10 miles from the proposed Bypass on the south side of U.S. 74, and therefore would not be able to even use the Bypass. Essentially the DSFEIS' own data shows that recent growth has been most rapid in areas NOT served by the proposed Bypass.</p> <p>Therefore the rapid growth rate of Union County between 2000 and 2010, even if reported correctly, is irrelevant for evaluating the need for the project.</p>		
			<p><b>Union County out-of-county commuting</b></p>	<p>The commenter cites the change in the percent of commuters who travel outside</p>	

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16	Communting	38	<p><b>shares are declining, not increasing.</b>  The DSFEIS states that in 2006 about 61% of Union County workers commuted outside of the County, but that in a more recent census survey (2006-09), 50% of workers commuted outside. Such wild swings in such a short time question the data's validity, but even if true it shows <i>declining dependence, not increasing dependence, of Union County on adjacent-county jobs.</i></p>	<p>the County for work (61% in 2006 to 50% in 2009) as an indication that Union County residents are becoming less dependent on jobs outside the county and therefore there will be less demand to drive to Mecklenburg County and that would reduce the need for any improvements to U.S. 74 or adjacent corridors. As the commenter himself notes, such wild swings in these data suggest it is unreliable to compare longitudinally for these data. A deeper look suggests that this substantial difference is attributable to the different data sources used for each data point. The data point cited in the <i>Draft EIS</i> and <i>Final EIS</i> showing that 61 percent of Union County commuters traveled outside Union County was derived from the Employment Security Commission of North Carolina and relied on data supplied via the Census Bureau Local Employment Dynamics which builds upon state and federal reporting for unemployment insurance, the Quarterly Census of Employment and Wages, Business Dynamics Statistics reports and other federal and state database systems to create a comprehensive assessment of</p>	<p>Here, the Respondent shows that the key out-of-county commuting share, which would use the Bypass and the present U.S. 74 to Mecklenburg County, has actually declined between 2006 and 2011.</p>

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				<p>local labor market conditions.</p> <p>The data point cited in the <i>Draft Supplemental Final EIS</i> showing that 50 percent of Union County commuters traveled outside Union County was derived from the Census Bureau's American Community Survey 3-Year Estimate for 2006-2009 and the ACS relies on broad surveys of the general population. Since these data were collected in entirely different methods, they are not comparable.</p> <p>A more reasonable comparison would be to look at longitudinal data from both sources. Based on the Employment Security Commission of North Carolina Workforce In-Depth web tool (<a href="http://esesc23.esc.state.nc.us/WorkForceInDepth/">http://esesc23.esc.state.nc.us/WorkForceInDepth/</a>), of the 83,179 workers in Union County, 57,875 (70%) commuted out of the county to reach their jobs in 2011. This is an increase from the 61 percent (45,916 out of 75,325) reported in the 2006 report. Of those commuting outside the county, 37,836 (65%) commuted to Mecklenburg County. This is a slight decline from the 68 percent (31,211 of 45,916) noted in the 2006 report.</p>	<p>Here the Respondent shows that the key out-of-county commuting share, which would use the Bypass and the present U.S. 74 to Mecklenburg County, has actually <i>declined</i> between 2006 and 2011.</p>

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				<p>The 2005 to 2007 ACS 3-Year Estimate of Workers by Place of Work (Table B08007) indicates that of the 82,960 workers in Union County, 41,632 (50%) worked outside the county. The 2010 to 2012 ACS 3-Year Estimate of Workers by Place of Work (Table B08007) indicates that of the 91,002 workers in Union County, 46,924 (52%) worked outside the county. Thus in both instances, the data show that the percentage of workers living in Union County but commuting outside the county for work is increasing. While the estimates of that increase diverge based on the data source, both show an upward trend. It is understandable that the commenter would reach his conclusion based on the data cited in the <i>Draft Supplemental Final EIS</i>, but as detailed above, out-of- county commuting shares are actually increasing.</p>	
16-17	Commuting	39	<p><b>The DSFEIS selectively reports trends in commuting time.</b></p> <p>The DSFEIS states that commute times for Union County residents average 27.8 minutes, the highest of the region's counties, implying that the Bypass would somehow</p>	<p>The commenter notes that changes in commute times cited in Appendix B to the <i>Indirect and Cumulative Effects Quantitative Analysis Update</i> (Michael Baker Engineering, Inc., November 2013) are evidence that commute times are improving and that therefore there may not be a need for the project. However, the commenter fails to note the specific caveat that is cited in Appendix B for the comparisons of 2000 to 2010 commute times. As it specifically</p>	

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			<p>reduce them. The DSFEIS does NOT mention, however, that <i>commute times are improving, not worsening, for all counties in the region, and that from 2000 to 2010 Union county's average commute time fell from 29.0 minutes to 27.8 minutes, the largest drop of the region's counties. Union County commute times are improving, not worsening, and within county employment is increasing, decreasing the share of long-distance commuting.</i></p>	<p>says on page 16 of that Appendix:  <i>The raw differences [in the reported commute times] may be misleading due to changes in survey methods the Census has instituted from 2000 to 2010, specifically, the Census changed its methods in gathering data on this question. In Census 2000, questions regarding commute lengths and modes were included on the "long form", which 1 in 6 household received. For the 2010 Census, no "long form" was used and instead the American Community Survey has replaced it. The American Community Survey reaches fewer households but surveys annually. Since the survey methodology is different, direct comparisons are less revealing.</i></p> <p>Furthermore, the commute time data was specifically reviewed in the context of the overall growth trends for the county and the region and the conclusions of the analysis were that Union County had some of the highest average commute times and has continued to grow despite these conditions for several years. Therefore, the conclusion was that increasing commute times were not a major constraint on future growth.</p> <p>Lastly, while the raw drop in the minutes of commute time was the largest among</p>	<p>These differences in procedure are well known, but they do not obviate the fact that most counties in the Charlotte MRM are reporting declining commuting times and that Union County has reported the largest drop.</p> <p>This drop is still quite significant.</p>

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				<p>the counties in the region, it is still only a 4% drop and as noted in Response 15 above, the commenter's conclusions regarding in-county employment and cross-county commute trends is inaccurate.</p>	<p>The 2010 Census showed that for the first time many regions were actually reporting a DECLINING average commute time. This observation has generated considerable discussion in the professional literature. While the drop is relatively small, its presence in rapidly growing Union County is cause for considerable speculation about regional growth patterns.</p>

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17-18	Traffic Growth	40	<p><b>Recent traffic growth on U.S. 74 has been flat.</b></p> <p>In spite of Union County's now-slowing population growth since 2000, <i>traffic on U.S. 74 has not increased substantially since 2000.</i> The following table shows the NCDOT traffic counts for various sections of U.S. 74, and the DSFEIS forecast volumes.</p> <table border="1" data-bbox="590 837 940 1040"> <caption>Average Daily Traffic on U.S. 74 Parallel to the Proposed Monroe Bypass</caption> <thead> <tr> <th rowspan="2">Count Location</th> <th colspan="4">Historical</th> <th rowspan="2">12-year Annual Percent Change</th> <th colspan="3">DSFEIS Forecast</th> </tr> <tr> <th>2000</th> <th>2005</th> <th>2010</th> <th>2012</th> <th>Raw Model 2010 No Build</th> <th>Raw Model 2015 No Build*</th> <th>Estimated Volume 2015</th> </tr> </thead> <tbody> <tr> <td>Meck-Union Line</td> <td>50000</td> <td>50000</td> <td>48000</td> <td>37000</td> <td>0.15</td> <td>30500</td> <td>101600</td> <td>89000</td> </tr> <tr> <td>W of Monroe</td> <td>49000</td> <td>48000</td> <td>46000</td> <td>35000</td> <td>0.35</td> <td>49000</td> <td>95200</td> <td>65000</td> </tr> <tr> <td>East of Monroe</td> <td>26000</td> <td>27000</td> <td>24000</td> <td>23000</td> <td>0.82</td> <td>32200</td> <td>41500</td> <td>60000</td> </tr> <tr> <td>W of Marshville</td> <td>20000</td> <td>21000</td> <td>17000</td> <td>18000</td> <td>-0.4</td> <td>23500</td> <td>21000</td> <td>31000</td> </tr> <tr> <td>Assess-Union Line</td> <td>12000</td> <td>12000</td> <td>14000</td> <td>13000</td> <td>-1.1</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p><small>*Source: NCDOT, Traffic Count Maps, and DSFEIS, Traffic Forecast Summary, November 8, 2011, Appendix G.</small></p> <p>At the Mecklenburg-Union line, just west of the project end, the traffic has grown just 0.15%/year (1.8% in 12 years), and has actually declined since 2005. Near Monroe, growth has been modest, about</p>	Count Location	Historical				12-year Annual Percent Change	DSFEIS Forecast			2000	2005	2010	2012	Raw Model 2010 No Build	Raw Model 2015 No Build*	Estimated Volume 2015	Meck-Union Line	50000	50000	48000	37000	0.15	30500	101600	89000	W of Monroe	49000	48000	46000	35000	0.35	49000	95200	65000	East of Monroe	26000	27000	24000	23000	0.82	32200	41500	60000	W of Marshville	20000	21000	17000	18000	-0.4	23500	21000	31000	Assess-Union Line	12000	12000	14000	13000	-1.1	-	-	-	<p>From 2000 to 2012, U.S. 74 traffic growth has not increased substantially. The project level traffic No-Build and Build forecasts were completed in 2008 and incorporated the most current available annual average daily traffic volumes (AADT's) from 2005 and 2006 and collected field counts in 2007. These forecasts accounted for half of the 12-year period in question. The commenter fails to note this in his assessment. In either case, project level forecasts consider a longer time horizon than just 12 years and inherently account for both upturns and downturns in traffic growth by projecting out 20 to 30 years into the future using approved population and socio-economic estimates. These estimates directly relate to model raw output volumes and future growth rates used as a basis in forecasting future traffic demand on a given transportation facility.</p> <p>Specific to the commenter's table, he incorrectly compares raw model volumes to estimated (forecasted) volumes at the "East of Monroe", to show an inflated growth rate of 5.4% and uses this high-end growth rate to further substantiate his claim that "the implied percent changes</p>	<p>I thank the Respondent for now moving this finding to the central part of the EIS. Noting the quote from above:</p> <p><i>"Over the five year period from 2007 to 2012, average volumes along the U.S. 74 corridor cumulatively grew approximately zero percent, based on available AADT data. Based on historical AADT growth trends, it is reasonable to conclude that an updated base year forecast (i.e. 2013) would generally be equal to the 2007 No-Build Forecast"</i> (revised traffic forecast memo, p. 6, 5/1/14).</p> <p>In spite of this admission, and the obvious inconsistency between the traffic growth numbers and the Census growth numbers, the Respondent has not updated its traffic forecasts made in 2007-08. Worse, NCDOT continues to baselessly assert that traffic growth will now "turn around" and jump substantially by 2035: <i>"2012 NCDOT AADT volumes range from 23,000 to 57,000 and are projected to increase to a new range from 31,600 to 89,100 based on 2035 No-Build forecast volumes"</i>.(Traffic Forecasting Memo, 5/1/14, <b>Table 1, F</b>).</p>
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			<p>0.4%/year. At the eastern edge of the project, traffic volumes are much lower and have <i>declined</i> not increased, since 2000. The DSFEIS notes that its own analysis of traffic counts from 2007 to 2012 also showed “zero change,” but then the DSFEIS simply ignores this data and asserts that “<i>Based on 2008 and 2035 No-Build traffic forecasts, (HNTB, March 2010), average volumes along the U.S. 74 corridor are projected to increase approximately 34 percent.</i>” So the whole need for the project simply ignores the last 12 years of history regarding traffic trends on U.S. 74.</p>	<p>from current volumes range from 1.3 to 5.4% per year are 5-10 times faster than the recent 12-year history.” In his table, for the location “East of Monroe” where 2030 and 2035 raw model volumes are 32,200 and 41,500, respectively, he uses a forecast volume 60,600 (ID#25 from p. G-23) that is not aligned with the 2012 traffic volumes for the 2030 and 2035 raw model volumes (ID# 26 G-23). However, had the commenter used the corresponding forecast volume of 39,700 (pp. G- 22 and G-23), a 2.0% annual growth rate would have been determined at this count location instead of 5.4%. See Table 4B below, Tables 2 and 5 of the <i>Draft Supplemental Final EIS</i>, and the <i>Traffic Forecast Summary</i> (HNTB, November, 2013, superseded by May, 2014) Appendix G. Tables 4A and 4B show U.S. 74 historical growth rates and future growth rate trends for multiple locations and time periods (4-year, 10, 12, 20, 25 and 32). Overall, the historical data shows trends of longer-term sustained U.S. 74 corridor growth rates that reasonably coincide with raw model volume growth rates “necessary” to reach forecasted No-Build volumes. In some</p>	<p>The Respondent has had ample opportunity to incorporate this major trend into its traffic forecasts. Being that the Respondent now feels the need to go back to the 1980s to justify its belief in a continuing upward trend in traffic, when even its own recent counts show ZERO growth over the past decade, stretches credibility.</p>

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				<p>cases, the growth rates are higher and some lower, but the overall trends are increasing at reasonably foreseeable rates consistent with a holistic view of historical growth trends and planned population and socio-economic projections. Based on a 20-year period, all five locations on U.S. 74 have increased in the range of 0.6% to 3.4% annually, with 3.4% at the Mecklenburg-Union line. Based on a more recent 4-year period, U.S. 74 at the Mecklenburg-Union line is growing 1.4% annually. Tables 3A and 3B illustrates that a 34 percent increase on U.S. 74 corridor volumes (1.5% annually) from 2012 to 2035 is very realistic and is already occurring along the corridor as previously noted.</p> <p style="text-align: center;">Table 3A: US 74 Growth Rates</p> <table border="1" data-bbox="955 987 1501 1117"> <caption>Average Daily Traffic on U.S. 74 Parallel to the Proposed Monroe Bypass</caption> <thead> <tr> <th rowspan="2">AADT Station #</th> <th rowspan="2">Count Location</th> <th colspan="6">Historical</th> <th colspan="2">1980-2005</th> <th colspan="2">1980-2012</th> <th colspan="2">2000-2012</th> <th colspan="2">2000-2012</th> </tr> <tr> <th>1980</th> <th>1992/1995</th> <th>2000</th> <th>2002</th> <th>2005</th> <th>2008</th> <th>2010</th> <th>2012</th> <th>25-year Annual % Change</th> <th>12-year Annual % Change</th> <th>20-year Annual % Change</th> <th>12-year Annual % Change</th> <th>10-year Annual % Change</th> <th>4-year Annual % Change</th> </tr> </thead> <tbody> 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This is where the Bypass would end. Even if the recent growth rate for the Mecklenburg-Union line is assumed to be correct, this argues even further for selective LOCAL treatments along the existing U.S. 74 corridor, rather than a huge bypass that seems to have little demand east of Monroe.</p>
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000281	NW of Monroe	n/a	33,000*	48,000	51,000	48,000	44,000	46,000	50,000	-	-	2.3%	0.3%	-0.2%	1.4%																																																																																																																																																																																																																								
000296	East of Monroe	n/a	33,000*	29,000	29,000	30,000	32,000	27,000	-	-	0.9%	0.0%	-0.2%	0.0%	-																																																																																																																																																																																																																								
000279	W of Marshella	n/a	17,000*	20,000	22,000	21,000	19,000	17,000	-	-	0.6%	-0.4%	-1.4%	0.0%	-																																																																																																																																																																																																																								
000039	Anson-Union Line	n/a	11,000*	15,000	15,000	14,000	14,000	13,000	-	-	1.0%	-1.1%	-1.9%	-1.8%	-																																																																																																																																																																																																																								
AADT Station #	Count Location	Historical						GSEEN Forecast			MIMMSvc, D			% Change, (From 2012) AADT to 2015 M0 Forecast by 2015	% Change, (From 2012) AADT to 2015 M0 Forecast by 2040																																																																																																																																																																																																																								
		1980	1992/1995	2000	2002	2005	2008	2010	2012	Raw Model 2030	Raw Model 2035	Estimated Volume 2035	Raw Model 2030			Raw Model 2035	30-year Annual % Change																																																																																																																																																																																																																						
000119	Meck-Union Line	22,400	34,000	56,000	57,000	58,000	54,000	54,000	57,000	70,300	101,600	89,100	43,200	70,300	2.1%	2.4%	2.0%																																																																																																																																																																																																																						
000281	NW of Monroe	n/a	33,000*	48,000	51,000	48,000	46,000	50,000	40,000	66,200	85,000	34,174	39,965	0.6%	1.3%	1.1%																																																																																																																																																																																																																							
000296	East of Monroe	n/a	33,000*	29,000	29,000	30,000	32,000	27,000	32,200	43,300	39,700	21,038	21,150	1.9%	2.0%	1.7%																																																																																																																																																																																																																							
000279	W of Marshella	n/a	17,000*	20,000	22,000	21,000	19,000	17,000	19,000	31,000	31,400	15,311	15,400	3.3%	3.9%	2.4%																																																																																																																																																																																																																							
000039	Anson-Union Line	n/a	11,000*	15,000	15,000	14,000	14,000	13,000	-	-	n/a	n/a	-	-	-	-																																																																																																																																																																																																																							

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				<p>along U.S. 74 compared to higher population growth trends as evidence that traffic may not grow as quickly as expected in the future. The commenter looks only at the AADT growth from NCDOT Traffic Count Maps for U.S. 74 (from Anson County to Mecklenburg County). While growth in traffic on U.S. 74 has been relatively flat by strictly comparing the past 10-year or 12-year period, the commenter fails to consider the effect that congestion on U.S. 74 has had on shifting traffic growth to parallel corridors and sustained, positive growth rates comparing shorter and longer-term time periods.</p> <p>Table 4, below, shows the AADT trends for the major corridors between Union and Mecklenburg Counties for a 4-year (2008-2012), 10-year (2002-2012) and 20-year period (1993-2012). This shows that traffic growth has increased along all these routes between the counties and that the total AADT between the counties has increased 17% (1.7% annually) to 81% (3.2% annually) over 10 and 20-year periods, respectively. Figure 2 in the memo gives a visual representation of that growth and shows that the growth in AADT has not been limited to just one or two routes in the</p>	<p>As the traffic on U.S. 74 has been flat during the same period, this</p>

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				<p>southwest portion of Union County, but has increased at count locations north of U.S. 74 as well. Overall, the U.S. 74 AADT segment just west of Stallings Road shows growth in the short-term (4- year period 2008-2012) of 1.4% annually and long-term (20-year period) of 2.4% annually. While growth in the medium-term 10-year period at this one location along U.S. 74 has been stagnant, overall growth rates comparing different time periods and paralleling routes show sustained long-term growth. Therefore, while traffic increases have not perfectly matched population increases, they have certainly increased when one compares U.S. 74 AADT at the location the commenter references along with the overall travel between the counties screen lines.</p> <p>It's important to note that traffic forecasts are concerned with demand on a given facility. If that particular facility is at or over capacity, it may not be exhibiting increasing traffic volumes under existing conditions, though in fact, vehicle trips in the area are being diverted from the facility to avoid congestion on it. Table 4 shows the AADT trends for the major corridors</p>	<p>observation supports my view that Union County residents are using other routes, alternative paths and times to do their traveling.</p>

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between Union and Mecklenburg Counties for 2002 to 2012. It shows that traffic growth has increased along all these routes between the counties and that the total AADT between the counties has increased 17% (1.7% annually) over ten years.

If so, then how can the forecasted traffic on U.S. 74 be even higher in the “no-build” scenario?

Table 4: Change in Average Annual Daily Traffic at NCDOT Count Locations near Mecklenburg and Union County Line

ROUTE	Road Name	LOCATION	2002 to 2012			2002 to 2012			AADT														
			AADT	% Change	Growth Rate	AADT	% Change	Growth Rate	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012				
157A	Independence Rd	W of SR 1305	21,000	47.0%	3.8%	0	0.0%	0.0%	17,000	17,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000		
NC 15	Providence Rd	W of SR 1340	16,200	224.7%	10.2%	1,000	21.7%	2.2%	1,000	3.7%	3.7%	20,000	-	-	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	
NC 113	Farmers Rd	W of SR 1330	3,400	122.3%	10.2%	8,700	85.2%	8.2%	800	7.9%	7.9%	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	
SR 1245	Hollings Rd	W of SR 1324	1,200	70.0%	3.9%	800	37.8%	2.9%	400	22.2%	14.1%	1,800	1,800	-	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	
SR 1245	Hollings Rd	W of SR 1309	1,000	41.7%	-2.2%	100	-6.7%	-0.7%	200	18.7%	4.2%	1,400	1,300	1,300	800	800	1,000	1,000	1,000	1,000	1,000	1,000	
SR 1245	Hollings Rd	W of SR 1324	12,700	231.6%	12.8%	1,000	88.7%	3.8%	-2,000	-15.7%	-3.7%	18,000	20,000	20,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	
SR 1245	Hollings Rd	E of SR 1840	3,800	187.7%	9.3%	4,300	10.8%	5.6%	-1,000	-7.9%	-1.9%	12,000	12,000	13,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	
SR 1245	Hollings Rd	W of SR 1324	2,000	14.8%	1.8%	2,000	14.8%	1.8%	1,700	18.5%	1.7%	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	
SR 1245	Hollings Rd	E of SR 1840	2,000	27.8%	4.4%	3,000	37.8%	3.4%	2,500	25.0%	2.7%	8,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	
SR 1245	Hollings Rd	E of SR 1840	60,700	82.1%	4.2%	27,400	37.7%	3.7%	4,000	6.6%	0.7%	153,200	-	148,000	151,400	154,100	156,600	159,000	161,400	163,800	166,200	168,600	
SR 1245	Hollings Rd	E of SR 1840	11,200	60.2%	3.7%	17,000	53.6%	4.0%	1,000	8.9%	0.9%	125,200	124,000	124,000	124,000	124,000	124,000	124,000	124,000	124,000	124,000	124,000	124,000

Source: NCDOT AADT Stations Spreadsheet (http://www.ncdot.gov/transportation/traffic/traffic\_data/traffic\_data.htm)

\* County Line Total volumes and associated calculations include closest available AADTs for those segments where current year AADT is not available.

Table 5 compares 2012 AADT to general capacity ranges reaching LOS F for those facility types. Based on an individual review, all five higher volume facilities (10,000 AADT or greater) are nearing or over general capacity estimates. Overall, all facilities combine for an average daily volume to capacity ratio of 0.83 or 83 percent of capacity. Generally, when a facility reaches 80 to 90 percent V/C, high levels of congestion, delay and reduced speeds are present. Table 5 illustrates a lack of additional available capacity from Mecklenburg/Union County.

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Table 5: HCM 2010 General Facility-Type Daily Capacity Range Estimates

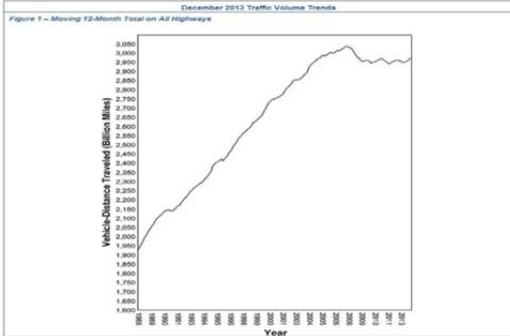
ROUTE	Road Name	2012 ADOT	Daily Capacity Range			Daily Volume to Capacity Range		
			High	Low	Average	High	Low	Average
US 74	Independence Blvd	53,000	37,500	28,000	33,150	1.50	2.01	1.74
NC 16	Providence Rd	28,000	37,000	28,400	33,150	0.74	0.89	0.86
NC 218	Fairview Rd	8,200	15,000	14,000	17,400	0.41	0.55	0.48
SR 1365	Stallings Rd	2,800	15,000	14,000	17,400	0.14	0.19	0.16
SR 1460	Rider Rd	1,400	15,000	14,000	17,400	0.07	0.09	0.08
SR 1501	Silverfield Rd	18,000	15,000	14,000	17,400	0.80	1.21	1.06
SR 1468	Weddington Rd	13,000	15,000	14,000	17,400	0.60	0.81	0.70
SR 1004	Laniers Rd	16,000	15,000	14,000	17,400	0.80	1.07	0.94
SR 1445	Toby Morris Rd	9,300	15,000	14,000	17,400	0.49	0.66	0.58
<b>Total</b>		<b>153,200</b>	<b>225,100</b>	<b>163,100</b>	<b>188,100</b>	<b>0.71</b>	<b>0.95</b>	<b>0.83</b>
<b>Total w/o NC 16</b>		<b>125,200</b>	<b>177,200</b>	<b>132,700</b>	<b>154,950</b>	<b>0.71</b>	<b>0.94</b>	<b>0.83</b>

\*\* - Based on Service Volume Tables - HCM 2010 Page 10-13 and 10-27, assuming ranges of R=0.9 to 0.11 and D=0.55 to 0.60.

Based on this review of U.S. 74 and all major county line facilities across multiple time periods, traffic volumes are growing overall. However, the lack of sustained growth on U.S. 74 in recent years is not surprising due to the lack of available capacity. The higher levels of projected traffic demand forecasted will contribute to future growth along U.S. 74 and other corridors. However, this additional demand may continue to be unserved, further substantiating the need for the Monroe Connector/Bypass project and additional capacity to serve existing and projected demand.

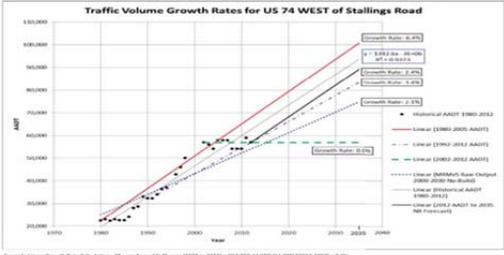
As shown in Figure 1 below, national vehicle miles traveled (VMT) has declined since 2007 and therefore is a national trend and not just specific to the Monroe Connector/Bypass area. However, the figure also shows recent increases in national VMT indicating signs of improvement.

This argument would have weight *if* the traffic forecasts for a no-build test showed a large demand if U.S. 74 were widened. However, the “no-build” forecasts for U.S. 74 traffic show large increases in traffic, even though the road is assumed to not be widened. This apparent inconsistency is noted below and suggests serious problems in the

Hartgen Report Page No.	General Topic	Comment Number	Prof. Hartgen's Original Comment	NCDOT Response	Prof. Hartgen's Reply
				 <p data-bbox="947 618 1478 630">Source: U.S. Department of Transportation, Federal Highway Administration: <a href="http://www.fhwa.dot.gov/odot/information/ncraf_monitoring/13dotc/Report1.cfm">http://www.fhwa.dot.gov/odot/information/ncraf_monitoring/13dotc/Report1.cfm</a></p>	<p data-bbox="1537 217 1923 245">underlying MRM application.</p> <p data-bbox="1537 472 2024 906">The figure actually makes my point that local traffic growth has slowed and suggests the recession or changes in demographics are the cause. The recent 1-year “upturn” at the end of the graph is provides no basis for predicting future upward movement. This issue – “has traffic peaked?” – is now being widely studied in the transportation community, with no consensus so far as to its trend, magnitude, or causes.</p>
18	Traffic Growth	41	<p data-bbox="581 985 905 1433">In Appendix G to the DSFEIS, the data show projected 2035 traffic volumes on U.S. 74 for the “no-build” alternative. The implied percent changes from current volumes range from 1.3 to 5.4% per year are 5-10 times faster than the recent 12-</p>	<p data-bbox="938 985 1486 1230">See response to <b>Comment #39</b> and the commenter’s incorrect calculation and use of growth rates. The 5.4% growth rate is actually 2.0% which substantially changes the commenter’s argument on unexplainable future growth rates.</p> <p data-bbox="938 1247 1486 1409">The commenter also fails to acknowledge that the project level traffic forecasts were completed in 2008 and considered available AADT data thru 2005 and</p>	<p data-bbox="1537 985 2011 1198">See Reply to Comment 39 above. Our main point remains unanswered. The EIS does not justify the remarkable projected turnaround in U.S. 74 traffic, on which the entire need for the Bypass rests.</p> <p data-bbox="1537 1312 2011 1417">Given that 7 years have now passed from when the forecasts were made, ample time has been made to re-</p>

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			<p>year history. Nowhere in the document is it explained how the traffic will grow 34% in 23 years when the past 12 years have shown “zero change” in traffic. One might argue that, yes traffic growth has been flat recently, but as the Recession ends it will accelerate. This argument fails to note that traffic has been flat since 2000, BEFORE the Recession. Failure to justify this highly optimistic “kink” in the traffic forecast and failure to consider recent traffic trends, while knowing that recent evidence indicates a huge change in prior trends, are serious oversights.</p>	<p>collected field counts in 2007. The forecasts did not ignore this period of slowing growth but instead considered it as best as possible. Socio-economic projections indicate that Union County in the project study area will experience growth into the future. The projections show increased demand on major facilities such as U.S. 74 and the proposed Monroe Bypass. Along U.S. 74, 2000 to 2030 No-Build raw model volumes, which are inter-related with socioeconomic projections, project approximately 1 to 2 percent annual growth. Based on known 2012 AADT volumes (with the understanding the forecast was developed in 2007/2008, five years prior), an approximate 1 to 3 percent annual growth is “necessary” to reach estimated 2035 No-Build volumes or 1 to 2 percent annual growth by 2040, five years later. Based on a review of overall growth rates (both historical AADT and projected socio- economic rates), these growth rates seem reasonable and appropriate while accounting for periods of low and high growth. What does not seem reasonable or prudent is the commenter’s implication that a specific</p>	<p>forecast traffic using more recent data reflecting recent trends.</p> <p>It is difficult to reply without being redundant, but the discussion concerning regression lines needs comment. The raw data in Chart 1</p>

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				<p>growth rate (approximately zero percent) over the past 12 years will continue or should be used as the basis when socioeconomic projections and longer-term AADT's show higher future growth rates. See Tables 4A and 4B in response to <b>Comment #40</b> in this table.</p> <p>Chart 1 , plots historical AADT volumes/trend lines and model volume growth rates on U.S. 74 just west of Stallings Road to clearly show the overall trend of higher future traffic volumes and reasonable growth rates. The forecasted design year traffic demand is based on more than four data points at one location during a period containing two economic recessions from 2000 to 2012, one being the Great Recession, which was the most significant economic recession since the 1930's. Chart 1 shows that periods of slow or stagnant growth were also experienced from 1980-1986 and 1989-1992. The long-term growth rates incorporate and account for these periods. The model growth rate (slope) on U.S. 74 at this location is actually less than all long-term projections further substantiating growth rates are not overly optimistic and not accounting for slowdowns in traffic growth. The project-</p>	<p>confirms my point: <b>Beginning about 2000, pre-dating the recession, traffic growth on U.S. 74 (west of Stallings Road) slowed markedly.</b> Other locations are not shown here, for instance east of Monroe, that show <i>declines</i> in traffic. The graph actually consists of two "time regimes," before 2000, and after 2000, which therefore, should have been "regressed" separately. The bottom-line is that recent (2000+) traffic growth all along U.S. 74 has been FLAT or DECLINING.</p>

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				<p>specific forecasts are based on data including, but not limited to, the socioeconomic data and the travel demand model as developed and approved by the MPO for future years, as well as traffic counts and historic travel trends.</p> 	
18	Traffic Growth	42	<p>A serious inconsistency in the table is the magnitude of the traffic forecasts themselves. NCDOT's rated LOS D capacity of 6-lane arterials is about 55,000 ADT, but the forecast for U.S. 74 at the Mecklenburg County line is 89,000 ADT,</p>	<p>The commenter makes an incorrect comparison when he suggests there is a "serious inconsistency" in the magnitude of the traffic forecasts. He supports this incorrect assertion by stating that the planning-level LOS D capacity of a 6-lane arterial is about 55,000 ADT, but that the forecast for U.S. 74 at the Mecklenburg County line is 89,000 ADT, "60% higher than a 6-lane "no-build" could carry." In fact, roadways can carry much more than</p>	<p>I agree with the Respondent that traffic forecasting models can, and sometimes do, assign more traffic to roads than their rated capacities. But the Respondent's response is not convincing. According to the Highway Capacity Manual, observed LOS E volumes are typically only 10-15% higher than LOS D volumes, and LOS F volumes are generally</p>

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			<p>60% higher than a 6-lane "no-build" could carry. Similarly, for the 4-lane section northwest of Monroe, the rated capacity is about 40,500 ADT, but the forecast for the "no build" is 61% higher, 65,000 ADT. As the congestion-decay equations of traffic forecasting models generally limit flow rates to the rated capacity (they spread out the traffic to "fit" within the road system), it is not clear how these "no-build" forecasts for U.S. 74 could be 60% higher than the rated capacities.</p>	<p>a LOS D-level capacity thresholds, as evidenced by the frequent occurrence of worse levels of service of LOS E and LOS F in congested areas.</p> <p>The MRM model includes capacity constraints, as described in the <i>Metrolina Model User's Guide</i> (July 11, 2008). An excerpt from the Guide is included in <b>Appendix A</b> in the slide titled "7. Questions Remain Concerning Details of Traffic Forecasts. (Hartgen)". As noted, in the MRM, "capacities are calculated for Level of Service (LOS) E and are calculated for each of the four time periods in the model. These capacities are used in conjunction with free-flow and loaded speeds in the model to reflect the impacts of congestion on travel times and route choices in the model." Many characteristics are used to estimate capacities and speeds for roadways in the MRM network, including but not limited to: number of lanes, speed limits, functional classification, and intersection control.</p> <p>However, it's important to know that the MRM model does not limit the volumes it assigns to a roadway to the roadway's estimated capacity, as the commenter</p>	<p>lower, not higher, than LOS D volumes. (<i>Highway Capacity Manual, 2010</i>). And the Respondent has already argued that as congestion increases, traffic diverts to avoid it.</p> <p>The 60% higher volumes forecast for U.S. 74 under a no-build' scenario cannot possibly be realistic unless:</p> <ol style="list-style-type: none"> <li>1. The MRM 'no build' forecast assumes a 6-lane widened U.S. 74 or a significant improvement in signal coordination;</li> <li>2. There is not enough capacity in the remainder of the computer network to handle the higher trip numbers; or</li> <li>3. The MRM does not allow shifts of traffic by time of day, thus 'piling' the traffic into an artificially short time-frame (or possibly day-of-week).</li> </ol>

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				<p>incorrectly notes. In layman's terms, the MRM model will assign traffic to a roadway up to its estimated capacity, then it will begin to assign trips to other routes. The capacity value simply triggers the model to consider alternate routes for trips that desire to take the original route. As alternate routes for trips begin to 'fill up', the model will then resume assigning trips to the at-capacity routes, until all travel demand has been assigned. Therefore, in congested urban areas, it is common for roadways in the MRM to have projected volumes greater than the capacity assigned in the model, as in real life, these roadways experience, or will experience, LOS E or LOS F congested conditions.</p>	
18	Traffic Growth	43	<p>Another anomaly in the table is the large differences between the 2035 "raw volume" (model output) forecasts and the estimated 2035 volumes. These differences are quite large, and are 46-50% higher for volumes east of Monroe. Although</p>	<p>The methodology of incorporating raw travel demand outputs into the final traffic forecast estimates is described in the <i>Traffic Forecast for the No-Build Alternatives for NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector/Bypass Study, Martin/Alexiou/Bryson (MAB), June 2008; Technical Memorandum for TIP Projects R-2559 &amp; R-3329 US74 Upgrade Scenario</i>, Wilbur Smith</p>	

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			<p>the DSFEIS cautions about the use of raw volumes directly in forecasting, the process used to estimate the estimated volumes is not adequately described. Differences of this magnitude, particularly at the eastern edge of the project where long-distance travel would be entering the region, and particularly on the high side (favoring the Bypass) need to be fully justified.</p>	<p>Associates (WSA), June 2008; <i>Traffic Forecast for TIP Projects R-3329 &amp; R-2559 Monroe Connector/Bypass</i>, WSA, September 2008; and <i>Monroe Connector/Bypass Traffic Forecast Summary</i>, HNTB, November, 2013, superseded by May, 2014.</p> <p>The difference between raw volume (model output) and forecasted volumes is not an anomaly. The forecast process considers multiple data sources and does not rely solely on raw model assignments. In the No-Build forecast (MAB), see Table 8 AADT location "HHHH" for the volume east of Monroe in question for further explanation of AADT's, field count data, model output, growth rates and selected forecast AADT. For this particular location, the existing 2007 AADT was higher than the 2000 raw model volume and slightly less than the 2030 model volume. <b>In summary, an average final growth rate (considering the model growth rate and historical growth rate) was applied to existing 2007 AADT to forecast future year volumes.</b> Variations between existing field conditions and raw model volumes are not uncommon nor are they expected to match for each facility or</p>	<p>This is the first explanation I have seen of this action. Nowhere in prior documents is this "averaging" step described. Essentially, the DOT says they adjusted the traffic forecast growth rate by simply 'averaging' the overstated population-based traffic growth rate from the MRM with the historical traffic growth rate prior to 2000, which I have already shown to be unrealistic for more recent years.</p>

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				<p>segment along a given facility or comparing different model/field-collected years. See referenced forecasts for additional details.</p>	<p>In essence, the whole traffic forecast is based on:</p> <ol style="list-style-type: none"> <li>1. An unrealistic population growth rate for the corridor based on trending population forecasts from before the Recession;</li> <li>2. An arbitrary rejection of “raw model” volumes in a (presumed) effort to downplay their magnitude;</li> <li>3. Use of pre-2000 traffic growth rates that are much higher than recent traffic volume trends; and</li> <li>4. Exclusion of implemented and likely-to-be implemented traffic improvements in the existing corridor.</li> </ol>
19-20	Traffic Growth	44	<p><b>Inconsistent historical growth data for population and traffic.</b> A fundamental inconsistency in the DSFEIS is the apparent inconsistency between the population growth and the corridor traffic growth. The recent history of population growth in the region is</p>	<p>As discussed previously and in more detail in <b>Comment #s 37 thru 43</b> in this table, population and traffic growth rates have been increasing and continue to increase based on a more thorough review of available data. While these growth rates may not trend at the same rate, they are both growing and should not be described as inconsistent. Specific to U.S. 74 corridor at the Mecklenburg/Union line, the 1980 to 2005 25-year growth rate available for the forecast was 6.4%</p>	<p>This is simply not true. The traffic growth rate is <i>zero</i>, and the population growth rate is <i>slowing</i>, not increasing.</p>

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			<p>shown in the following table:</p> <table border="1" data-bbox="592 305 928 535"> <caption>Population Growth, 2000-2010*</caption> <thead> <tr> <th>Area</th> <th>2000</th> <th>2010</th> <th>Percent Change 2000-10</th> <th>Perce n Chang</th> </tr> </thead> <tbody> <tr> <td>Union County</td> <td>123,677</td> <td>201,292</td> <td>62.8</td> <td>6.</td> </tr> <tr> <td>Mecklenburg County</td> <td>695,454</td> <td>919,628</td> <td>32.2</td> <td>3.</td> </tr> <tr> <td>Project Study Area</td> <td>80,470</td> <td>120,103</td> <td>49.3</td> <td>4.</td> </tr> </tbody> </table> <p>*Source DSFEIS, Appendix D, Updated Census Tables.</p> <p>All of these population growth rates have been much faster, per year, than the traffic growth rates shown above, about ten times the traffic growth rates. The last item, the population of the study area, is referred to several times as a key historical justification for the project's need.</p> <p>Yet, this raises a fundamental question: <i>How can the traffic growth on U.S. 74 be "zero growth" when Union County and</i></p>	Area	2000	2010	Percent Change 2000-10	Perce n Chang	Union County	123,677	201,292	62.8	6.	Mecklenburg County	695,454	919,628	32.2	3.	Project Study Area	80,470	120,103	49.3	4.	<p>annually and the 1992 to 2012 20-year growth rate incorporating the Great Recession was 3.4% annually, see Table 4A in response to <b>Comment #40</b> in this table. Table 3 (found in <b>Comment #40</b> response) also confirms that the average 10-year and 20-year growth rates for corridors between Union and Mecklenburg Counties is 1.7% and 4.2% annually. These growth rates confirm a positive correlation with population growth rates. The commenter also incorrectly compares county-wide population growth to location-specific traffic data sets and then inappropriately states that population growth rates are occurring "about ten times the traffic growth rates".</p> <p>The Purpose and Need for the project has been established and re-confirmed by re-examining items such as U.S. 74 existing corridor travel speeds and population, socio-economic and MRM/CRTPO data that continue to project growth and increased demand.</p> <p>However, if one were to speculate and attempt to answer the commenter's question, the following answers may be</p>	<p>Mine is an appropriate comparison as the Study Area and the County growth are consistently cited as the basis for the project's need. If the <i>flat</i> traffic on U.S. 74 were highlighted, the "need" for the project would collapse.</p> <p>The Respondent does not address the substance of my question: <b>How can the historical population growth rate and the historical traffic growth rate on U.S. 74 be so different?</b> Given this discrepancy, the Respondent's suggested causes, and others I suggested, should be thoroughly investigated.</p>
Area	2000	2010	Percent Change 2000-10	Perce n Chang																					
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			<p><i>study area population is growing so fast?</i></p> <p>This inconsistency is neither identified nor explained in the DSFEIS. It has a number of possible explanations, for instance:</p> <ol style="list-style-type: none"> <li>1. The current traffic congestion on U.S. 74 has actually slowed its growth; with more capacity, it would have grown more.</li> <li>2. The Recession slowed the traffic growth, but not the population growth.</li> <li>3. Population growth is largely in areas south and west of U.S. 74, near the Mecklenburg line, and thus does not use U.S. 74. (This is suggested by the sub-area discussion</li> </ol>	<p>contributing factors, but not necessary limited to these potential explanations:</p> <ol style="list-style-type: none"> <li>1. The U.S. 74 Corridor is at or over capacity. U.S. 74 traffic and growth rates are slowing accordingly as demand continues to be unserved due to roadway capacity limitations. U.S. 74 traffic is seeking alternative routes for travel when given a choice as illustrated in higher growth rates on competing facilities, per Table 3.</li> <li>2. Population growth and traffic growth rates do not and do not have to trend precisely with each other. The data presented shows an overall positive correlation between population and traffic growth. One potential contributor is that population located near the corridor, but not directly on the corridor, is deciding to take alternative routes for many or all trip types.</li> <li>3. It is plausible that the recession did reduce the amount of travel or number of trips and people still moved to Union County, but there were less job and work-related trip growth.</li> <li>4. Traffic growth is not directly tied to</li> </ol>	

Hartgen Report Page No.	General Topic	Comment Number	Prof. Hartgen's Original Comment	NCDOT Response	Prof. Hartgen's Reply
			<p>above).</p> <p>4. Population growth is largely locally-based and does not use regional highways.</p> <p>5. Traffic data is misestimated, or population data is miscounted.</p> <p>6. The traffic model used for forecasting does not capture the reasons for travel behavior.</p> <p>It is not appropriate for us here to determine the reasons for this discrepancy.</p> <p>Nevertheless, because the discrepancy impacts the validity of the traffic forecasts (see discussion below) it must be researched and then incorporated into the Purpose and Need for the project.</p>	<p>population growth and for this reason not all trips are “population” i.e. residential-based. The U.S. 74 corridor has many “built-out” commercial areas and is affected by commercial work and shopping-related trips and should not be considered to be directly “tied” to population data.</p> <p>5. All future traffic AADT data on U.S. 74 is an “estimate” and the forecasts were developed by comparing/evaluating many points along U.S. 74, other roadways and considering the information available in its totality. The forecast does not focus solely on one or two select locations, time period, or data results like the commenter’s questions.</p> <p>6. Traffic is growing if viewed over all locations and periods of time (longer and shorter time periods), but not necessarily at selective points and locations.</p> <p>7. Historic traffic data trends do not drive future traffic forecasts data, but are one of many pieces of data considered along with socio-economic and population</p>	

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				<p>projections.</p> <p>We disagree with commenter's statement and his creation of explanations designed to address and cast doubt on the project process for a question he created. While population and socio-economic increases positively correlate to traffic growth, they do not have to trend perfectly together nor does knowing this relationship for one specific location or point in time change the project need or conclusions. The commenter states that "It is not appropriate for us here to determine the reasons for this discrepancy.", but he continues to speculate and hypothesize. We find no discrepancies that require a change or update to the Purpose and Need of the project.</p>	
20-23	Growth	45	<p><b>The population forecasts used to forecast traffic are probably significantly over-stated.</b></p> <p>The process used to estimate future traffic is described in the DSFEIS and can be summarized as follows:</p> <ol style="list-style-type: none"> <li>1. A Charlotte-region population forecast is estimated by reviewing US growth.</li> </ol>	<p>The commenter cites a number of reasons for why the population and household forecasts used in the travel demand modeling and the quantitative indirect and cumulative effects analysis may be overstated. The commenter notes that a number of the Hammer Report assumptions may no longer be valid. First, the commenter argues that the recent recession has dramatically altered future growth trends at the national level and those trends do not support Dr. Hammer's projections. Dr. Thomas Hammer conducted the Top-</p>	<p>The UNC Keenan School (Prof. Appold), in reviewing the original Hammer forecasts, recommended an 8.7 % reduction in corridor growth: <i>"For Union County, Dr. Appold's projections show about 9 percent fewer households and about 23 percent fewer jobs in 2030 than Dr. Hammer"</i> (memo, Wagg to Harris, 5/1/14, p. E3-3), and projected the growth to be concentrated in the northwest portion of Union County: <i>"The district breakdown for Union County shows how the change in the density to distance gradient</i></p>

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			<p>2. County growth to each of 35 counties/sub-areas in the region is allocated from the regional control total, using statistical relationships from 227 counties in 29 regions nationwide.</p> <p>3. County population growth and "population-chasing" employment is then allocated to traffic analysis zones ("TAZs") within counties, using travel time to employment and other factors.</p> <p>4. Non-population-chasing employment is estimated using expert review.</p> <p>5. "Induced" growth due to the presence of the Bypass is estimated by a variety of methods.</p> <p>6. TAZ-level population and employment forecasts, and non-residential growth (in acres of</p>	<p>Down analysis and his report, Demographic and Economic Forecasts for the Charlotte Region, documents his methodology and results. The commenter further argues that the fact the recession was so close to 2010 to negate any valuable comparison between the projected population in 2010 and the actual Census count. While the recession has cast doubt on some of Dr. Hammer's assumptions, the projections he developed and that the MPO used were and are the adopted projections used for a variety of planning and air quality conformity purposes for the region. Furthermore, Dr. Appold worked from the MPO projections in his Traffic and Revenue study and when asked to adjust them, reduced them by only about 8% to adjust of the effects of the recession. Dr. Stephen J. Appold, had several roles that were of importance to this study including assisting in the development of the regional growth projections used in the Traffic and Revenue study. This adjustment is within the range Dr. Hammer produced and well within the typical range of error for long range projections of population and employment.</p> <p>Second, the commenter suggests that Dr.</p>	<p><i>assumption substantially shifted the expected growth toward the northwest district of Union County relative to the east and central districts."</i> The memo's table shows a 35% reduction in the projected 2030 population on the east side of Union County, where the Bypass would end, compared with the earlier forecast.</p> <p>In February 2014 the MPO revisited the population forecasts for Union County, and concluded that they should be reduced by 16 and 21%, respectively: <i>"For Union County, the 2014 Projections for 2030 households and employment differ from the 2009 Projections by -16 percent and -21 percent respectively."</i> (ID, p. e3-4). As a result, they found that the time needed to reach the old 2030 projections would be increased by over 70%, from 14 years to 24 years. In developing the new 2014 forecasts, 40% of weight was applied based on "planners' judgment," rather than analytical modeling, demonstrating once again the uncertain nature of such forecasts.</p> <p>These changes in demographic forecasts are critical and are consistent with our concern that prior forecasts were significantly</p>

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			<p>development) are then converted to trip ends, by purpose, and then to productions and attractions.</p> <p>7. Although not explicitly discussed, external travel (leaving and entering the study area) is presumably estimated separately.</p> <p>8. Trips between origins and destinations are then estimated, by purpose, and external travel origins and destination are added.</p> <p>9. O-D pair trip flows, by time of day, are then assigned to the network ("build" or "no-build"), adjusting for capacity, toll rates, and value-of time.</p> <p>10. The raw volumes (direct from the model) are then adjusted further for local access and "balance."</p>	<p>Hammer's assumption that the Charlotte region will outpace national growth trends is no longer valid since the recent recession hit North Carolina and the Charlotte region particularly hard. While it is true that unemployment in North Carolina and the Charlotte region peaked higher than the national rates, (10.6% nationally in January 2010, 11.9% for North Carolina in January 2010, 12.7% in the Charlotte area in February 2010), the trends for the region have returned to near the national average as of December 2013: 6.5% nationally, 6.6% in North Carolina and 6.9% in the Charlotte area. While regional employment growth may not be as robust as during the boom years, regional employment has increased to 861,012 (as of November 2013) from the trough during the recession of 760,290 in December 2009.</p> <p>Third, the commenter suggests that the distribution of growth within the region in the future will not be as favorable to Union County as forecasted and argues that the boom of growth in Union County in the 2000's is attributable almost entirely to the proximity to the Ballantyne area of</p>	<p>overstated. Even the MPO, and apparently the NCDOT, now believe that growth in Union County will be significantly less than prior forecasts and that this growth will be concentrated in northwestern Union County rather than further east where the Bypass would start.</p> <p>I believe that this new analysis vindicates our concerns, and that its magnitude warrants a complete review of the growth forecasts underlying the MRM, as well as NCDOT's analysis of the Bypass and alternative solutions.</p>

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			<p>The process begins with estimates of likely population growth for the region and its counties. Specifically, a Charlotte-region population forecast is estimated by reviewing US growth, and then assigning portions of that growth to each of the major regions of the US. In the next step, the total regional growth is then allocated to 35 local counties/sub-areas using historical statistical relationships from 227 counties in 29 regions nationwide. The DSFEIS reviewed this forecast, prepared in 2003, finding it in substantial agreement with the 2010 Census estimate for Union County. It then went further, suggesting that the Hammer forecasts are valid for the future because:</p> <p><i>“Put more succinctly: ‘Why would Union</i></p>	<p>Charlotte and is outside the study area. Again, the commenter’s conclusion is invalid as his analysis of the growth the study area compared to Union County as a whole is flawed, as noted in Response 14. As the commenter notes, a sizeable portion of the growth within the county has been in the southwest area adjacent to Mecklenburg County. Nevertheless, 46% of the growth from 2000 to 2010 occurred within the DSA even though this area is only 28% of the county. The commenter is correct that growth as estimated from the American Community Survey between 2010 and 2012 has been much below the long-term forecasted growth trends. However, two years of down growth, in the midst of one of the slowest growth periods in post-World War II experience does not necessarily portend a long-term change in the overall growth patterns. Additionally, the commenter notes that the Charlotte region was hit very hard by the recession and that unemployment levels in North Carolina have exceeded US averages. Furthermore, more recent data suggests growth may be returning as the 2013 Census Population estimates shows Union County growing at a 2% rate from</p>	

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			<p><i>County have such robust growth in the absence of new transportation infrastructure?’ The short answer is that the factors that caused Union County to experience higher growth than any other regional county since 1990 are still in place and are likely to continue to result in higher than average growth.”</i></p> <p>The Baker assessment then goes even further, putting the 2030 population forecasts for Union County (adjusted for “reconciliation”) near the upper range of the Hammer forecasts. While the Hammer study appeared to accurately predict the 2010 Census estimate of population, its accuracy for future years is questionable. The Hammer study, prepared in 2003, made</p>	<p>2012 to 2013. Furthermore, Mecklenburg and Union County have remained among the fastest growing counties in North Carolina from July 2010 to July 2013 (based on Census Bureau estimates). Therefore, it stands to reason that when the economic recovery accelerates, growth in the Charlotte region would likely be above state averages and that growth in Union County would be among the highest in the region.</p> <p>Finally, the commenter argues that a highly unlikely “turn-around kink” in growth would be needed for Union County to reach the 2030 projected population of 337,000. He cites that growth rates would need to average 3.4% per year compared to the recent average of 1.7%. Presumably the commenter is using average annual growth rates for his calculations, whereas compound annual growth rates would be more appropriate. From 2010 to 2013, Union County saw a compound annual growth rate of 1.7% per year. From 1990 to 2000, Union County’s compound annual growth rate was 3.9%. From 2000 to 2005 it was 5.7%. From 2005 to 2010 it was 4.3%. To reach the projected 2030</p>	

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			<p>the following critical (and as it turns out, wrong) assumptions:</p> <p><i>1. The US will continue to grow as in the past.</i></p> <p>The Hammer study essentially trends the US population and economic activity forward. But the Recession of 2008-12 significantly slowed both in-migration and US growth, employment was cut by over 4 million, and recent US population increases (births – deaths + net in-migration) have slowed too. The key relationship between population and employment (percent of population that is employed) was also weakened. The current growth rates for the US are now 1/3-1/2 what was estimated just 10 years ago, and the employment/population ratio is the lowest in</p>	<p>population by 2030 would require a compound annual growth rate of 2.7% per year. Thus it would not take a highly improbable “turn-around kink” in growth to reach the 2030 projected population, it would only require a return to growth rates that average about 1% higher than the growth seen during the worst recession since World War II and about 2% lower than that seen during the boom years of growth from 2000 to 2010.</p>	

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			<p>50 years. Further, virtually all of the 2000-2010 Census population growth for Union County was already "in place" by 2009, when the Recession hit hard, and so the 2010 census estimate was largely unaffected by the Recession. But as noted above, the recent (2010-12) population growth rate for Union County has been much slower, just 1.7%/year.</p> <p><i>2. The Charlotte region will continue to excel relative to other regions.</i></p> <p>The Hammer study assumed that the Charlotte region will continue to exceed the national growth rates. But North Carolina and the Charlotte region was very hard-hit in the Recession, with large banks and other employers shedding</p>		

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			<p>jobs inordinately, and unemployment remains significantly above the US and NC levels. This effect has slowed the local employment growth to a crawl. This “inconvenient truth” is ignored by the Baker review.</p> <p><i>3. Union County will attract a relatively large share of regional growth.</i></p> <p>The Hammer study allocated growth to the region's 35 county and sub- county areas based on employment-population-economy relationships developed from around the US. <i>But in the 2000's, most of the growth in Union County was driven not by local county economic activity but by proximity to Charlotte, particularly in the Ballantyne area, which is not even in the study area. Essentially, Union</i></p>		

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			<p><i>County's growth in population was a "population" boom near to another county's "job" boom, which has now slowed. The Hammer study and the recent Baker review do not discuss the location of that growth within Union County, and thus overlook the fact that the most of the Union County growth has been outside of the Bypass study area.</i></p> <p>Dr. Hammer's estimates were reviewed by the UNC Kenan School, which found them to be too high. The Kenan review recommended an 8.7% reduction in the 2030 corridor growth for "national" trends, and a re-allocation of some growth within the County to zones in the Bypass corridor.</p> <p><i>Therefore, Dr. Hammer's forecast of population and employment for Union</i></p>		

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			<p><i>County is likely to be significantly overstated, as are Baker forecasts made from it.</i></p> <p>Of course, in 2003-04 Dr. Hammer could not have foreseen the 2008-12 Recession or its disproportionate impact on banking sector employment. That is exactly the point: <i>If one is to believe Dr. Hammer's 2030 forecast now, one must now assume an equally unlikely upward "turn-around kink" in population for the region and particularly for Union County. To reach the projected 337,000 population by 2030 from its current (2012) level of 208,000, Union County would have to average 3.4% growth annually, twice its recent growth rate of 1.7%. Assuming this would mean justifying the Bypass on an unsupported future turn-</i></p>		

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			<p><i>around in growth for the Charlotte region, and a return to a rapid growth spurt for Union County, events as unlikely as was the recent Recession.</i></p>		
23	Socio-economic data	46	<p><b>The Hammer population forecasts are then used to forecast traffic.</b>  Unfortunately from a modeling perspective, Dr. Hammer's assumptions about future Union County population growth are also used as the basis for the subarea allocation to zones (the Smith study and refinements to it). The Smith study is described as allocating the county-level population and "population chasing employment" control totals to TAZs based on vacant residential acres</p>	<p>The commenter's conclusions regarding how Dr. Hammer and Mr. Smith allocated population and employment from the region to the TAZ does not reflect the extensive inputs and calculations that were used to develop the MRM model and serves as an overly broad generalization. See section 3.2 of the Indirect and Cumulative Effects Quantitative Analysis Update (DSFEIS Appendix E).</p> <p>The processes used to develop traffic forecasts are fully detailed in the <i>Monroe Connector/Bypass Traffic Forecast Summary Memo</i> (HNTB, November, 2013, superseded by May, 2014).</p>	See discussion in Reply 45, above.

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			<p>and travel time to employment. The DSFEIS apparently continues to use the county-level control totals in making these TAZ allocations. In other words, the higher-level population forecasts are then used to estimate zonal population and employment, which are then used for estimating local traffic growth. This means that, if the Hammer-based forecasts of population growth by county are high, then the TAZ forecasts will be high in the same proportion.</p>		
23	Socio-economic data	47	<p><b><i>The Smith re-study incredibly found no impact of the Bypass on population growth.</i></b>  According to the DSFEIS, the original Smith study completed</p>	<p>The commenter is incredulous that the analysis of Paul Smith's travel time to employment factor discussed in the <i>Monroe Connector/Bypass (R-3329/R-2559) Indirect and Cumulative Effects Quantitative Analysis Update</i> (Michael Baker Engineering, Inc., November 2013)</p>	<p>The Respondent does not mention that the new forecasts, prepared by the MPO and referred to above, do not use the Smith forecasts. This vindicates my concern.</p>

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			<p>in 2004, allocated county-level control totals to TAZs using vacant residential acres and travel time to employment. In 2012 Mr. Smith re-analyzed the impact of the Bypass on population and “population-chasing employment,” and found <i>no change in growth forecasts for any of the TAZs</i>. This result is not believable given the projected change in access that the proposed Bypass would create, particularly in those TAZs both near the Bypass and close to the Mecklenburg line. This suggests that the original allocations prepared by Smith did not consider the key factors that affect regional population</p>	<p>(Quantitative ICE Update) shows that that factor was unaffected by the presence of the Monroe Connector/Bypass in the travel time model used. The commenter concludes that Mr. Smith's model must be inadequate as it “did not consider that the whole study area growth might slow if U.S. 74 became congested to the extent predicted elsewhere in this DSFEIS”. Mr. Smith's model was designed to try and capture a multitude of factors, including many factors the commenter suggests are critical: “school quality, sewer and water availability, zoning density restrictions, improved road access, rising congestion on existing roads, crime rates, average housing values and neighborhood incomes . . . .” (pp. 23-24). Specifically, Mr. Smith's model included the availability of developable land (estimated using available land and zoning restrictions), re-developable land (estimated using zoning restrictions), water and sewer availability, recent population change, growth policies, expert panel input and travel time to employment centers. Thus, most of the variables that the commenter cites were accounted for in Mr. Smith's analysis and those that were not directly accounted for</p>	

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			<p>growth. For example, the Smith study did not consider that the whole study area growth might slow if U.S. 74 became congested to the extent predicted elsewhere in this DSFEIS.</p>	<p>(crime rates, neighborhood incomes, shopping and retail access) were among the considerations of the expert panel during their input. However, it is important to note that as documented in Appendix B of the <i>Quantitative ICE Update</i>, the presence or absence of a major highway such as the Monroe Connector/Bypass does not necessarily have a major impact on county-wide growth trends. In fact, as documented by Dr. Hammer, such supply side considerations typically have very localized impacts on growth. The purpose of the re-analysis of Mr. Smith's travel time to employment center factor was to determine the extent, if any, that the inclusion of the Monroe Connector/Bypass had on that factor to determine the most reasonable use of the forecasts within the context of an indirect and cumulative effects analysis.</p>	
23-24	ICE	48	<p><b><i>The revised DSFEIS shows a modest impact of the Monroe Bypass on induced growth.</i></b></p> <p>Later in the discussion, the Michael Baker team indicated dissatisfaction with the Smith study on</p>	<p>The commenter's discussion in this section does not suggest that the conclusions on induced growth are incorrect. The commenter suggests that "the Michael Baker team indicated dissatisfaction with the Smith study on the precisely those grounds — that it did not show a difference in development for the</p>	<p>I have not evaluated the magnitude of induced growth, but have instead focused on the underlying assumptions of the whole travel-demand forecasting exercise.</p>

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			<p>the precisely those grounds — that it did not show a difference in development for the “build” vs. the “no build” forecast. Among the obvious factors that might have been included in a more careful assessment of potential growth would be school quality, sewer and water availability, zoning density restrictions, improved road access, rising congestion on existing roads, crime rates, average housing values and neighborhood incomes, provisions for and distance to shopping and retail, etc. The Baker study then uses other methods to estimate induced <i>residential</i> growth (about 1%). A method developed by this author</p>	<p>“build” vs. the “no build” forecast”. The Michael Baker Team expressed no dissatisfaction with Mr. Smith’s work. The team simply used different methods to assess the specific induced growth effects of the one project in question. These methods were naturally different than the methods used by Mr. Smith in a regional growth disaggregation modeling process. See response to <b>Comment #43</b> in this table for additional discussion of traffic forecasts.</p>	

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			<p>(Hartgen) in 2000 is also used to estimate <i>induced commercial growth</i> at Bypass interchanges.</p> <p>Other methods are also used to estimate the impact of the Bypass on industrial, transportation, and other uses. Overall, the review found modest estimates of induced growth, about 3.4% overall (a difference of 3200 acres, “build” vs. “no-build” (128,200 vs. 125,000), from a base of 95,200 acres of development.</p> <p>The report does not indicate what markets this “nonresidential” growth would serve, but it seems unlikely that they would be other than the nearby new population. However, as noted below, this difference does not seem</p>		

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			to have been actually used to make new traffic forecasts.		
24	Calibration	49	<p><b>The Regional Travel Model and the traffic operations model appear to have been insufficiently calibrated.</b></p> <p>It is widely agreed that the use of a traffic model in forecasting first requires that it is well calibrated, that is, it matches reasonably well existing traffic counts, travel times, and speeds in the base year. This elementary step is intended to ensure that the model, when used for forecasting, will not require inordinate adjustments to raw traffic forecasts. Standards for model calibration accuracy are detailed nationally. The</p>	<p>The Metrolina Regional Travel Demand Model (MRM) was developed as the primary tool for evaluating existing and future travel demand in the greater Charlotte area. The MRM is governed by a Memorandum of Agreement (MOA) through an Executive Committee and a Planning &amp; Oversight Committee. The region's four MPOs and two RPOs are signatories to the MOA, along with the North Carolina and South Carolina Departments of Transportation.</p> <p>The MRM base year models used for the traffic forecasts were/are appropriately calibrated to standards that allow their use for region-wide applications. Per the <i>Metrolina Model User's Guide</i> (July 11th, 2008), Documentation Revision 2.0, page 3-11, Table 3.1, notes a minimum of 10 extensive surveys and studies were performed at a cost of nearly \$2.5 million to "serve as a basis for model equations, settings, and calibration targets". The <i>Metrolina Regional Travel Demand Model Technical Documentation</i>, dated May 31, 2006 and developed by the</p>	<p>I have noted several clues indicating calibration problems in the MRM. One major concern mentioned above is the high "raw volume" model estimates relative to observed base-year counts, and the subsequent "averaging" of output volumes growth rates with old traffic count-growth rates.</p> <p>I recently reviewed the calibration report (12/5/06) from the MRM, Runstats worksheet. This is the "calibration run" for the regional (not county-level) MRM model. The Worksheet shows numerous cases where the traffic volume estimates are not within the noted "Root Mean Square Error" ("RSME," a widely-used measure of the average difference between observed and estimated traffic volumes) allowable ranges, but among the most concern are the following major discrepancies:</p> <ul style="list-style-type: none"> <li>• Traffic counts for minor thoroughfares (average volume 5,175) have an</li> </ul>

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			<p>general rule of for regional model calibration accuracy is that estimated base-year traffic for roads with volumes over 50,000 ADT should be within <math>\pm 20\%</math> of observed counts, and within <math>\pm 30\%</math> of observed counts for roads with volumes between 50,000 and 10,000 ADT, with most roads showing considerably less error. And of course, if a specific project is being studied, such as U.S. 74, estimated base-year traffic volumes on that road should be close to actual ground counts. In addition to this limited standard, for major studies such as this one good practice is also to calibrate the models by cut-line in-out balance,</p>	<p>Charlotte Department of Transportation Planning Division, the North Carolina Department of Transportation (Transportation Planning Branch) and AECOM Consultants provides details of the MRM calibration process in the model calibration report.</p> <p>The traffic forecast documents discuss in detail the modifications, adjustments, and enhancements made to the MRM to allow for its appropriate use in the project-level traffic forecast process. (See <i>Traffic Forecast for the No-Build Alternatives for NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector/Bypass Study</i>, Martin/Alexiou/Bryson (MAB), June 2008; <i>Technical Memorandum for TIP Projects R-2559 &amp; R-3329 US74 Upgrade Scenario</i>, Wilbur Smith Associates (WSA), June 2008; <i>Traffic Forecast for TIP Projects R-3329 &amp; R-2559 Monroe Connector/Bypass</i>, WSA, September 2008.)</p>	<p>average RSME of 29.8%, just under the 30% RSME standard.</p> <ul style="list-style-type: none"> <li>• Traffic counts for collectors (average volume 2,922) have an average RSME of 58%. The standard is 30%.</li> <li>• Urban, suburban, and rural roads have an average RSME of 35% to 44%.</li> <li>• Rural thoroughfares and collectors have an average RSME of 38% to 83%.</li> <li>• Union County's roads (average volume 7,343) have an average RSME of 50.3%.</li> <li>• Traffic volumes crossing the Mecklenburg-Union Co. line have an average RSME of 43.3%.</li> <li>• Traffic crossing the CSX Railroad in Union County (roughly parallel to U.S. 74) has an average RSME of 43.9%.</li> <li>• Union County rural expressway traffic is underestimated by 31%.</li> <li>• Union County urban major arterial traffic is underestimated by 24%.</li> <li>• Union County 2010 households are</li> </ul>

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			<p>geographic region, road functional class, time-of-day and direction to a similar or tighter level of accuracy, for greater confidence in forecasting. In addition, travel times and speeds through the base-year network should correspond closely to observed field data.</p>		<p>underestimated by 9% (62,019 vs. 67,862). While not conclusive, these data seem to indicate significant calibration problems with the Union County portion of the MRM, the portion most important in analyzing the Bypass. Therefore, even though the MRM may be sufficiently calibrated for regional modeling (e.g., air quality planning) it may not be sufficiently calibrated for use in corridor planning, particularly in Union County. Therefore I stand by my original concerns.</p>
25	Calibration	50	<p><b>The calibration of the Metrolina Regional Model (“MRM”) used for this study has not been demonstrated.</b> In prior documentation of the regional modeling effort for this study, the consultant (Wilbur Smith Associates, now CDM Smith) states that: <i>“The base-year model was calibrated in the immediate project area</i></p>	<p>Beyond the level of effort involved in creating and calibrating the Base Year MRM models, the Monroe Connector/Bypass project-level traffic forecasts were developed based on data including, but not limited to, traffic counts, historic travel trends, the MUMPO Long-Range Transportation Plan (LRTP), the calibrated MRM, and existing roadway network operations. Thus, additional information was utilized in producing base year project-level forecasts that were better “calibrated” to local traffic conditions along U.S. 74. The individual data sources are not</p>	<p>The ‘proof’ of calibration would be a simple table showing the base year Union County traffic counts on major links, versus the estimated volumes from the model. Additional “proof” would be a RSME scatter diagram showing Union County links by relative error and volume. A third would be time-of-day and directional comparisons of estimated and count volumes, and estimated v. actual trip length and time distributions for Union County, for the base year. These basic exhibits are nowhere to be found in the NEPA analysis or</p>

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			<p><i>to achieve the best traffic volume assignments compared to observed traffic counts and observed speeds from speed-delay runs conducted for the traffic and revenue analysis. . . . The base year 2008 model was run using inputs supplied by the MPO... A series of traffic assignments were compared with ground counts supplied by the NCDOT and those collected specifically for the traffic and revenue study...Adjustments were made to input network speeds and trip tables in the study area in order to improve the calibration of the model in comparison with ground counts for the specific</i></p>	<p>intended to be traffic forecasts and do not include the level of detail ultimately developed in the traffic forecast. For example, the MRM does not include all the roadways within the study area. Therefore, those roadways are included in the traffic forecast through analyzing traffic counts or other available data sources. Another example of source data are Annual Average Daily Traffic (AADT) volumes, which are developed by annualizing traffic counts collected at one point in time. The <i>Monroe Connector/Bypass Traffic Forecast Summary Memorandum</i> (HNTB, November, 2013, superseded by May, 2014) summarizes the traffic forecasts and references historical traffic data, socioeconomic data and MRM data developed throughout the Monroe Connector/Bypass project development process and concludes that the project forecasts are still valid for the purposes for which they were developed and used.</p>	<p>supporting documents.</p>

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			<p><i>corridor area. After calibration was obtained, a series of traffic assignments to the highway network were made for years of 2008, 2010, 2015, 2020, and 2030 under No-Build, Toll-free, and Tolled conditions.” This statement admits the presence of initial calibration errors which were (apparently) “improved” by changes to network speed and trip tables. But no data comparing “observed” vs. “estimated” or “improved” traffic is provided, no chart showing either regional or study area agreement by link type or volume is provided, and no calibration statistics by cut-line are given. No reference is made to time-of-day or</i></p>		

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			<p><i>directional agreement. As the MRM was not updated for the DSFEIS, the possibility of remaining errors, such as those caused by inadequate calibration, is a distinct possibility.</i></p>		
25	Calibration	51	<p><b>The current DSFEIS does not discuss calibration.</b>  The DSFEIS contains no discussion of calibration, but instead asserts that prior modeling is adequate for the purpose of environmental assessment. Therefore, one is left to assume that the current traffic forecasts are based on an adequately calibrated model, which as noted above has not been demonstrated. Given that recent traffic has not grown to the extent</p>	See response to <b>Comment #49</b> in this table.	See Replies to Comment 49-50 above.

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			forecast in 2008, the MRM should probably have been re- calibrated.		
25-26	Calibration	52	<p><b>Errors in calibration will be carried forward into future estimates.</b></p> <p>If the original MRM was not adequately calibrated, traffic forecasts are in serious doubt as calibration errors on specific road links are therefore carried forward into future tests.</p> <p>Essentially, if traffic for a specific road section is over-estimated in the base year, it is likely to be also over-estimated in the future year as well. The problem is particularly severe for calibration of U.S. 74 traffic volumes, which, as noted below, are clearly open to question since U.S. 74 apparently was modeled with too-</p>	See responses to <b>Comment #s 49 and 50</b> in this table.	See Replies to comments 49-50.

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			<p>high volumes, and with too-slow speeds relative to actual INRIX travel speeds. The accuracy of traffic forecasts for new roads is also open to question. This also affects estimates of traffic diversion and revenue for toll roads. In addition, errors in calibration carried forward in forecasts, are also likely to impact other key elements of the EIS, particularly noise, air quality and stream runoff, bringing large portions of the EIS into serious question. In short, the use of poorly calibrated traffic models to make forecasts is a serious mistake in traffic modeling that must be corrected BEFORE the resulting traffic forecast can be used in decision-</p>		

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			making.		
26-27	Calibration	53	<p><b>The traffic operations simulation model (SIMTraffic) also appears not to be well calibrated.</b></p> <p>The study uses a traffic operations simulation model (SIMTraffic) to simulate traffic operations for existing and no-build future traffic on U.S. 74. Good planning practice dictates that these models also be “calibrated” in the field, that is, they replicate existing travel times and speeds before being used for forecasting. According to the consultant’s documentation, in 2008 calibration was undertaken by driving 4 runs through the project section, 2 in the AM and 2 in the PM peaks. The</p>	See response to <b>Comment #35</b> in this table.	I am pleased to see that the traffic simulation model has now been discarded in favor of the INRIX data. I did not believe its calibration anyhow.

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			<p>reported (average of the 2 runs in each direction?) travel times in 2008 was 41 minutes (30 mph) eastbound in the PM peak, and 40 minutes (30 mph) westbound in the AM peak. The SIMTraffic model for the same conditions yielded 47 minutes, at 29 mph (westbound) and 50 minutes at 24 mph eastbound, that is, the <i>SIMTraffic tests showed significantly higher travel times and (according to the consultant) "slightly lower speeds" than the travel time runs.</i> The consultants attributed these differences to different input traffic volumes (the SIMTraffic volumes were taken from the regional travel demand</p>		

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			<p>model and were higher than the 2007 field volumes), and so the consultant considered the SIMTraffic model "calibrated." The following table summarizes their findings:</p> <table border="1" data-bbox="592 587 949 760"> <caption>Travel Time Calibration Runs on U.S. 74, 2008 (PBSJ)</caption> <thead> <tr> <th rowspan="2"></th> <th colspan="2">Travel Time</th> <th colspan="2">SIMTraffic</th> </tr> <tr> <th>Minutes</th> <th>Speed</th> <th>Minutes</th> <th>Sp</th> </tr> </thead> <tbody> <tr> <td>Westbound PM Peak</td> <td>41</td> <td>30</td> <td>47</td> <td>29</td> </tr> <tr> <td>Eastbound AM Peak</td> <td>40</td> <td>30</td> <td>50</td> <td>24</td> </tr> </tbody> </table> <p>The consultant's conclusion that this is adequate calibration is not believable. First, the use of just 4 travel time runs to prepare a baseline for calibration is wholly inadequate, as traffic varies considerably just day-to-day, let alone on weekends or by time-of-day or direction. A much larger set of runs, perhaps 30 for each time/direction, would be</p>		Travel Time		SIMTraffic		Minutes	Speed	Minutes	Sp	Westbound PM Peak	41	30	47	29	Eastbound AM Peak	40	30	50	24		
	Travel Time		SIMTraffic																					
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			<p>needed for statistical accuracy and for obtaining data for travel time reliability (see discussion below). Further, setting aside the obvious miscalculation of speed (47 minutes through a 19.7- mile section is 25 mph, not 29 mph), the large differences in travel time between the field runs and the simulation model could not possibly have been caused by different traffic volumes as the volumes were virtually unchanged between 2007 and 2008. Either the traffic volumes used to calibrate the model were way too high — a serious error as one should always use field- measured volumes for calibration — or the model's performance</p>		

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			was understated. Either way, the SIMTraffic model clearly underestimated the 2007 speeds on U.S. 74.		
27-28	Calibration	54	Further, recent analysis (in early 2013) of new travel time runs on U.S. 74 and INRIX data also suggests that speeds on U.S. 74 are significantly higher now than in 2007. NCDOT re-did the travel time runs on U.S. 74 in March 2013, this time with (apparently) three runs in each direction/time period. They found average speeds of 39.1-43.9 mph, about 10 miles per hour faster than the runs made in 2007! In other words, the NCDOT's own tests showed that travel speeds had improved significantly between 2007 and 2012.	<p>As described in Section 1.2.4 of the <i>Draft Supplemental Final EIS</i>, FHWA and NCDOT collected new travel time information to update travel performance along the existing corridor and did not use a computer model to evaluate travel performance along the existing corridor. Based on the data, which is from actual travel speeds as reported by INRIX for 2011, 2012, and 2013, average travel speeds along the U.S. 74 corridor are still below 50 mph.</p> <p>As stated in response to <b>Comment #35</b>, improvements made along the U.S. 74 corridor between 2007 and 2013 likely contribute to the speed improvements that the commenter notes. However, the 2013 INRIX data, see 2013 eastbound and westbound speed tables and diagrams below, that he bases his own assertions on also shows quite clearly that multiple segments of U.S. 74 have reported speeds in the 20-35 mph range for multiple hours throughout a typical weekday (see the</p>	<p>As noted in Reply to Comment 35, speeds have increased markedly in the corridor, and some sections now have operating speeds near or over 50 mph. There is no state or federal <i>requirement</i> that operating speeds on any section of route be 50 mph, let alone 50 mph for a corridor. The Respondent's charts actually make my point that the corridor should be segmented into several separate sections or "regimes," and that local solutions should be developed for each. Indeed the DOT has done exactly this by making improvements to the corridor through selected "superstreet" treatments and signal timing.</p>

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			<p>Using a new source of data provided by INRIX, which tracked the speeds of hundreds (perhaps thousands) of actual road users between January 1 and Feb 28, 2013, the INRIX analysis also found that the actual operating speeds were even higher — between 44.2 and 44.9 mph, than in the upward- revised field runs. Both these sources say the same thing: <i>Travel speeds on the present U.S. 74 have improved substantially over the past 7 years, and are MUCH HIGHER (by 10-15 mph) than the speeds used to calibrate the SIMTraffic operations model.</i> No explanation is given for these findings, but they are likely a combination of poor</p>	<p><i>INRIX U.S. 74 Corridor Travel Speeds</i> memorandum (HNTB, April, 2014)).</p> <p>Whether or not there is a perceived “magnitude of error” in the SimTraffic model does not refute the fact that travel speeds along the corridor are lower, when examined at the segment level, than at the “gross” corridor-level as presented by the commenter. It is also vital to note that any calibration procedures or perceived errors in a traffic simulation model used for evaluating the performance of alternatives at any time in the project process has NO bearing on calibration procedures used in the development or validation of travel demand models used in the traffic forecast. The models, and calibration procedures for each, are two entirely different things. No input or result from a SimTraffic microsimulation model was used to predict diversion to a proposed Bypass – this would be a feature utilized in a travel demand model. The commenter appears confused about the proper application and processes of travel demand models versus microsimulation models</p> <p>For comments related to the commenter’s discussion of road capacities and travel demand model calibration, see details in</p>	<p>I am not confused about the use of the SimTraffic model. Its original use was to evaluate traffic flow, given a traffic circumstance, not to forecast traffic. I am pleased to see that it has been replaced by the INRIX data.</p>

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			<p>initial model calibration and recent improvements to U.S. 74 to smooth and speed its operation.</p> <p><i>Errors of this magnitude in calibration cannot be ignored. If not revised to accurately reflect current operating conditions, the SIMTraffic model used for studying flow on U.S. 74 is likely to significantly overstate congestion and travel time through the section, and therefore overstate the potential for diversion to a proposed Bypass.</i></p> <p>To correct the above problems, several steps should be undertaken. First, road capacities should be updated in both the simulation model and the regional</p>	<p>response to <b>Comment #s 49 and 50.</b></p> <div style="text-align: center;"> <p>Table 9 - US 74 Corridor INRIX Average Speed Data 2013, Thursday, Thursday</p> <p>Average Speed for US 74 from I-40 to NC 200 (0.0m to 1.0m)</p> <p>Direction: 01 - Eastbound Average Speed</p> <table border="1"> <thead> <tr> <th>TIME CODE</th> <th>SEGMENT NAME</th> <th>LENGTH (mi)</th> <th>06:00</th><th>07:00</th><th>08:00</th><th>09:00</th><th>10:00</th><th>11:00</th><th>12:00</th><th>13:00</th><th>14:00</th><th>15:00</th><th>16:00</th><th>17:00</th><th>18:00</th><th>19:00</th><th>20:00</th><th>21:00</th><th>22:00</th><th>23:00</th> </tr> </thead> <tbody> <tr><td>01</td><td>US 74 from I-40 to NC 200</td><td>1.0</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td></tr> <tr><td>02</td><td>US 74 from NC 200 to I-40</td><td>1.0</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td></tr> </tbody> </table> </div> <div style="text-align: center;"> <p>Average Speed for US 74 from NC 200 (0.0m to 1.0m)</p> <p>Direction: 02 - Westbound Average Speed</p> <table border="1"> <thead> <tr> <th>TIME CODE</th> <th>SEGMENT NAME</th> <th>LENGTH (mi)</th> <th>06:00</th><th>07:00</th><th>08:00</th><th>09:00</th><th>10:00</th><th>11:00</th><th>12:00</th><th>13:00</th><th>14:00</th><th>15:00</th><th>16:00</th><th>17:00</th><th>18:00</th><th>19:00</th><th>20:00</th><th>21:00</th><th>22:00</th><th>23:00</th> </tr> </thead> <tbody> <tr><td>01</td><td>US 74 from I-40 to NC 200</td><td>1.0</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td></tr> <tr><td>02</td><td>US 74 from NC 200 to I-40</td><td>1.0</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td><td>45</td></tr> </tbody> </table> </div>	TIME CODE	SEGMENT NAME	LENGTH (mi)	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	01	US 74 from I-40 to NC 200	1.0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	02	US 74 from NC 200 to I-40	1.0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	TIME CODE	SEGMENT NAME	LENGTH (mi)	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	01	US 74 from I-40 to NC 200	1.0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	02	US 74 from NC 200 to I-40	1.0	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
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			close agreement with INRIX travel times and speeds through the section, also by direction and time of day. These elemental steps must be undertaken BEFORE either model is used in forecasting.		
28	Induced Travel	55	<p><b>The DSFEIS leaves unanswered key questions regarding induced travel.</b></p> <p>The DSFEIS describes methods and results for an estimate of “induced land use development.” This estimate, about 3.4% (an increase of development from 125,000 acres “no-build” to 128,200 acres “build,” compared with a base-year value of 95,200 acres), includes induced-growth impacts for residential, commercial, industrial, and other land</p>	<p>The NCDOT considered how changes in socio-economic data related to the project’s indirect and cumulative effects could affect the traffic forecasts for the Monroe Connector/Bypass. This question is considered in detail in the <i>Monroe Connector/Bypass Traffic Forecast Summary Memorandum</i>, HNTB (November, 2013, superseded by May, 2014). 2030 Build MRM11v1.1 model runs using 2009 Socioeconomic (SE) data and 2009 ICE SE data were prepared to assess potential impacts to raw model output volumes using the four-step modeling process.</p> <p>As discussed in Section 2.5.2 of the <i>Draft Supplemental Final EIS</i>, a sensitivity analysis was conducted using the most current version of the MRM (MRM</p>	See my Replies 56-59 below.

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			<p>uses. A variety of methods are used to make this estimate, including one developed by this reviewer (Hartgen) in 2000, a review of estimated industrial land use impacts, and a review of development forecasts in the original EIS.</p>	<p>11v1.1) available at the time of the <i>Draft Supplemental Final EIS</i> to see how raw model output would change between the 2009 socioeconomic (SE) data used in the model and a modified 2009 SE data set that includes the potential induced growth forecasts from the <i>Monroe Connector/Bypass (R-3329/R- 2559) Indirect and Cumulative Effects Quantitative Analysis Update</i> (Michael Baker Engineering, Inc., November 2013) (<i>Quantitative ICE Update</i>). After extensive review of model outputs, it was determined that changes in SE data (between the baseline SE and ICE SE data sets) caused relatively minor changes in raw output traffic volumes in the MRM model runs. Maps 16 thru 19 from the <i>Quantitative ICE Update</i> comparing 2030 No-Build and Build land use scenarios are referenced on slides 11 thru 14 in <b>Appendix A</b>. Based on the comparison of 2030 Build MRM11v1.1 model runs using 2009 SE data and 2009 ICE SE data, the volume changes and percent changes are not substantial. The change in VMT and VHT in Union County is 3 percent and 4 percent respectively, while changes in Mecklenburg County and across the MRM</p>	

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				<p>network are approximately zero percent. It was concluded that these minor variations in raw model daily volume assignment will not affect the conclusions of the traffic forecasting development process. It was concluded that since the travel demand model outputs are just one of many factors considered in the development of a project specific traffic forecast, it can be reasonably concluded that changes in the socioeconomic data due to potential induced growth from the Monroe Connector/Bypass would not substantially or significantly alter the future Build scenario traffic forecasts for the project study area.</p> <p>As documented in the <i>Monroe Connector/Bypass Traffic Forecast Summary</i> (HNTB, November, 2013, superseded by May, 2014), MRM14v1.0 output provided by CRTPO (Charlotte Regional Transportation Planning Organization formerly MUMPO) on February 3, 2014 was considered. The raw model daily volume assignment data from a run of MRM06v1.1, that was used in the development of the No-Build and Build traffic forecasts used in the May 2010 FEIS, was compared to a model run using</p>	

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				<p>the MRM14v1.0 (with 2013 SE data). Overall corridor VMT results indicate that, even with an updated model network (MRM14v1.0), SE data (2013), and methodology, the Monroe Connector/Bypass is still generally attracting similar levels of demand as MRM06v1.1 and 2005 SE data used in the 2030 Build forecast. In addition, the MRM14v1.0 is predicting more demand for the existing U.S. 74 corridor. Thus, it is reasonable to conclude that the MRM14v1.0 assigns similar magnitudes of raw travel demand model daily volume assignment to the Monroe Connector/Bypass and U.S. 74 compared to MRM06v1.1.</p> <p>Indirect and cumulative impacts to traffic are also considered in Section 5.8 of the <i>Monroe Connector/Bypass (R-3329/R-2559) Indirect and Cumulative Effects Quantitative Analysis Update</i> (Michael Baker Engineering, Inc., November 2013). The evaluation concludes that overall, induced growth impacts of the proposed project will add to the total volume of traffic in Union County and to the total vehicle miles traveled and vehicle hours traveled. Roads that connect to the</p>	

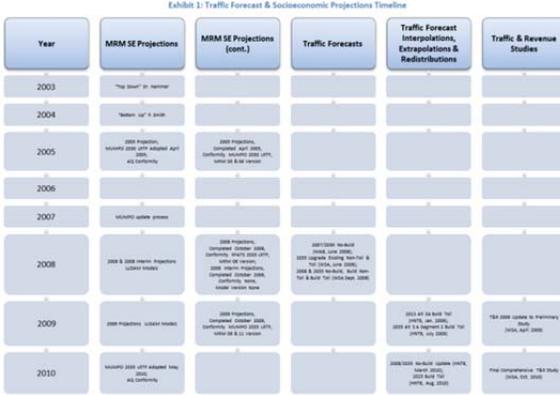
Hartgen Report Page No.	General Topic	Comment Number	Prof. Hartgen's Original Comment	NCDOT Response	Prof. Hartgen's Reply
				<p>Monroe Connector/Bypass will likely see some increases in traffic. However, the increases in traffic are modest and would not likely create substantial congestion issues within the design year of the project, particularly given that the impacts will be spread across the many miles of transportation facilities throughout Union County. Thus, the traffic impacts of induced growth do not appear to be substantial enough to result in indirect or cumulative effects to roadway congestion or overall traffic levels.</p> <p>As documented in the <i>Review of Draft CRTPO Socioeconomic Projections Memorandum</i> (Baker, March 20, 2014), the Charlotte Regional Transportation Planning Organization (CRTPO) socioeconomic projections developed for the 2040 Metropolitan Transportation Plan (MTP) was compared to the projections used in the Indirect and Cumulative Effects (ICE) Quantitative Analysis Update (Quantitative Analysis Update) for the Monroe Connector/Bypass (R-3329/R-2559) completed by Baker in November of 2013. This comparison determined that a reanalysis of the indirect and cumulative effects using the new 2014 Projections</p>	<p>See my Reply above at Comment 45. CRTPO recently lowered the forecasts of population and employment for 2030 by 16 and 21%, respectively. These are very significant changes that cannot be simply asserted to result in “similar conclusions” as now the underlying demographic forecasts would be quite different.</p>

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				would likely lead to similar conclusions regarding the indirect and cumulative effects of the Monroe Connector/Bypass.	
28	Land Use Forecasts	56	<p><b>Are there different land use forecasts for each alternative?</b></p> <p>The documentation of the changes in land use forecasts do not specifically address the question of whether separate land use forecasts were prepared for all alternatives, or (more likely) for just one Build alternative, a generic “corridor” alternative, and the No-build. This raises the question of whether, for modeling purposes, the induced impacts of <i>other alternatives</i> (e.g., an “on- current alignment” upgrade of U.S. 74) should also have been studied.</p>	<p>The commenter is incorrect. It is not necessary to study in detail the induced impacts of alternatives that have been eliminated from detailed study, such as the Improve Existing Roadways Alternatives.</p> <p>A qualitative <i>Indirect and Cumulative Effects Assessment</i> (HNTB, February 2009) was prepared for the Detailed Study Alternatives (DSAs), as summarized in Section 7 of the <i>Draft EIS</i>. The qualitative assessment identified areas of potential growth or land use change under the No-Build and New Location scenarios. There would be no substantial differences between new location Detailed Study Alternatives.</p> <p>In addition, see response to <b>Comment #55</b> in this table.</p>	<p>As numerous courts have made clear, land use forecasts for the “no build” must not contain the effect of the proposed project. In this particular case, only one off-current-alignment “build” alternative was studied. Whether separate land use forecasts are required for each of the other “build” alternative is a question for the courts to address.</p>
			<p><b>Are the land use forecasts carried into</b></p>	Specific model modifications and runs completed for the quantitative indirect and	Thank you for the clarification. However, this Response does not mention the subsequent adjustment

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28	Land Use Forecasts	57	<p><b>the modeling, through trip generation, trip distribution and assignment steps?</b></p> <p>Nowhere in the material submitted is it specifically stated that the different land use forecasts were then used to re-estimate trip generation, trip distribution, and then assignments of estimated traffic. This might be implied by the discussion of "raw model volumes," but the report does not actually explain how the adjusted volumes were calculated. Elsewhere (Appendix C- 3, section 6.7) the description of the method seems to imply that standard traffic forecasting methods (trip generation, distribution, and</p>	<p>cumulative effects analysis are described in response to Comment #55 in this table.</p> <p>As documented in the <i>Monroe Connector/Bypass Traffic Forecast Summary</i> (HNTB, November, 2013, superseded by May, 2014), a standard 4-step model approach, using the Metrolina Regional Model, MRM11v1.1 as the base model, was used to develop raw trip generation, trip distribution, and then daily volume assignment. The raw model daily volume assignment were developed and compared for the 2035 No-Build and Build conditions utilizing the appropriate available socioeconomic data sets (2005 SE, 2008 Interim, 2009 SE and 2009 ICE SE data). Based on a direct comparison of these raw model daily volume assignments It is reasonable to conclude that the differences between these sets of socioeconomic data would not substantially change the traffic forecast.</p>	<p>made by "averaging" the growth rates in traffic from the raw model and the growth rates from prior traffic count trends. This "post model" adjustment needs to be thoroughly justified.</p>

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			assignment) were NOT used in the revised EIS. So, which is it? Was a standard 4-step model used for the DSFEIS, or not?		
29	Model Assignment	58	<p><b>Do the trip distribution and assignment steps in the traffic forecast for the “no-build” alternative now exclude “project-induced travel” development and exclude the Bypass in the No- build forecast?</b></p> <p>It is still not clear if the land use, trip generation, trip distribution and assignment steps described in the DSFEIS include the project's effect. For instance, even if the land use forecasts were found to be the same for “build” and “no-build” scenarios, the trip distributions from them</p>	The No-Build MRM model runs did not initially include the effects of induced travel/development, as those effects were captured in separate model runs for the Build Alternative as described in response to Comments #55 and #56 above.	I understand this point, but am not clear whether the trip forecasts of the “induced” traffic were distributed through the network. I take the Response to mean that they were.

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			<p>would certainly NOT be the same since they undoubtedly included the Bypass in distributing trips between TAZs. If the trip distributions for the no-build alternative included the proposed Bypass in the network, then that would incorrectly forecast the traffic using the no-build network.</p>		
29	Induced Development	59	<p><b>If not, how do the traffic forecasts actually reflect the induced development?</b></p> <p>The DSFEIS needs to state clearly, in professional “modeling” language that can be reviewed by independent experts, exactly how the revised traffic forecasts for the “build” and the “no build” were prepared.</p>	See response to <b>Comment #55</b> in this table.	Thank you.
			<b>Questions remain</b>	See response to <b>Comment #s 61 through</b>	The Respondent's clarifications have

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29	Traffic Forecasts	60	<p><b>concerning details of traffic forecasts.</b></p> <p>The extensive coverage of induced traffic issues in the DSFEIS does not contain a commensurate discussion of the traffic forecasting method itself, so the reader is left to understand that the assumptions in the original traffic model forecast remain valid.</p>	<p><b>68</b> in this table.</p> <p>Exhibit 1 provides a timeline of project-related socioeconomic projections, traffic forecasts and traffic &amp; revenue studies.</p> 	<p>helped to explain this process. However, the large remaining “hole” in the discussion is the “adjustment” mentioned above, by averaging raw model forecasts with old traffic count trends.</p>
29-30	Land Use Forecasts	61	<p><b>Was the MRM used with the updated ICE land use forecasts to estimate future traffic volumes?</b></p> <p>The DSFEIS states that changes were made to land use to account for the induced effects, and “then the [Metrolina Regional] Model was run...” implying that the full generation-distribution-assignment</p>	<p>The question of “if the traffic forecasts that were used in the May 2010 FEIS are still valid” was documented in the <i>Monroe Connector/Bypass Traffic Forecast Summary</i> (HNTB, November, 2013, superseded by May, 2014). Based on that assessment of 2012 NCDOT AADT volumes, the Metrolina Regional Travel Demand Model (MRM06v1.1, MRM11v1.1 and MRM14v1.0), a comparison of available socioeconomic data sets (2005 SE, 2008 Interim, 2009 SE and 2009 ICE SE data), and existing U.S. 74 corridor travel time runs, it was</p>	

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			<p>sequence was used. The technical documentation further reports an 3.5% increase of VMT in Union County as a result. But elsewhere, the Traffic Forecast Memo Appendix (Nov. 8, 2013) states: <i>"This approach uses the original accepted forecasts and base data assumptions to mathematically calculate traffic estimates and redistributions of traffic for conditions not included or known at the time of the initial forecast. This methodology is appropriate because the differences being considered do not change the original forecast, assumptions, methodology or base</i></p>	<p>determined the No-Build and Build traffic forecasts used in the May 2010 FEIS are still valid for the purposes they were used <i>and the development of additional project level traffic forecasts were not required.</i></p>	<p>This Response seems to indicate that additional traffic forecasts using the 4-step model AND induced travel were NOT performed. This appears to contradict Response #58. How then was the induced traffic distributed and "added" to the prior forecasts?</p>

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			<p><i>data. The interpolation and extrapolation process is a method for developing new data points for years not considered in the base forecast but within the range of volumes established by the base forecast.” And at a later point the documentation says: “Based on a meeting with NCDOT Transportation Planning Branch (TPB) on March 21,2013 and the document Guidelines to Determine When to Request an Updated Traffic Forecast 2 (NCDOT TPB, February 24, 2009), the current <u>Build traffic forecasts meet the guidelines that indicate the existing forecast is valid and an updated forecast is not warranted. All of these guidelines are met since</u></i></p>		

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			<p><i>no new alternatives have been identified, the current let date of the project is less than the Future Forecast Year plus 20 years, the study area is not experiencing growth not previously considered in the forecast, and the traffic forecast is not five years older than the Base Year.”</i> These different statements make it unclear as to exactly whether new traffic forecasts were prepared using the MRM, or by some other method, or not at all.</p>		
30	Truck percentage	62	<p><b>Truck percentages.</b> It is well known that truck traffic forecasting is one of the weakest elements of traffic modeling. For proposed toll roads, the issue is doubly important as trucks constitute</p>	<p>See pages C3-4 and C3-5 of the <i>Draft Supplemental Final EIS</i> regarding projected truck traffic on the project and existing U.S. 74.</p>	<p>I previously reviewed these estimates, and found them to be a simple “takedown” percentage of the ADT estimates, rather than modeled separately. This means that they have the same average “values-of-time” as is used in the MRM, a clearly unwarranted assumption, since truck values-of-time are typically 5-10 times automobile VOTs. If trucks have the same value-of-time as cars,</p>

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			<p>typically 5-10% of traffic but pay 20-40% of toll revenue. Nowhere in the report does it clearly state the assumptions for truck forecasts, but most studies generally use current truck percentages and apply them to future ADT estimates. This simple "take down percent" for regional truck forecasts is probably inappropriate if it has not been updated since the Recession, because the Recession significantly affected truck travel too.</p>		<p>but have 4 times the toll, then their diversion will be substantially less than that of cars. Given the changes in the economy since 2008, and the importance of truck traffic to revenues from tolls and diversion rates, this cannot be ignored.</p>
30	Time of day percent	63	<p><b>Time of day percentages.</b> In standard modeling practice, time-of-day percentages (so-called K factors for peak hour travel) are assumed to be about 9-10 percent of</p>	<p>Then (sic?) NCDOT methodology was followed in the traffic forecasting process for the Monroe Bypass by using ground count data to initially develop the associated K Factors". Model data was not directly used in the development of the K Factors, although the MRM assigns traffic in multi-hour (peak period, off peak)</p>	<p>This Response confirms my suspicion that the MRM does not allow for traffic to move <i>between</i> times of the day to avoid congestion. This feature is a standard part of</p>

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			<p>ADT, based on historical traffic counts. However, in many regions peak periods are lengthening as commuters shift start times to avoid congestion, and work trips are declining as a percentage of total travel. In more advanced models these effects are accounted for by feedbacks between time-of-day assumptions and traffic assignment. The MRM does not apparently account for such trends, either through feedbacks or by increasing the length of peak hours.</p>	<p>blocks of time to account for peak hour spreading effects. Per the <i>Project Level Traffic Forecasting Administrative Procedures Handbook</i> (NCDOT, May 2011), "Design K Factor (K) – The K factor is the DHV expressed as a percentage of the AADT, or <math>K=DHV/AADT</math>. K factors differ by location and facility type. NCDOT has automatic traffic recorders located throughout the state which count traffic for all hours of the year. From these counts, the K factor can be calculated. Typically the K factor is estimated by examining traffic counts taken for the specific forecast, and additionally comparing with related sites which do have automated traffic recorder stations."</p>	<p>large-region modeling systems, and its omission here is troubling. It also limits peak spreading within time periods, producing (among other things) the strange effect above of huge volume estimates for U.S. 74 "no build" forecasts. For a more than \$800 million investment, state-of-the-practice modeling should be used.</p>
30	Traffic and revenue	64	<p><b>The value of time used for modeling is unclear.</b> The Traffic and Revenue Study states the values of time for trip classes, \$7- 22/hr for trucks, and \$7-8/hr</p>	<p>The <i>Final Report Proposed Monroe Connector/Bypass Comprehensive Traffic &amp; Revenue Study</i> (Wilbur Smith Associates, October 2010) clearly discusses value of time used in the study. The commenter alludes to the fact that the traffic and revenue study values for time seem low, which would be a conservative</p>	<p>A high value-of-time encourages diversion, rather than lowering it. I continue to suspect that hidden assumptions within the MRM and the tolling tests have within them a too-high value-of-time.</p>

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			<p>for cars. These values seem low for both cars and trucks, given national studies. Elsewhere in this review we note that a high value of time, about \$18/hr, would seem to be necessary to create substantial diversion. A high value of time for trucks would similarly be needed for substantial truck diversion. As the estimated toll for trucks on the proposed Bypass would be over \$10, the value of time for trucks would seem to be too low to induce much diversion</p>	<p>way to approach the issue so as not to over-predict trip diversion. The commenter then returns to his estimation of a high value of time necessary to create diversion, but only referencing current travel conditions. No analysis is made by the commenter for future conditions when U.S. 74 would be more congested and the time savings would be much greater – regardless of the value placed on time savings.</p>	
31	Travel time	65	<p><b>The <i>reliability</i> of travel time has not been considered in diversion or benefits.</b></p> <p>Recent research on travel time reliability (the value that travelers</p>	<p>Travel time reliability is not currently a metric that is required to be incorporated or replicated in the travel demand modeling or traffic forecasting process in North Carolina. However, its use as a metric to assess project benefits would add to the viability of the Build Alternative, since</p>	<p>Using reliability as a criterion might increase the traffic volume on the Bypass compared to a “no-build” alternative, but it might also increase the traffic volume on U.S. 74 for improved signal timing, directional flow, superstreet or other treatments. The methods I referred to earlier</p>

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			<p>place on the <i>certainty</i> of arriving within a given time window) suggests that this value is quite high, perhaps higher than the value of time itself. Several national studies have developed guidelines for including reliability in traffic forecasting, and how improved operations affect reliability. These methods have not been incorporated into the analysis of the Monroe Connector/Bypass or its alternatives.</p>	<p>reliability of travel times decreases in congested conditions that are predicted for the existing U.S. 74 corridor in the No-Build scenario.</p>	<p>show how this effect can be incorporated into travel demand models. Such an effect should have been thoroughly evaluated in the NEPA analysis.</p>
31	Capacity	66	<p><b>Road capacities have not been updated.</b> The DSFEIS forecasts rely on regional networks that use estimates of highway capacity from the 2000 Highway Capacity Manual. The new Highway Capacity Manual generally raises</p>	<p>Development of the MRM travel demand model is based on the latest available information and factors other than the Highway Capacity Manual (HCM). HCM 2010 information was not readily available until 2012, after the model was developed. In either case, the commenter is overstating the changes between HCM 2000 and 2010 with regards to certain capacity methodologies and does not provide an explanation for his opinion that</p>	<p>HCM 2010 is now generally available. I actually do not know the precise impact of using it, but I do know that it generally increases capacities for most road categories. Given the non-linear relationship between capacity and speed, a small change in capacity, particularly for urban arterials, can substantially improve speeds. This is likely one of the explanations for the large increase in speed in the current U.S. 74 corridor over the past several</p>

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			<p>highway capacities for various road classes, and significantly changes the capacity estimation and level-of- service procedure for urban and rural arterials such as U.S. 74. In particular, the new method for estimating capacity for signalized arterials includes signal progression, access points, and traffic volumes, all of which are obviously relevant for study of U.S. 74. These updated capacities have apparently not been used in the traffic modeling. If the estimates of capacity for U.S. 74 are too low, the effect would be to over-state future congestion estimates on U.S. 74, and thus over-state diversion to the Bypass, and also under-state the viability of other</p>	<p>the incorporation of the HCM 2010 would have an effect on the MRM results.</p>	<p>years. Now that HCM 2010 is available and the new MRM has been used for the 2040 forecasts for the region, both should be used for study of the Bypass too.</p> <p>Would this delay the start of the project? Maybe, but with more \$800 million of taxpayer money at stake, addressing such essential obvious issues is imperative.</p>

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			alternatives.		
31	Capture Rate	67	<p><b>Market capture rates (40-50%) seem very high.</b></p> <p>While the percentage of non-local traffic was not calculated as part of the traffic forecasts for the project, given that less than half of the traffic on U.S. 74 is appears to be non-local, the overall capture rate of around 50% suggested by the traffic forecasts seems very optimistic indeed. Assuming a generous capture rate of 50% of non-local trips, an overall capture rate less than 25% seems more likely, and even that might be too high if the diverters are infrequent rather than every-day diverters, as the forecast assumes.</p>	See response to <b>Comment #33</b> in this table.	See Reply # 33.
			<b>Earlier errors in the</b>	We disagree with the commenter's	

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31	Traffic forecast	68	<p><b>2030 and 2035 traffic forecasts reduce confidence in current estimates.</b></p> <p>The report notes that earlier traffic forecasts, by Wilbur Smith Associates (now CDM Smith) contained errors resulting in higher traffic forecasts. This revelation raises questions about whether the current traffic estimates can also be trusted.</p>	<p>assertion. For the <i>Draft Supplemental Final EIS</i>, NCDOT systematically revisited all of the traffic forecasts to determine whether they were still valid and reliable. Based on additional review, analysis and comparison, it was determined that the existing traffic forecasts remain valid and reliable and it was unnecessary to perform new traffic forecasts, as explained in Section 2.5.2 and Appendix G of the <i>Draft Supplemental Final EIS</i>.</p>	<p>The Response does not refute the presence of prior errors, but says that they are minor and need not be addressed. But the presence of prior errors in the earlier forecast, along with numerous inconsistencies in this forecast, demand that more work must be done.</p>
32	Costs	69	<p><b>Project cost and cost-effectiveness are not detailed.</b></p> <p>Environmental impact statements generally contain comparative estimates of cost for viable alternatives. The DSFEIS reports an estimated cost range of \$845-923 million (in year of expenditure, assuming award in</p>	<p>The NCDOT undertook a detailed investigation of the project cost information included in the <i>Draft Supplemental Final EIS</i> and determined the values shown should be revised to most accurately reflect remaining project costs. The <i>Draft Supplemental Final EIS</i> cost data did not consider the design build contract awarded, the work completed, or the right of way purchased since the original 2010 <i>Final EIS</i>. The delays experienced by the project were also not considered. Updated costs are presented in</p>	<p>My comment stands. The earlier cost estimates are not specified to a similar level of detail.</p> <p>Further, if the project were “scored” under the STI, then certainly a new cost estimate, along with many other numbers, would be needed.</p> <p>NCDOT should also estimate the costs of the proposed 6-laning of U.S. 74 as well as other alternatives.</p>

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			<p>October 2014 and opening in October 2018). But the discussion of costs for the Monroe Connector/Bypass is incomplete:</p> <ul style="list-style-type: none"> <li>• If the construction of the road is delayed significantly, which might happen given environmental and financing issues, this cost estimate is likely to be higher.</li> <li>• No data is provided for maintenance and operation costs after construction but during service life, converted to present worth, for various alternatives.</li> </ul>	<p>the <i>Final Supplemental Final EIS</i>. The assertion that the cost was not considered for the other project alternatives studied is simply incorrect. Construction costs were developed and compared for all preliminary study alternatives as presented in Table 2-4 of the 2009 <i>Draft EIS</i>.</p> <p>The NCDOT's original approach to financing the project is documented in the <i>Monroe Connector/ Bypass Project Initial Financial Plan</i>, submitted to FHWA on September 27, 2011. It is important to note the <i>Initial Financial Plan</i> was developed after the issuance of the previous <i>Record of Decision (ROD)</i> and the procurement and opening of design-build contract price proposal to construct the project. Due to the legal challenge, the previous ROD has been rescinded and the project construction has been put on hold. The ultimate impact to the project schedule is still undetermined at this time. Therefore, the information needed to determine the true impact to the financial plan is not available.</p> <p>Based on the cost information developed for the <i>Final Supplemental Final EIS</i>, funds will be available in the State Transportation Improvement Plan (STIP)</p>	

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			<ul style="list-style-type: none"> <li>• No costs are shown for other alternatives, particularly those for various upgrades of U.S. 74. This appears to violate NEPA regulations that require comparable evaluation of viable alternatives.</li> <li>• No data is provided on the relative cost-effectiveness of the alternatives. Most EISs show costs, benefits and cost-effectiveness, using such measures as benefit- cost ratios, for various alternatives, not just for the recommended alternative.</li> <li>• The DSFEIS</li> </ul>	<p>to cover the estimated increase in the project cost.</p> <p>Regarding monetary cost-benefit ratios and analysis, as stated in 40 CFR 1502.23: “For purposes of complying with the Act [NEPA], the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations.” An exception is cited in 23 CFR 650.809 for moveable span bridges: “If there are social, economic, environmental or engineering reasons which favor the selection of a movable bridge, a cost benefit analysis to support the need for the movable bridge shall be prepared as a part of the preliminary plans.” A movable span bridge is not proposed as part of the Monroe Connector/Bypass.</p>	<p>The Respondent is correct that cost-benefit assessment is not required by NEPA, but it certainly is the norm, particularly for major projects. I have never seen a project of this magnitude NOT scored using even a simple benefit/cost methodology. More sophisticated benefit assessment methods include direct and indirect impact, economic impacts regarding jobs and development, treatment of tax valuation, and dollarized environmental impacts. Several national vendor software packages are now available to assist in this important step, and NCDOT is actually already using one of them (TREDIS) for helping to score road projects.</p> <p>All the other projects in the NC STIP are now being subjected to cost-effectiveness assessment. Particularly in light of its price tag, this project should be cost-justified.</p>

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			contains no summary table that compares the impacts, costs, benefits, and other features of the viable alternatives.		
32-3	External Trips/Trucks	70	<p><b>External traffic forecasts for U.S. 74 and other roads is not discussed.</b></p> <p>In modeling terminology, “external traffic” is that traffic which leaves, enters or goes through the study area. The issue of how to forecast external traffic is particularly severe for proposed projects on the edges of regions, such as the proposed Monroe Connector/Bypass, which ends at the far eastern edge of the MRM coverage area. Specifically, the traffic on U.S. 74 just east of</p>	<p>As part of the MRM development process, the Metrolina Region External Travel Survey (May 2003) was conducted. One of the data collection points was located at U.S. 74, east of Wesley Chapel Road, which lies within the project study area. The results of this study were used in the development of the MRM to develop the travel demand model.</p> <p>The MRM was used in the development of project-specific forecasts to calculate future growth within the study area (i.e. 2035). While recent growth trends have been slightly impacted by the recession, future long-term growth trends are still projected to increase over existing conditions, further substantiating the need for the Monroe Connector/Bypass project. It is important to note that the traffic volumes are not forecasted to grow evenly along the corridor.</p> <p>The west end of the study area is</p>	<p>The Respondent's comment is troubling for several reasons:</p> <ol style="list-style-type: none"> <li>1. The data used for estimating external traffic is over 10 years old.</li> <li>2. The “external point” noted (U.S. 74, at Wesley Chapel Road) is NOT actually on the external edge of the current MRM, but within it. This means that external travel entering the Study Area, has to be estimated by some other means.</li> <li>3. There is no discussion about how this estimation of current or future external traffic was conducted.</li> <li>4. Whatever was done, it pre-dates the Recession, which affected long-distance travel significantly, and trucking even more. Given the earlier admission that truck traffic was estimated simply as a flat percentage takedown of average daily traffic, the estimate of toll revenue from trucks is highly suspect.</li> </ol> <p>Therefore, the estimate of external travel entering the Study</p>

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			<p>the proposed project terminus is treated as “external” traffic, and therefore is not forecast directly using the MRM. Instead, external traffic is forecast separately using a variety of methods such as trend-lining, statewide modeling, or inter-regional modeling. It is then typically added to the internal (within the Model) forecast of trip ends, or is added to trip OD matrices, or is added directly to network volumes as a “pre- load.” In each case, the separate treatment of external traffic is in addition to that of within-region traffic modeling. In some cases, such as on U.S. 74 just east of the project, external traffic could be as much as 30-</p>	<p>forecasted to grow almost three times faster than the east end. It is to be expected that growth rates will fluctuate from year to year.</p> <p>The commenter incorrectly draws conclusions based on four data points over a 12-year period. As described in the NCDOT Transportation Planning Branch <i>Project Level Traffic Forecasting Administrative Procedures Handbook</i>, dated May 3, 2011, long-term (20 years) historical travel data should be considered. This was done in the development of the project level traffic forecasts for the Monroe Connector/Bypass project. (See Table 3 of the <i>Traffic Forecast for the No-Build Alternatives for NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector/Bypass Study</i>, Martin/Alexiou/Bryson (MAB), June 2008; <i>Technical Memorandum for TIP Projects R-2559 &amp; R-3329 US74 Upgrade Scenario</i>, Wilbur Smith Associates (WSA), June 2008; Exhibit 3 of the <i>Traffic Forecast for TIP Projects R-3329 &amp; R-2559 Monroe Connector/Bypass</i>, WSA, September 2008). The MAB and WSA forecast considered over 600 data</p>	<p>area, which is undoubtedly a significant share of the traffic diverting to the Bypass, must be updated.</p> <p>Using DOT data that stretches over 12 years is not being selective. The Respondent admits at several points above that traffic growth on U.S. 74 has been “zero” and “flat” over the past 12 years. This recent flatness is much more relevant than a 20-year trend going back to the 1980s.</p>

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			<p>40% of traffic volume. This includes truck traffic, which is often a significant portion of smaller-region external traffic.</p> <p>In the case of the proposed Bypass, our review of recent traffic count history at the far eastern edge of the region (Union-Anson County line) shows that the <i>external traffic has actually been declining</i> in recent years.</p> <p style="text-align: center;"><small>U.S. 74 Average Daily Traffic at the Union-Anson County Line</small></p> <table border="1" data-bbox="596 911 945 971"> <thead> <tr> <th>Count Location</th> <th>2000</th> <th>2005</th> <th>2010</th> <th>2012</th> <th>12-year Change per year</th> </tr> </thead> <tbody> <tr> <td>Anson-Union Line</td> <td>15000</td> <td>15000</td> <td>14000</td> <td>13000</td> <td>-1.1</td> </tr> </tbody> </table> <p style="text-align: center;"><small>Source: NCDOT Traffic Count Maps, available at <a href="http://www.NCDOT.gov">www.NCDOT.gov</a></small></p> <p>Neither the DSFEIS nor the earlier documentation we looked at contains references to external traffic, leaving the reader completely in the dark as to how it was forecast, whether the current count history was</p>	Count Location	2000	2005	2010	2012	12-year Change per year	Anson-Union Line	15000	15000	14000	13000	-1.1	<p>points over a 26 year period and over 500 data points over a 20 year period respectively in the development of their project level traffic forecasts, cited above.</p>	
Count Location	2000	2005	2010	2012	12-year Change per year												
Anson-Union Line	15000	15000	14000	13000	-1.1												

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			<p>considered or the 2009-12 Recession was accounted for. However, given the huge changes in recent US economic activity, it is likely that any forecasts of external traffic prepared before the Recession would now have to be substantially revised.</p>		
33-34	Modeling Uncertainty	71	<p><b>Considerable uncertainty exists in traffic modeling.</b>  Traffic modeling and forecasting is a craft, not an art or a science. The process is fraught with uncertainty throughout because each step in the process involves the use of critical and generally not-verifiable assumptions concerning the nature of growth or traffic. Uncertainties in the myriad assumptions that must be made in virtually all of its steps</p>	<p>Discussion provided in this section by the commenter supports the overall project process and comment responses discussed in previous sections. The traffic results and conclusions made for this project are not certain, since they are forecasts of the future, but they are the product of a detailed, approved methodology and standard process used for project-level traffic forecasting and analysis in North Carolina, and meet the requirements under 40 CFR 1502.24. The results and conclusions have gone through a detailed review and update process to ensure that uncertainty was considered and accounted for, as deemed reasonable and necessary, using the latest available data.</p>	<p>I am pleased to see that the Respondent agrees with me that traffic forecasts are by their nature, "not certain." To paraphrase George Box, "All forecasts are wrong. By how much determines their value."</p> <p>The DOT used an 8-year old model for traffic forecasts, did not update it for major changes in demographics, did not re-calibrate it to the corridor of interest, did not include all improvements to the existing route, failed to adequately explain the inconsistencies between zero traffic growth on U.S. 74 and Study Area population growth, and did not adequately consider alternative growth scenarios. These facts, not in dispute, compel me to stand by my original concerns about the reliability</p>

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			<p>have the effect of making “output” uncertainties substantial.</p> <p>The DSFEIS supporting documents recognize this uncertainty, but only for land use inputs, noting that errors in population and land use forecasts can be very high. <i>“For county level projections of 25 years, the typical mean algebraic percentage errors are about 30 percent while for census tracts (which are typically larger than TAZs) errors are typically 45 percent for the same period. Thus, despite the best efforts of researchers and forecasters, the error rates for long-range projections are still quite high and thus any projection or estimate of induced and cumulative</i></p>		<p>of the traffic forecasts for corridor decision-making.</p> <p><i>How accurate can a traffic forecast be reasonably expected to be, given our present state of knowledge about travel behavior?</i> New data collected by this reviewer (Hartgen) addresses this question. The following table shows the results, based on a survey of 134 professional transportation modelers and planners in 2014.</p> <p><b>How accurate is a travel demand forecast ‘reasonably expected’ to be? (Average accuracy, pct, and range)</b></p> <table border="1" data-bbox="1537 829 2034 1440"> <thead> <tr> <th data-bbox="1537 829 1717 1052">Project type</th> <th data-bbox="1717 829 1808 1052">Cali b</th> <th data-bbox="1808 829 1927 1052">1 year after opening</th> <th data-bbox="1927 829 2034 1052">20 years after opening</th> </tr> </thead> <tbody> <tr> <td data-bbox="1537 1052 1717 1154">New road, tolled</td> <td data-bbox="1717 1052 1808 1154">*</td> <td data-bbox="1808 1052 1927 1154">11+-6</td> <td data-bbox="1927 1052 2034 1154">24+-14</td> </tr> <tr> <td data-bbox="1537 1154 1717 1256">New road, un-tolled</td> <td data-bbox="1717 1154 1808 1256">*</td> <td data-bbox="1808 1154 1927 1256">11+-6</td> <td data-bbox="1927 1154 2034 1256">24+-13</td> </tr> <tr> <td data-bbox="1537 1256 1717 1440">Widen existing road, un-tolled</td> <td data-bbox="1717 1256 1808 1440">9+-5</td> <td data-bbox="1808 1256 1927 1440">12+-8</td> <td data-bbox="1927 1256 2034 1440">23+-12</td> </tr> </tbody> </table>	Project type	Cali b	1 year after opening	20 years after opening	New road, tolled	*	11+-6	24+-14	New road, un-tolled	*	11+-6	24+-13	Widen existing road, un-tolled	9+-5	12+-8	23+-12
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			<p><i>effects must be considered the best estimate within a wide range of error. The accuracy of projected growth under any future scenario could be affected by many variables. These include individual owner or developer actions, the timing of or changes in utility provision, changes in local or state regulations on land use and, most importantly, changes in national or regional economic conditions. While the potential for error is high, the techniques used by the MPO are the best available and provide the best available data for projecting population and employment conditions in the future.”</i> Such “input”</p>		<table border="1" data-bbox="1537 207 2039 430"> <tr> <td data-bbox="1537 207 1717 430">Major arterial improvement, but no widening</td> <td data-bbox="1717 207 1808 430">10+-7</td> <td data-bbox="1808 207 1927 430">11+-6</td> <td data-bbox="1927 207 2039 430">24+-14</td> </tr> </table> <p data-bbox="1537 430 2039 613"><i>Source: D. Hartgen, ‘The next 50 years in travel analysis: what we need to know.’ Internet Survey and workshop Summary, April 3, 2014 available at <a href="http://www.hartgengroup.net">www.hartgengroup.net</a>.</i></p> <p data-bbox="1537 613 2039 1421">The table indicates that calibration accuracy for major existing roads can be ‘reasonably expected’ to be within 9-10%, +- 5-7%. This is consistent with model calibration standards noted in my original comments that “major road” traffic volumes should all be within +-20% of ground counts. A 2009 study by Schiffer and Rossi (<i>R. Shiffler and T. Rossi, ‘New calibration and validation standards for travel demand modeling’, Transportation Research Board, 2009 Compendium of Papers, # 09-3049 available at <a href="http://www.trb.org">www.trb.org</a></i>) suggests a similar standard for freeways: 75% of links should be within +- 20%, and 50% of links within +- 10% of ground counts. Based on the above discussion of calibration, it is likely that the MRM</p>	Major arterial improvement, but no widening	10+-7	11+-6	24+-14
Major arterial improvement, but no widening	10+-7	11+-6	24+-14						

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			<p>errors and also errors in model calibration are also carried forward into traffic forecasts. However, just because the techniques of land use forecasting are the "best available" does not mean that their results can be trusted for decision-making.</p> <p>In addition to large errors in inputs, and errors in calibration (discussed above) recent studies have found wide variations in the accuracy of modeled traffic forecasts, and the errors can be either an "under" or an "over" forecast. A study of 20-year traffic forecasts for Minnesota found that freeway traffic was <i>under-</i> forecast by about 5%, while forecasts for other roads were <i>over-</i>forecast by</p>		<p>fails these calibration standards.</p> <p>For traffic forecasts for major new roads (either tolled or un-tolled), the average 20-year forecast accuracy should be within 24%, +/- 13-14%.</p> <p>Of course, no one can know in advance of road construction and a 20-year wait, what the actual accuracy of the DOT's forecast of traffic will be. But failure to base forecasts on up-to-date demographic and traffic trends seriously undermines any attempt at accuracy. Based on the large changes in demographics and road improvements in the Study Area, it is likely that the 20-year traffic forecasts for the Monroe Bypass will fail the professionals' "reasonable accuracy" test.</p>

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			<p>14-29%. On the other hand, a US national review of toll road forecasts found that for 15 US toll roads, the actual traffic averaged 35% <i>under</i> the predicted traffic. In England, the Department for Transport found that 90% of major road traffic forecasts were within 43% of actual traffic — a very wide spread for policy making. In another study of 104 toll roads worldwide, Bain found that after correcting for “optimism bias” the average 20-year- out actual traffic was about 20% <i>under</i> the predicted traffic. Also worldwide, Flyvbjerg and colleagues found in a review of 258 road and transit projects that</p>		

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			<p>the actual road traffic averaged about 17% <i>under</i> the forecast traffic, but actual costs were 250% <i>over</i> the forecast cost, with toll roads in particular having larger errors. <i>In short, the limited reviews so far have found that the average error in 20-year forecasts of road traffic range from ±20% upwards to ±30-40%, with most actual traffic coming in substantially under the forecast traffic.</i> The errors are also substantially higher for toll roads, leading some observers to suggest that “optimism bias” may be substantially inherent in forecasts prepared on behalf of project advocates. This author (Hartgen) has</p>		

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			<p>recently reviewed the topic and has found that the overall accuracy of traffic forecasts is likely to be so large that he recommends considerable caution in their use and less reliance on traffic forecasts for transportation decision-making.</p>		
34-35	Modeling Uncertainty	72	<p>The DSFEIS partially recognizes this uncertainty (at least in inputs) and employs sensitivity tests to evaluate the range of its results. However, the range of variation in the assumptions (for instance assumption concerning population forecasts, a 20% difference for value-of-time, a 30% difference in economic growth, the use of electronic toll collection, and 5%</p>	<p>The range of variation applied in sensitivity tests of variables employed in the traffic and revenue forecasts for the Monroe Connector/Bypass follows toll industry standards for evaluation of projected traffic demand, given a conservative range of potential variation. It is the commenter's own opinion, with no citation to any published source or reference, that these sensitivity ranges are not "extreme" enough to encapsulate what would be a multitude of possible outcomes.</p> <p>Proper caution has been exercised through the traffic and revenue forecast, project-level traffic forecast, and in all travel demand models utilized for the project to capture, to the extent practicable, all</p>	<p>The Respondent's comment ignores the large body of research and the calibration discussion above, that quantifies both how accurate model forecasts should be, and how accurate they actually are.</p> <p>The Triangle Expressway, in southeast Wake County, is a modern 6-lane freeway with a maximum (LOS E) capacity of about 150,000 vehicles/day. That it presently carries just 20,000 vehicle/day at its highest point and 5,000-8,000 vehicles/day for most of its route is an indication of either forecasting failure or</p>

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			<p>difference in fuel prices) do not seem to be extreme enough given recent history.</p> <p>The recent experiences of South Carolina's Southern Connector, in bankruptcy, the New York court case regarding toll-road forecasts in Detroit and Alabama, and North Carolina's Triangle Expressway — built 6-lanes wide but carrying just 20,000 ADT near I-40 and 4,000-6,000 ADT elsewhere — all encourage extreme caution in the use of traffic and revenue forecasts for decision-making, particularly for proposed toll roads where project risk is shifted to distant investors, or if fiscal failure occurs, to the People of North</p>	<p>potential unknowns related to variation in the forecast. The commenter's example of the Triangle Expressway as a "cautionary tale" related to traffic forecasting for toll facilities – using data showing what he alludes to be "low" traffic volumes – completely ignores the fact that the facility has only recently been open to traffic and has shown steady increases in traffic volumes and transponder sales while meeting or exceeding projections for both.</p>	<p>government waste, regardless of whether the road "meets or exceeds projections."</p> <p>Here is a recent (Jan, 24, 2013) photo showing the largely-empty road.</p>  <p>Does NCDOT want a similar picture to be made of the Monroe Bypass traffic in 2017?</p>

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			Carolina.		