# 2. ALTERNATIVES CONSIDERED

*Section 2 summarizes the extensive multi-step alternatives development process carried out during the preparation of the Draft EIS, additional analyses conducted and documented in the Final EIS as a result of public and agency comment, and updates and analyses conducted after the Final EIS. This section consolidates information from the Draft EIS, Final EIS, and technical reports developed during the course of project studies. DSA D remains the Preferred Alternative, as noted in* ***Section 2.6*** *and discussed in* ***Section 3*** *of this Draft Supplemental Final EIS.*

## 2.1 ALTERNATIVES DEVELOPMENT AND SCREENING

The NCDOT followed an alternatives screening process for the Monroe Connector/Bypass, and incorporated additional comparative and detailed analyses as part of the Final EIS and after the Final EIS, including those following comments received from the public and resource agencies. A typical alternatives screening process for a transportation project starts with an initial qualitative screening of a large number of alternatives. Further screenings refine the remaining alternatives and implement progressively more detailed qualitative and quantitative evaluation criteria.

As defined in the American Association of State Highway and Transportation Officials' (AASHTO) *Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects – Practitioner's Handbook* (August 2007), the term "alternatives screening" is commonly used to refer to the process for reviewing a range of preliminary alternatives or concepts and deciding which ones to carry forward for detailed study. The primary function of an alternatives screening process is to determine reasonableness as a means of separating the unreasonable alternatives (which can be eliminated without detailed study) from reasonable alternatives that must be carried forward for detailed study. As was the circumstances of the Monroe Connector/Bypass, if there are many reasonable alternatives, the screening process also can be used as the basis for defining a range that represents the full spectrum of reasonable alternatives.

The development and evaluation of alternatives for determination of the Detailed Study Alternatives (DSA) included in the Draft EIS is documented in detail in the *Alternatives Development and Analysis Report* (PBS&J, April 2008), and further studies of existing US 74 are documented in the *Upgrade Existing US 74 Alternatives Study* (HNTB, April 2009), incorporated by reference and available on the project Web site (www.ncdot.gov/projects/monroeconnector/). Additional studies of improving existing US 74 conducted after the Final EIS are documented in the *US 74 Corridor Analysis Scenarios* (HNTB, December 2010). This Draft Supplemental FEIS summarizes results of that work.

The following subsections summarize the process used to identify the Detailed Study Alternatives in the Draft EIS (**Section 2.2**); additional analyses conducted and included in the Final EIS as a result of public and agency comment (**Section 2.3**); and updates and analyses conducted after the Final EIS (**Section 2.4**). The majority of the public comments received on alternatives are related to the alternative analysis, including comments received after the Final EIS, and many of these comments are related to the alternatives for upgrading existing US 74. The history of the evaluation of the Improve Existing US 74 Alternative also is summarized in a table in **Appendix B**. **Section 2.5** summarizes a review of traffic forecasts and operations analyses for the Build Alternatives. Finally, **Section 2.6** provides a conclusion regarding the entire extensive alternatives development and evaluation process. The entire alternatives development process is depicted in the flow chart in **Figure 2-1a-b** at the end of this section. **Appendix B** includes figures showing the alternative

corridors for Upgrade Existing US 74 Alternatives and New Location Alternatives referenced in **Figure 2-1a-b**.

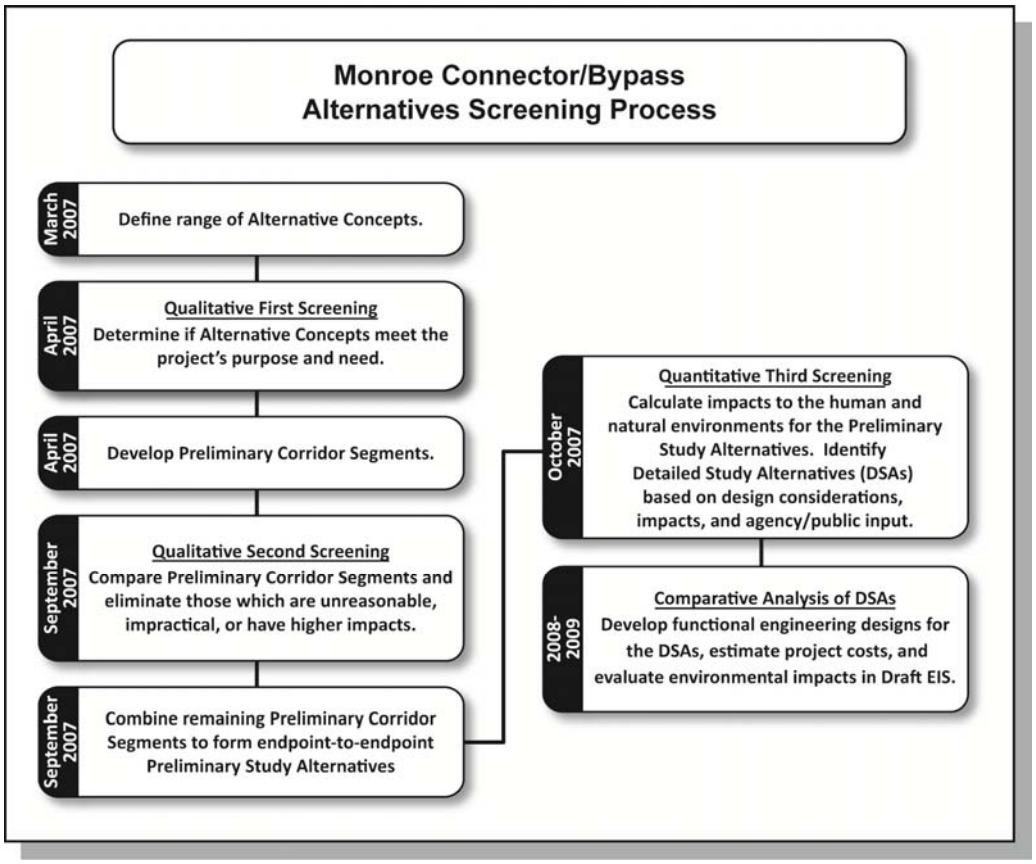
## 2.2 ALTERNATIVES SCREENING FOR THE DRAFT EIS

### 2.2.1 PROCESS OVERVIEW AND SCREENING RESULTS

**Screening Process**

**Exhibit 2-1** broadly depicts the overall alternatives evaluation process used to develop the Detailed Study Alternatives included in the Draft EIS, and the time frame for the screenings. The chart simplifies the extensive screening procedure used for the Monroe Connector/Bypass, involving several levels of study and analysis to narrow down a reasonable set of alternatives for detailed study in the Draft EIS. As the chart shows, the initial screening was conducted in three steps.

**EXHIBIT 2-1. Alternatives Evaluation Process for the Monroe Connector/Bypass**




1st Qualitative Screening – evaluated the ability of an alternative concept to meet the project's purpose and need based on the established screening criteria. The 1st Qualitative Screening evaluated the range of alternative concepts suggested in the *FHWA Technical Advisory T 6640.8A* (1987) that should be considered when determining reasonable alternatives. These are:

- No-Build or No-Action Alternative
- Transportation Demand Management Alternative

- Transportation System Management Alternative
- Mass Transit and Multi-Modal Alternatives
- Build Alternatives, including Upgrading Existing Roadways and New Location Alternatives

The following three evaluation criteria were based on the purpose and need and applied to the analysis of each alternative concept:

- Does the alternative address the need to enhance mobility and increase capacity in the US 74 corridor?
- 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)?
- Does the alternative maintain access to properties along existing US 74?

2nd Qualitative Screening – compared Preliminary Corridor Segments on new location and along existing US 74 and other roadways, and eliminated those which were determined unreasonable, impractical, and/or had higher impacts.

3rd Quantitative Screening – calculated and compared impacts to the human and natural environments for the Preliminary Study Alternatives and identified the Detailed Study Alternatives based on design considerations, impacts, and agency/public input.

## Public and Agency Input

The public and local, state, and federal environmental resource and regulatory agencies were involved throughout the project development process. Numerous opportunities for involvement were provided to solicit and obtain input and comment, beginning at the initial development of the project's purpose and need, and continuing through the determination of the range of reasonable alternatives for detailed study (and beyond). Comments were accepted at any time, with formal opportunities provided at milestones in the process. The plan to involve the public and agencies in the process is included in the *Section 6002 Project Coordination Plan* (October 2007) for the project and summarized in Section 2 and Section 9 of the Draft EIS.

Agencies were involved in the technical process of both purpose and need and alternatives development and screening via monthly agency coordination meetings (Turnpike/Environmental Agency Coordination, or TEAC, meetings). Input from agencies was requested as the screening criteria were developed and refined. At the TEAC meetings, NCDOT requested and received agreement from participating agencies on vital elements of the project's purpose and need and subsequent alternatives development and detailed study alternatives identification.

In June 2007, over 25,000 newsletters were distributed to solicit public involvement beginning early in the process. The purpose and need for the project was presented at Citizens Informational Workshops held on June 25 and 26, 2007. There was agreement on existing and future need, and strong support of the project purpose by the public[1]. Following support of the project purpose and need, project alternatives were then presented to both the public and agencies, as documented in Section 2 of the Draft EIS.

[1] Per the Summary of the Citizens Informational Workshop Comment Forms (July 2007), over 90% of respondents agreed with the proposed project purposes of 1) improving mobility 2) providing high-speed regional travel, and 3) maintaining property access.

## Tolling

Tolling was a consideration in the alternatives development process beginning with the 2nd Qualitative Screening. However, as discussed below, the tolling aspect of the project had no influence on the concepts identified for detailed study and little influence on the roadway preliminary design.

In the 1st Qualitative Screening, which evaluated alternative concepts' abilities to meet purpose and need, tolling was not a consideration. Non-toll alternatives considered included upgrading existing US 74 by widening, upgrading existing US 74 to a Superstreet design, TSM Alternatives, and TDM Alternatives. Mass Transit/Multi-Modal Alternatives (the mass transit component likely would include user fees) also were considered. These were eliminated from detailed study for reasons unrelated to the ability to toll.

Concepts that passed through the 1st Qualitative Screening were Improve Existing US 74 (controlled-access highway), New Location Roadway (controlled-access highway), and New Location/Improve Existing Roadways Hybrid (controlled-access highway). These concepts were determined to be the only ones that could meet the project's purpose and need (either tolled or non-tolled).

As discussed in Section 2.3.2.5 of the Draft EIS, the NCTA determined that the Monroe Connector/Bypass is financially feasible with the collection of tolls. In the Charlotte Regional Transportation Planning Organization's (CRTPO's) 2035 LRTP, tolling has been identified as a funding source for this project. Using tolls, the NCDOT can provide the funding needed to construct the project many years earlier than with traditional funding sources. Using tolls as a funding mechanism for construction and maintenance allows needed capacity to be added when budget shortfalls would otherwise prevent or delay completion of critical projects.

In the 2nd Qualitative Screening, tolling was considered in the design of the Preliminary Corridor Segments. All alternative concepts that made it through the first qualitative screening to the second qualitative screening are concepts that could involve tolling in their designs. The FHWA memorandum titled *NEPA Analysis of Toll Roads* (October 2004) states that an MPO may identify toll revenues as a funding source for a highway in its transportation plan when all other public funds are committed for other projects and not available (as is the case for the Monroe Connector/Bypass). The memo goes on to say that the NEPA document for such projects does not need to consider non-toll alternatives since the planning process demonstrated that these alternatives are not economically feasible.

State law prohibits tolling of existing roadways and requires a free alternate route (NCGS 136-89.197). To accommodate this, constructing the project along an existing roadway corridor would require frontage roads to provide the free alternate route. However, as part of the purpose and need criteria for the project, there is a need to maintain access to existing properties along existing US 74, so frontage roads would be needed for the Upgrade Existing US 74 Alternatives under either a toll or non-toll scenario to provide property access. Also, as discussed in Draft EIS Section 2.5.1.3, there are minimal differences between a roadway design with and without an electronic toll collection (ETC) system as proposed with this project.

## Results of Alternatives Screening in Draft EIS

1st Qualitative Screening – Concepts eliminated in the 1st Qualitative Screening were the TSM concept, the mass transit/multi-modal concept, and transportation demand management concepts (measures such as carpooling, telecommuting, and shifting work schedules to off peak hours). The

results revealed that only a controlled-access highway type facility (either on new location or an upgrade of existing roadways, or combination of new location and upgrade existing) would fulfill the identified needs and meet the purpose of the project.

The reasons for the conclusions are detailed in the *Alternatives Development and Analysis Report* (PBS&J, April 2008) and Section 2.2.2 of the Draft EIS. These conclusions were reviewed and remain valid.

The No-Build (or No-Action) alternative served as the baseline comparison for the design year (2035). This alternative assumes that the transportation systems for Union and Mecklenburg Counties would evolve as currently planned in the MUMPO *2030 Long Range Transportation Plan*, but without major improvements to the existing US 74 corridor from near I-485 to between the towns of Wingate and Marshville. Since the Draft EIS, the MUMPO *2035 LRTP* has been released; however, the *2035 LRTP* does not include any additional projects within the project area that would change the conclusions presented in the Draft EIS regarding the No-Build Alternative.

2nd Qualitative Screening – Section 2.3 of the Draft EIS summarizes the 2nd Qualitative Screening. The 2nd Qualitative Screening consisted of a series of assessment steps to determine which Preliminary Corridor Segments to include in the 3rd Quantitative Screening. This 2nd screening included four steps:

1. Establish a project study area to develop Preliminary Corridor Segments.

   *This study area was reevaluated for this Draft Supplemental Final EIS and remains valid.*

2. Assess Individual Preliminary Corridor Segments
   - Preliminary Corridor Segments include new location corridors and corridors along existing roadways (including existing US 74 and a corridor south of existing US 74). These are shown in **Appendix B**.
   - Segment eliminated if it had likely substantial impacts to the natural and/or human environment.
   - Segment carried forward if it provided a route where no other similar options existed and/or if additional information and evaluation were needed to determine if the Preliminary Corridor Segment would be viable and reasonable.
3. Assess and Compare Relative Preliminary Corridor Segments
   - This evaluation focused on four areas where several options existed to provide the same route. These four areas are shown in Figure 2-4a-e of the Draft EIS.
   - Segments were eliminated that had greater impacts to the natural and/or human environment compared to other corridor segments in the same area that provided a similar function.
4. Consolidate Corridor Segments into Preliminary Study Alternatives (shown in **Appendix B**)

The 2nd Qualitative Screening resulted in the elimination of ten corridor segments and consolidation of several others (see Figure 2-5 of the Draft EIS for the Preliminary Corridor Segments that passed through to the evaluation in the 3rd Quantitative Screening).

3rd Quantitative Screening - The Preliminary Corridor Segments retained after the 2nd Qualitative Screening were combined to form 25 Preliminary Study Alternatives (PSAs). The purpose of the 3rd screening was to identify those Preliminary Study Alternatives that should be carried forward for detailed study in the Draft EIS. Sixteen DSAs were identified, as discussed in **Section 2.2.2**.

For the PSAs, design criteria and conceptual alignments were developed within the 1,000-foot corridors and preliminary impacts were quantified for the PSAs to compare and evaluate them. The screening criteria included factors such as cost, residential and business relocations, stream and wetland impacts, potential impacts to protected species, and other human and natural environment impact screening factors. These factors, listed in Table 2-3 in the Draft EIS, were identified with input from local, regional, and federal agency representatives and staff and the public.

All PSAs 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.

Subsequent to the 3rd Quantitative Screening, additional evaluation of PSA G (Improve Existing US 74) was included in the Draft EIS in response to agency comments requesting additional information regarding upgrading existing US 74. NCDOT further assessed PSA G and also developed and assessed a Revised PSA G (reduced impact compared to PSA G), as documented in *Upgrade Existing US 74 Alternatives Study* (HNTB, April 2009) and summarized in Sections 2.4.4.2 and 2.4.4.3 of the Draft EIS. The additional evaluations confirmed that PSA G and Revised PSA G would still not be reasonable or practicable, and therefore, they were not considered as detailed study alternatives.

### 2.2.2 DETAILED STUDY ALTERNATIVES IN THE DRAFT EIS

The 16 endpoint-to-endpoint detailed study alternatives (DSAs) listed in **Table 2-1**, and shown in **Appendix B**, were selected for further detailed study based upon the outcome of the alternatives screening process described above.

As previously noted, despite its inability to meet the project purpose and need, the No-Build Alternative was still retained to provide a baseline for comparison with the DSAs in accordance with NEPA regulations (40 CFR Part 1502.14(d)) and FHWA guidelines (Technical Advisory T 6640.8A; Section V.E.1).

Based on the information considered in the Draft EIS, the FHWA and NCDOT identified DSA D as the Recommended Alternative, as discussed in Section 2.8 of the Draft EIS and shown in Figure 2-8a-c of the Draft EIS. The FHWA and NCDOT identified a Recommended Alternative as a way of giving readers of the Draft EIS an indication of the agencies' thinking at the time.

**TABLE 2-1: Detailed Study Alternatives**

| DSA | DSA Segments* | Length (miles) |
|---|---|---|
| A | 18A, 21, 22A, 31, 36, 36A, 40 | 20.6 |
| B | 18A, 21, 30, 31, 36, 36A, 40 | 20.5 |
| C | 2, 21, 22A, 31, 36, 36A, 40 | 19.7 |
| D | 2, 21, 30, 31, 36, 36A, 40 | 19.6 |
| A1 | 18A, 21, 22A, 31, 34, 34B, 40 | 20.5 |
| B1 | 18A, 21, 30, 31, 34, 34B, 40 | 20.5 |
| C1 | 2, 21, 22A, 31, 34, 34B, 40 | 19.6 |
| D1 | 2, 21, 30, 31, 34, 34B, 40 | 19.6 |
| A2 | 18A, 21, 22A, 31, 36, 36B, 41 | 20.6 |
| B2 | 18A, 21, 30, 31, 36, 36B, 41 | 20.5 |
| C2 | 2, 21, 22A, 31, 36, 36B, 41 | 19.7 |
| D2 | 2, 21, 30, 31, 36, 36B, 41 | 19.6 |

**TABLE 2-1: Detailed Study Alternatives**

| DSA | DSA Segments* | Length (miles) |
|---|---|---|
| A3 | 18A, 21, 22A, 31, 34, 34A, 41 | 20.5 |
| B3 | 18A, 21, 30, 31, 34, 34A, 41 | 20.4 |
| C3 | 2, 21, 22A, 31, 34, 34A, 41 | 19.6 |
| D3 | 2, 21, 30, 31, 34, 34A, 41 | 19.6 |

*Preliminary Corridor Segments 0, 1, 1A, 42, and 43 were combined with other segments during development of the DSAs. DSA Segments 34A, 34B, 36A, and 36B were added within existing DSA Segment corridor limits during preparation of the functional design plans to allow combinations of all DSA Segments to form end-to-end alternatives. DSA Segment descriptions can be found in Figure 2-1 and Section 2.5 of the Draft EIS.

## 2.3 ADDITIONAL CONSIDERATION OF ALTERNATIVES IN THE FINAL EIS

After the Draft EIS comment period ended, the FHWA and NCDOT identified a Preferred Alternative (DSA D), as documented in the Final EIS, based on consultation with local transportation planning agencies, and state and federal environmental resource and regulatory agencies, as well as consideration of agency and public comments received on the Draft EIS and at the public hearings. The Preferred Alternative is discussed in **Section 3** of this Draft Supplemental Final EIS.

During the comment period for the Draft EIS, comments were received requesting additional information on the Transportation Demand Management (TDM) Alternative, Mass Transit/Multi-Modal Alternatives, and Transportation System Management (TSM) Alternatives. Additional information on the TDM Alternative and the Mass Transit/Multi-Modal Alternative from the *Alternatives Development and Analysis Report* (2008) was provided in Section 3.3.2 of the Final EIS, and is reproduced below. Minor updates are provided below for the existing conditions for the TDM Alternatives and Mass Transit/Multi-Modal Alternatives, but these updates do not change the decision to eliminate these alternatives from detailed study.

One additional TSM Alternative concept was evaluated and documented in Section 3.3.2 of the Final EIS. This additional analysis from the Final EIS is summarized below. Other studies conducted on the TSM Alternatives after the Final EIS are summarized in **Section 2.4**.

### TDM Alternatives

The Charlotte Area Transit System (CATS) promotes ridesharing to employment destinations in the Charlotte area by providing a car rideshare matching service and a vanpool program. The CATS vanpool program had 78 vanpools at the time the Final EIS was published, with two originating in Union County – one in Indian Trail and one in Waxhaw. Currently there are 76 vanpools, with three originating in Union County – two in Indian Trail and one in Waxhaw (CATS website: http://charmeck.org/city/charlotte/cats/commuting/vanpool/Pages/current.aspx).

CATS also promotes employer programs for managing travel demand. As reported in the Final EIS, there were 57 companies participating in CATS Employee Transportation Coordinator (ETC) Program. Currently there are 62 participating companies (CATS website: http://charmeck.org/city/charlotte/cats/commuting/ETC/Pages/default.aspx).

The TDM Alternative was eliminated from further study because it does not meet the project's purpose and need, as discussed in Section 3.3.2 of the Final EIS. TDM measures would provide increased transportation choices in the area, however, only a small percentage of travelers would take advantage of these options. TDM measures would not provide for high-speed regional travel, enhanced mobility, nor increased capacity for the majority of travelers in the US 74 corridor.

### Mass Transit/Multi-Modal Alternatives

The Mass Transit Alternative concept would include bus or rail passenger service. The Multi-Modal Alternative concept would combine mass transit with existing roadway improvements under the TSM Alternatives, as described in Section 3.3.2 of the Final EIS.

Separate studies of mass transit are being undertaken in Mecklenburg County by CATS. Plans and existing services in Union County, and between Union County and Mecklenburg County, are described below. Neither Union County nor the City of Monroe operates a public transportation system, with the exception of on-demand paratransit services. There are no plans to begin other public transportation services in the near future.

As reported in the Final EIS, CATS operates an express bus service to and from Uptown Charlotte (Route 74X), stopping at three park and ride lots in Union County. The first is located at Union Towne Shopping Center off US 74 in Indian Trail. The second is located at the K-Mart at 2120 West Roosevelt Boulevard (US 74) in Monroe, and the third one is located at Christ Bible Teaching Center at 1103 Unarco Road off (US 74) in Marshville. CATS still operates this express service, but it no longer stops at the Christ Bible Teaching Center (CATS Web site: http://charmeck.org/city/charlotte/cats/Bus/routes/Pages/default.aspx).

CATS is planning a major expansion of its mass transit service throughout Mecklenburg County. In November 1998, Mecklenburg County citizens approved a local sales tax (one-half percent) to support implementation of the *2025 Integrated Transit/Land Use Plan*, which identified five major mass transit corridors. One of these corridors, the Southeast Corridor, has a study area that extends from Center City Charlotte southeast along US 74 to Central Piedmont Community College just south of I-485 in Mecklenburg County. This project is also known as the LYNX Silver Line, and there are currently no plans to extend the project into Union County.

As discussed in Section 3.3.2 of the Final EIS, the Mass Transit and Multi-Modal Alternatives were eliminated from further consideration.

### TSM Alternatives

A TSM Alternative was studied and included in the Draft EIS. This TSM Alternative Concept 1 considered minor operational and physical improvements to increase capacity along existing US 74 consisting of traffic signal timing optimization, access control measures (e.g. driveway consolidation, closing median breaks), and intersection improvements such as adding intersection turn lanes and extending turn lanes to accommodate longer queues. This alternative concept could also include converting existing lanes on US 74 to high occupancy vehicle (HOV) lanes. This alternative was eliminated from detailed study in the Draft EIS (Section 2.2.2.3 of Draft EIS).

As part of the comments received on the Draft EIS, it was brought to the attention of NCTA that NCDOT Division 10 conducted a study of the existing US 74 corridor titled *US 74 Corridor Study* (Stantec, July 2007). Study goals were "to identify and develop improvements that, where possible, would provide a LOS [level of service] of D or better at each signalized intersection for projected 2015 traffic volumes. Because of development along the study corridor and agency budgetary constraints,

LOS goals were not attainable at all locations. Where LOS goals could not be attained, reasonable improvements were recommended within the study constraints."

It is clearly stated in the *US 74 Corridor Study* executive summary that the purpose of the study was to provide recommendations for interim and immediate actions until such time as the Monroe Connector/Bypass was constructed. The study itself notes that "this vital transportation corridor (US 74) will be in critical need of additional through lanes on US 74 or alternate routes will need to be identified to meet the demands of the public" (page iv).

The information from this study, including a description of the improvements studied, and the results, were incorporated into TSM Alternative Concept 2, as discussed in Section 3.3.2 of the Final EIS, summarized below.

TSM Alternative Concept 2 is an enhancement of Concept 1. Improvements included in Concept 2 are those labeled Long Term Improvements in the *US 74 Corridor Study* (July 2007). By long term improvements, the authors of that study meant improvements to be implemented by 2015. The improvements include closing median openings, converting US 74 to a Superstreet from Stallings Road (SR 1365) to Unionville-Indian Trail Road (SR 1367), a distance of about 2.7 miles, and a series of intersection improvements. These improvements are listed in Table 3-5 of the Final EIS.

The *US 74 Corridor Study* concluded that by implementing the improvements listed in Table 3-5 of the Final EIS, an overall LOS D in 2015 could be attained at the intersections along the US 74 study corridor, except for the intersection of US 74 at Rocky River Road (SR 1514). However, these improvements would not result in high-speed travel through the corridor in 2015. With the improvements listed in the table, average travel speeds in 2015 for the eastbound direction in the pm peak were estimated to be 30 mph along the Superstreet design and 29 mph for the remainder of the corridor evaluated. Travel times were calculated using computer modeling and reported in Appendix IV and Appendix VII (Superstreet Design Area) of the *US 74 Corridor Study*. A review of the travel time tables shows one consistent anomaly across all tables. This anomaly occurs for the segment from Faith Church Road to Unionville-Indian Trail Road, where average travel speeds are reported as well above speed limits (e.g. 101.4 mph, 127.8 mph). This anomaly was removed from the travel time reported here.

A comparison of the year 2015 traffic volumes used in the *US 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 US 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.

TSM Alternative Concept 2 was eliminated from further consideration, as discussed in Section 3.3.2 of the Final EIS.

Since the Final EIS, many of the recommended improvements from the *US 74 Corridor Study* have been implemented by NCDOT, as discussed in **Section 2.4** under the subheading "TSM Measures Implemented along Existing US 74".

# 2.4 ADDITIONAL CONSIDERATION OF ALTERNATIVES AFTER THE FINAL EIS

After the Final EIS, additional consideration was given to Improve Existing US 74 Alternatives as part of the Section 404 jurisdictional resources individual permit process. In addition, as part of the updates to all information conducted for this Draft Supplemental Final EIS, data was collected on improvements that have been made to existing US 74 in the project study area since the Final EIS. These improvements are TSM-type improvements. The additional analyses for the Improve Existing US 74 Alternatives and the TSM-type measures that have been implemented along the corridor are discussed below.

**Appendix B** includes a table that summarizes the history of Improve Existing US 74 alternatives in the project development process for the Monroe Connector/Bypass.

## Improve Existing US 74 Alternatives

In response to questions from the USACE on the Section 404 jurisdictional resource individual permit application NCDOT prepared a 2035 comparative planning level analysis of four Upgrade Existing US 74 corridor scenarios to determine if upgrading US 74 would provide acceptable corridor levels of service in the design year 2035 (*US 74 Corridor Analysis Scenarios*, HNTB, December 2010). A total of four scenarios were analyzed: 1) No-Build, 2) Superstreet Existing, 3) Widen to 6-Lane (No Superstreet), and 4) Superstreet 6-Lane. The third option assumed widening the entire US 74 corridor to a 6-lane section while maintaining other existing roadway characteristics.

The results of the comparative analysis showed that in the design year 2035, US 74 under all four scenarios is expected to exceed LOS D in the majority of the corridor. Exceeding the maximum volume LOS D threshold indicated that the segment is expected to operate at LOS E or F and experience heavy congestion, queuing and unstable traffic flow. The Superstreet 6-Lane scenario option provided the highest corridor capacity compared to the other three scenarios, and the best projected levels of service and travel speeds. However, 65 percent of the corridor is expected to operate at LOS F, and to operate with greatly reduced average travel speeds (well below the speed limit) under this scenario. For these reasons, these alternatives were not considered to be reasonable and feasible.

## TSM Measures Implemented along Existing US 74

In recent years, approximately 45 TSM measures have been implemented along existing US 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 US 74 that were mentioned for improvement in the *US 74 Corridor Study*. **Table 2-2** lists the improvements made within the existing US 74 corridor since the July 2007 publication of the *US 74 Corridor Study*. Whether an improvement was made before or after May 2010 (the date the Final EIS was published) and whether the improvement is included as a recommendation in the *US 74 Corridor Study* also are noted in the table.

**TABLE 2-2: US 74 Improvements Implemented Since July 2007[1]**

| Intersection | Improvement | *US 74 Corridor Study* Recommendation | Completed | |
|---|---|---|---|---|
| | | | Prior to May 2010[2] | After May 2010 |
| Stallings Road | Signal Timing Optimized | Y | | X |
| | Re-configured lane assignments on NB Stallings Rd. to have one left turn and one left turn/thru/right turn lane | N | | X |
| Indian Trail –Fairview Road | Signal timing optimized | Y | | X |
| | Incorporated 7-phase signal | N | X | |
| Unionville - Indian Trail Road | Signal timing optimized | Y | | X |
| | Added 2nd left turn lane for US 74EB | Y | X | |
| | Re-configured lane assignments on NB Unionville-Indian Trail Rd. to have one left turn/thru lane and one thru/right turn lane | Y | X | |
| Faith Church Road / Harris Teeter Dist Center | Signal timing optimized | Y | | X |
| | Added 2nd left turn lane for US 74EB | N | | X |
| | Added 2nd left turn lane on Faith Church Road | N | | X |
| Wesley Chapel - Stouts Road/Sardis Church Road | Signal timing optimized | Y | | X |
| | 8-phase signal | Y | X | |
| | Added 2nd left turn lane on Wesley Chapel-Stouts Road | Y | X | |
| | Added right turn lane on US74EB | Y | X | |
| | Added right turn lane on US74WB | N | | X |
| Chamber Drive | Signal timing optimized | Y | | X |
| | Added right turn lane on US74WB | N | X | |
| Rocky River Road | Signal timing optimized | Y | | X |
| | Added right turn lane on Rocky River Road SB | N | X | |
| Poplin Place/ Wellness Blvd. | Signal timing optimized | Y | | X |
| | Added 2nd left turn lane for US 74EB | N | X | |
| | Added right turn lane on US74WB | N | X | |
| | Re-configured lane assignments on Poplin Pl. to have one left turn lane, one left turn /thru lane and one right turn lane | N | X | |
| Hanover Drive | Signal timing optimized | Y | | X |
| | US 74WB left turn lane storage extended to 275 feet | Y | X | |
| Dickerson Boulevard | Signal timing optimized | Y | | X |
| | Added 2nd left turn lane on Dickerson Blvd. NB | N | X | |
| | US 74WB left turn lane storage increased | N | X | |

1. July 2007 is the date the US 74 Corridor Study was published.
2. May 2010 was the date of the Final EIS.

In addition to the improvements shown in **Table 2-2**, the NCDOT has also implemented a closed-loop signal system and optimized signal timings at the following intersections since the Final EIS was published, consistent with the recommendations included in the *US 74 Corridor Study*:

- Fowler Secrest Road/John Moore Road
- Rolling Hills Drive / Carroll Street
- Roland Drive / Round Table Road
- Williams Road
- Secrest Shortcut Road
- Stafford Street
- Boyte Street
- Morgan Mill Road
- Walkup Avenue
- Sutherland Avenue
- Venus Street / Dove Street
- Franklin Street
- US 601 South

The NCDOT also installed or modified directional crossovers (which only allow vehicles to make a specific movement such as eastbound US 74 to a destination on the north side of the roadway) at the following locations, consistent with the recommendations included in the *US 74 Corridor Study*:

- 2nd & 4th median openings west of Chamber Drive
- East of Poplin Place (into shopping center)

Finally, NCDOT converted the crossover between Dickerson Boulevard and Hanover Drive to a directional crossover, consistent with the recommendation of the *US 74 Corridor Study*.

One major long-term improvement recommended in the *US 74 Corridor Study*, constructing a superstreet facility for the intersections of US 74 with Stallings Road, Indian Trail-Fairview Road, and Unionville-Indian Trail Road, has not yet been implemented. In August 2013, NCDOT awarded $6.1 million in funding from the Highway Safety Improvement Program to convert four intersections on US 74 in Indian Trail (Indian Trail-Fairview Road, Unionville-Indian Trail Road, Faith Church Road, and Sardis Church Road) to superstreet facilities. These improvements are scheduled for construction in late 2015.

Even with the implementation of the improvements described above, US 74 experiences congestion during peak travel periods as highlighted in **Section 1.2.4**. Existing average speeds along US 74 are less than posted speed limits and less than 50 mph during peak travel periods. TSM improvements, while providing some short-term benefit, would continue to not meet the purpose and need for the Monroe Connector/Bypass project.

## 2.5 TRAFFIC FORECASTS AND OPERATIONS ANALYSES

### 2.5.1 BACKGROUND INFORMATION

As part of the alternatives analysis process, FHWA and NCDOT relied upon several traffic studies. The traffic studies include traffic forecasts (**Section 2.5.2**) and traffic operations analyses (**Section 2.5.3**). General descriptions for forecasts and operations analyses are provided below.

- A "traffic forecast" provides projected traffic volumes for a given year. Traffic volumes are provided as annual average daily traffic (AADT) on various roadways. Forecasts are based on consideration of a variety of data. For this project, this data includes, but is not limited

to: traffic counts, historic travel trends, the MUMPO Long Range Transportation Plan (LRTP), the *Metrolina Regional Travel Demand Model* (MRM), and existing road network operations. These individual data sources are not themselves traffic forecasts, and do not include the level of detail ultimately developed in the traffic forecast for a particular project. For example, the MRM may not include all of the roadways within a study area. Therefore, these roadways are included in the traffic forecast through analyzing traffic counts or other available data sources. Another example is traffic count data collected at one point in time and then annualized to compare to travel trends throughout the year.

- An "operations analysis" is based on the traffic forecasts. The operations analysis estimates congestion levels for roadway segments and intersections, which are typically measured in level of service (LOS). Other measures, such as volume/capacity (v/c) ratios, also are sometimes used.

A number of traffic forecasts and operations analyses were prepared for build and no-build Alternative scenarios, including several scenarios for upgrading US 74. Traffic forecasts and traffic operations analyses used in the Draft EIS are discussed in Sections 1.8.3 and 1.8.4 for the No-Build scenario, and in Section 2.6 of the Draft EIS for the Build scenario. Section 2.4.4.3 of the Draft EIS discusses upgrading existing US 74 to a toll facility, including traffic forecasts and operations.

In the Final EIS, Section 1.1.8 provides additional background information for the No-Build scenario traffic operations analysis discussed in Section 1.8.3 of the Draft EIS. Final EIS Section 2.3.5 notes traffic operations and traffic volumes were reevaluated for the Build condition based on the refined functional design of the Preferred Alternatives' interchanges at the US 74 Frontage Road, Unionville-Indian Trail Road, and Austin Chaney Road (SR 1758). Final EIS Appendix A – Errata corrects an error in Draft EIS Table 2-7 regarding the 2035 No-Build Alternative forecasts (further explained in **Section 2.5.2** – Question 4).

For this Draft Supplemental Final EIS, **Section 2.4** discusses additional traffic operations analyses conducted for various alternatives for improving existing US 74 (superstreets and widening scenarios).

### 2.5.2 TRAFFIC FORECASTS

As part of this Draft Supplemental Final EIS, the various traffic forecasts prepared for the project were given an in-depth hard look considering new data and updated regional travel demand models, and NCDOT guidance contained in *Guidelines to Determine When to Request an Updated Traffic Forecast* (NCDOT Transportation Planning Branch, February 24, 2009). The review is presented in the memorandum titled, *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013), included in **Appendix G**. The memorandum answers the following questions. A summary of the answer to each question is provided below, with full details in the memorandum.

1. What traffic forecasts were developed during the Monroe Connector/Bypass project development process and what were they used for?
2. How could updated socioeconomic (SE) data sets affect the No-Build scenario and Build scenario traffic forecasts for the Monroe Connector/Bypass project?
3. How could changes in socioeconomic data related to the project's indirect and cumulative effects affect the traffic forecasts for the Monroe Connector/Bypass?
4. Are the current No-Build traffic forecasts still valid for the purposes they were used?

5. Are the current Build scenario traffic forecasts still valid for the purposes they were used?
6. How would the Monroe Connector/Bypass affect the traffic on the US 74 corridor?

### Question 1 - What traffic forecasts were developed during the Monroe Connector/Bypass project development process and what were they used for?

Numerous traffic forecasts - and interpolations, extrapolations, and redistributions of these forecasts - have been developed and used for different purposes during the Monroe Connector/Bypass development process. **Table 2-3** provides a listing and description of each forecast and the uses of each forecast. Methods used to develop the forecasts are included in each of the listed traffic forecast documents. Additionally, traffic and revenue studies were developed to support the project financing, but these are revenue forecasts, not project-level traffic forecasts, so are not included in the table.

**TABLE 2-3: Summary of Monroe Connector/Bypass Project Traffic Forecasts**

| Document Name | | Date/Prepared By | Forecast Years/Scenarios | Used in NEPA process? / Notes | |
|---|---|---|---|---|---|
| **TRAFFIC FORECASTS** | | | | | |
| Document A | *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* | June 2008 Martin/Alexiou/ Bryson | 2007 & 2030 No-Build | Yes | Supplemented by Document F. |
| Document B | *Technical Memorandum for TIP Projects R-2559 & R-3329 US74 Upgrade Scenario* | June 2008 Wilbur Smith Associates (WSA) | 2035 Upgrade Existing: Non Toll and Toll for upgrade | Yes | Used to evaluate Upgrade US 74 Preliminary Study Alternatives PSA G and Revised PSA G in the Draft EIS. |
| Document C | *Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass* | September 2008 WSA | 2008 & 2035 No-Build Build Non-Toll Build Toll | No/ Yes | No-Build found in error, not used for any analysis and replaced by Document F (see Final EIS Appendix A). Build cases used in technical studies for Draft EIS and Final EIS. |
| **TRAFFIC FORECAST INTERPOLATIONS, EXTRAPOLATIONS, AND REDISTRIBUTIONS** | | | | | |
| Document D | *Monroe Connector/Bypass Alternative 3A - 2013 AADT Build Toll Scenario* | January 2009 HNTB | 2013 Build Toll | No | Only used to represent opening year traffic volumes on the April 2009 Public Hearing maps. Not used for any project analysis or presented in any NEPA document. |
| Document E | *2035 Build Toll Forecast, Segment 2 (Alternative 3A)* | July 2009 HNTB | 2035 Build Toll | Yes | Developed to account for a minor change in frontage road configuration at western terminus of project. |
| Document F | *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* | March 2010 HNTB | 2008 & 2035 No-Build | Yes | Corrects and replaces the No-Build forecast in Document C and supplements Document A. |
| Document G | *Monroe Connector / Bypass Year 2025 Build Toll Alternative 3A Traffic Volume Projections* | August 2010 HNTB | 2025 Build Toll | No | Prepared for the design-build teams for use in their design preparation. |

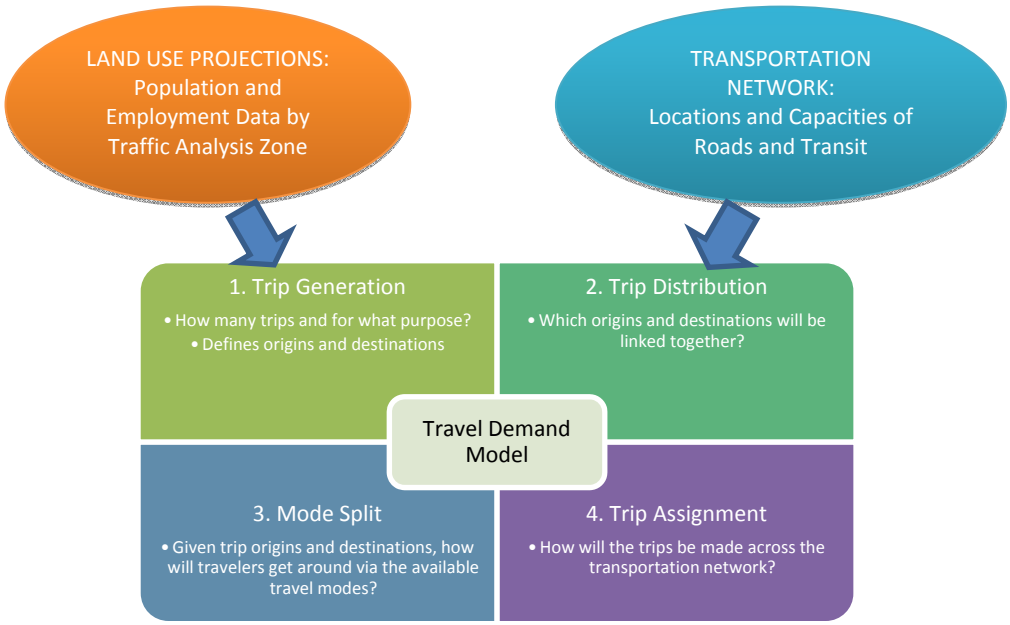
**A** – Utilized MRM Version MRM05 and 2005 socioeconomic (SE) data (SE_*Year*_taz2934)
**B thru G** – Utilized MRM06 and 2005 SE data (SE_*Year*_taz2934)
**D**, **E** and **G** – Based on interpolation or redistribution of **B**
**F** – Based on interpolation and extrapolation of **A**

Traffic forecast interpolations, extrapolations, or redistributions of the original traffic forecasts were developed for conditions or years not included in the initial traffic forecasts. This approach uses the original 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 forecasts. This methodology is appropriate when the differences being considered, such as different forecast years or minor differences in project geometry, do not change the original forecast, assumptions, methodology or base data.

### Question 2 - How could updated socioeconomic data sets affect the No-Build scenario and Build scenario traffic forecasts for the Monroe Connector/Bypass project?

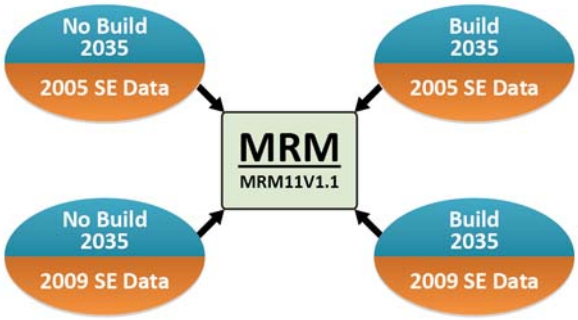
Socioeconomic (SE) data sets are used in the *Metrolina Regional Travel Demand Model* (MRM) as input to the model. The two key components of the MRM model are the set of SE data projections input to the MRM (population and employment data by geographic areas called traffic analysis zones [TAZ]), and the modeled transportation network (locations and capacities of roads, including the presence [build] or absence [no-build] of the Monroe Connector/Bypass, and transit). **Exhibit 2-1** illustrates the major components of the MRM.

**Exhibit 2-1: Components of the Metrolina Regional Travel Demand Model**




The MRM model output is an important, but not the only, input to the traffic forecasts developed for the project (see **Section 2.5.1**). The MRM is developed and maintained by the Charlotte Department of Transportation (CDOT) and is frequently updated, so over time a number of MRM versions and SE data sets are created. The travel demand model and SE data development process is described in detail in the *Monroe Connector/Bypass Quantitative Indirect and Cumulative Effects Analysis Update* (Michael Baker Engineering, Inc., November, 2013).

In order to consider if the updates to the SE data set that have occurred since the traffic forecasts were prepared would affect the No-Build Scenario and Build Scenario traffic forecasts, two sets of SE data were used with the current version of the MRM, MRM11v1.1, to test the sensitivity of the MRM output to different SE data sets. For this comparison, the MRM was run with two inputs for the transportation network (blue oval in **Exhibit 2-1**), the No-Build Scenario and the Build Scenario, and two inputs for the SE data (orange oval in **Exhibit 2-1**).




**MRM conditions modeled for Question 2**

The two SE data sets input to the MRM were the SE data included in the MRM for the original forecasts (called 2005 SE Data), and the latest SE data set (called 2009 SE Data).

The outputs from the MRM are travel demand model daily traffic volumes for the roadway links in the MRM. This raw model output (output straight from the model) is one of the factors that go into creating a traffic forecast, as discussed in **Section 2.5.1**. Raw model output is an important factor in developing traffic forecasts by, but not limited to, determining growth rates from base year to future year scenarios, traffic volume orders of magnitude, volume trends along facilities, and future year volumes for new location facilities.

It is important to note that a travel demand model is not an exact measure of existing or future traffic volumes, but is a tool to generally measure impacts of growth and development and help forecast travel characteristics at the planning level. Travel demand models employ a mathematical approach to understanding how changes in land use, population, and area employment may impact the transportation system. The MRM encompasses multiple counties in two states and was developed and calibrated as a tool to evaluate existing and future travel demands on a regional basis.

Raw model volumes for specific roadway links can be extracted from the regional model, but inherently have levels of variability based on the nature and purpose of the MRM. The accuracy of raw model volumes for existing and future conditions is based on a variety of factors which include existing and future roadway network detail, existing calibration parameters, and accuracy of future land use, population, and area employment estimates. Therefore, it is not appropriate to directly compare raw model daily volumes to balanced traffic forecast volumes. However, raw model output from the MRM can be used to determine trends and as validation of the applicability of results from the project's traffic forecasts since those forecasts use MRM model results as one of the factors in developing the forecasts.

To help answer **Question 2**, the raw model output from the MRM was extracted for segments along the Monroe Connector/Bypass and segments along existing US 74. To make the comparisons, this data was then converted to vehicle miles traveled (VMT) by multiplying the daily volume along a segment by the length of the segment. The VMTs were then added together to arrive at a total corridor VMT for the Monroe Connector/Bypass and a total corridor VMT for existing US 74 for each of the four model configurations used in this comparison. Because individual segment traffic volumes directly output from the MRM model have inherently higher degrees of variability, comparing the overall corridor VMTs and percent changes is more appropriate in identifying general trends in traffic patterns that may affect project traffic forecasts. The inherent variability of MRM

output for individual links can be based on different segment lengths, different socioeconomic growth assumptions in TAZs, different model networks and link characteristics, and different model methodologies for trip distribution and assignment from one MRM version to another.

**Table 2-4** presents the effects of varying the SE data sets on MRM model output using VMT.

**TABLE 2-4: Effects of Socioeconomic Data Sets on Travel Demand Model Output**

| Corridor | 2035 No-Build Scenarios Using MRM11v1.1 | | | 2035 Build Scenarios Using MRM11v1.1 | | |
|---|---|---|---|---|---|---|
| | Corridor VMT 2005 SE Data Set | Corridor VMT 2009 SE Data Set | % Change | Corridor VMT 2005 SE Data Set | Corridor VMT 2009 SE Data Set | % Change |
| Monroe Connector/Bypass | n/a | n/a | n/a | 798,990 | 822,160 | **3 %** |
| Existing US 74 | 921,340 | 965,940 | **5 %** | 743,790 | 782,050 | **5 %** |

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

As shown in **Table 2-5**, using the 2009 SE data resulted in an increase of 5 percent in VMT along existing US 74 under both the Build and No-Build scenarios and a 3 percent increase along the Monroe Connector/Bypass compared to the 2005 SE data. Changes in the MRM model output are to be expected and appropriate when comparing various socioeconomic data that are based on a variety of different information, assumptions, time periods, and horizon years. This comparison shows that even while differences exist between various socioeconomic data, the resulting VMTs are generally consistent.

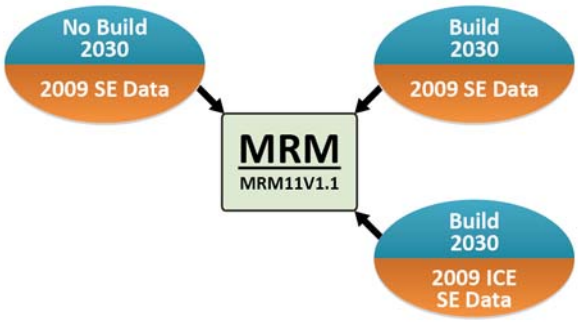
In summary, a comparison of the effects of the 2005 SE Data and the 2009 SE Data show that model output and VMTs are within 5 percent along existing US 74 and 3 percent along the Monroe Connector/Bypass. Keeping in mind that MRM model output is just one factor that goes into a traffic forecast, it is reasonable to conclude that the differences between the SE data sets would not substantially change the traffic forecast.

### Question 3 - How could changes in socioeconomic data related to the project's indirect and cumulative effects affect the traffic forecasts for the Monroe Connector/Bypass?

In the litigation related to this project (see **Section P.4.5**), the Plaintiffs challenged the traffic forecasts in the Draft EIS and Final EIS because the No-Build scenario traffic forecasts and the Build Scenario traffic forecasts used an MRM model that included the same set of SE data that did not account for alleged differences in the data that might result from constructing the project versus not constructing the project. The Defendants (FHWA and NCDOT) contended that the induced growth potential of the project would not change the socioeconomic data to a degree that would significantly alter the traffic forecasts, noting that raw model output from the MRM is just one of many inputs that go into a project's traffic forecasts.

However, for this Draft Supplemental Final EIS, a sensitivity analysis was conducted using the most current version of the MRM (MRM11v1.1) to see how raw model output would change between the most current 2009 SE Data and a modified 2009 SE Data set (2009 ICE SE Data) that includes the potential induced growth forecasts from the *Monroe Connector/Bypass Quantitative Indirect and Cumulative Effects Analysis Update* (Michael Baker Engineering, Inc., November, 2013).

The MRM model was run with one set of SE data (2009 SE Data) for the 2030 No-Build scenario and two sets of SE data (2009 SE Data and 2009 ICE SE Data) for the Build scenario. The year 2030 was used because this is the evaluation year used in the *Monroe Connector/Bypass Quantitative Indirect and Cumulative Effects Analysis Update.*




**MRM conditions modeled for Question 3**

**Table 2-5** presents the effects of the 2009 ICE SE Data on MRM model output using VMT. VMTs were calculated for the Monroe Connector/Bypass corridor and the existing US 74 Corridor. Regional VMTs for Union County, Mecklenburg County and the entire MRM model area also were evaluated for the Build Scenario to fully consider the potential effects of the 2009 ICE SE Data on the transportation network of the MRM.

**TABLE 2-5: Effects of the Indirect and Cumulative Effects Analysis Socioeconomic Data on Travel Demand Model Output**

| Corridor | *Column 1* Corridor VMT 2030 No-Build MRM11 2009 SE Data | *Column 2* Corridor VMT 2030 Build MRM11 2009 SE Data | % Change Column 1 to Column 2 No-Build to Build | *Column 3* Corridor VMT 2030 Build MRM11 2009 ICE SE Data | % Change Column 1 to Column 3 No-Build to Build | % Change Column 2 to Column 3 Build to Build |
|---|---|---|---|---|---|---|
| Monroe Connector/Bypass | n/a | 757,410 | n/a | 793,570 | n/a | 5 % |
| Existing US 74 | 918,520 | 729,910 | -21 % | 760,970 | -17 % | 4 % |
| Union County | n/a | 9,612,890 | n/a | 9,948,280 | n/a | 3 % |
| Mecklenburg County | n/a | 44,747,460 | n/a | 44,745,210 | n/a | ~0 % |
| MRM Network | n/a | 105,856,110 | n/a | 106,207,330 | n/a | ~0 % |

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

As shown in **Table 2-5**, there is a small difference in VMT reductions (3 percent) along existing US 74 comparing the No-Build scenario to the two Build scenarios. In other words, each Build scenario reduces VMT on existing US 74 relatively to the same degree over the No-Build scenario.

When comparing the two Build scenarios, again there is limited variability between the different build scenarios (2009 SE Data and 2009 ICE SE Data) output from the MRM model. At the corridor

level, the table shows a 4-5 percent increase in VMT between the Build Scenario with the 2009 SE Data and the Build Scenario with the 2009 ICE SE Data. As the geographic boundaries get larger, the relative difference in the MRM outputs between the modeled Build conditions becomes smaller. The difference in MRM model outputs in Union County is 3 percent, while for Mecklenburg County and the Metrolina region as a whole is effectively zero.

In summary, the effect of the 2009 ICE SE Data set on the raw MRM model VMT outputs between the Build conditions (Build with 2009 SE Data and Build with 2009 ICE SE Data) is relatively small. 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.

### Question 4 - Are the current No-Build traffic forecasts still valid for the purposes they were used?

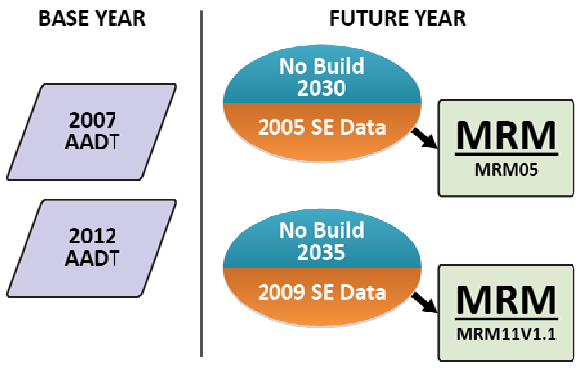
The current No-Build traffic forecasts are documented in the *Traffic Forecast for the No-Build Alternatives for NCDOT State TIP Project No. R-3329 and NCDOT State TIP Project No. R-2559, Monroe Connector Bypass Study* (Martin/Alexiou/Bryson, June 2008) (Document A), and *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (HNTB, March 2010) (Document F) listed in **Table 2-3**. The No-Build scenario forecasts include forecast volumes for the existing US 74 corridor. Both year 2030 and year 2035 No-Build forecasts used MRM version MRM05 with 2005 SE Data. Note that the current No-Build forecasts are for year 2035, but the MRM05 model they are based on has a horizon year of 2030, so the year 2035 forecast volumes were extrapolated from the 2030 MRM model output.

The base year 2007 and future year 2030 No-Build forecasts (Document A) were used in the traffic operations analyses conducted for the existing US 74 corridor, as summarized in Sections 1.8.3 and 1.8.4 in the Draft EIS. It should be noted that, as discussed in **Section 1.2.4**, real-time travel information on the existing US 74 corridor substantiates the need for the project, and it is no longer necessary to estimate traffic conditions using the base year forecasts.

The 2035 No-Build scenario forecasts (Document F) along the existing US 74 corridor were used to evaluate the effects of the Monroe Connector/Bypass on US 74 volumes through comparison with the 2035 Build scenario forecasts, as addressed in Final EIS Appendix A – Errata.

To determine whether the current No-Build scenario traffic forecasts are still valid for the purposes they were used, several conditions were compared to evaluate whether an updated No-Build forecast would be expected to have lower, equal, or higher forecast volumes.

In considering the base year (2007) No-Build scenario traffic forecasts, actual traffic counts (in annual average daily traffic volumes [AADT]) are a primary factor in determining these base-year forecast volumes. For this reason, 2007 and 2012 traffic count-based AADTs from NCDOT for existing US 74 were




**Comparisons used for Question 4**

compared to determine if an updated base-year traffic forecast would be expected to have higher volumes than the current 2007 No-Build forecasts. Over the five-year period from 2007 to 2012, average volumes along the US 74 corridor showed approximately zero percent growth based on available AADT data.

Based on this trend of no change in AADTs from 2007 to 2012, it is reasonable to conclude that an updated base year No-Build forecast (i.e. 2013) would generally be equal to the 2007 No-Build forecast. Therefore, the 2007 base-year No-Build traffic operations discussion included in Draft EIS Section 1.8.3 would still be valid for 2012 if no other physical conditions along existing US 74 substantially changed. However, a number of improvements have been made to existing US 74 in recent years, as described in **Section 2.4**. The effects of these physical changes on traffic operations analyses along existing US 74 are addressed in **Section 2.5.3**.

To consider the future year No-Build forecasts, **Table 2-6** compares the output in corridor VMT of the MRM version and SE Data for the 2030 No-Build scenario used for the original 2030 and 2035 No-Build forecasts (MRM05 with 2005 SE Data) with output from the latest MRM version with the latest SE Data (MRM11v1.1 and 2009 SE Data) for the 2035 No-Build scenario.

**TABLE 2-6: Comparisons of No-Build Scenario MRM Model Output**

| Corridor | Corridor VMT 2030 No-Build MRM05 2005 SE Data | Corridor VMT 2035 No-Build MRM11 2009 SE Data | % Change |
|---|---|---|---|
| Existing US 74 | 876,000 | 965,940 | 10 % |

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

As shown in **Table 2-6**, MRM model output in corridor VMT increases 10 percent from the original MRM model version, SE Data Set and horizon year (2030) to the latest MRM model, SE Data Set, and horizon year (2035). Based on this comparison, an updated future year No-Build forecast would reasonably be expected to have volumes equal to or greater than the current 2030 No-Build forecast and extrapolated 2035 No-Build forecast, and new forecasts would not change the conclusions in the Draft EIS regarding the need for the project. However, as mentioned above in the discussion of the base year forecasts, a number of improvements have been made to existing US 74 in recent years, as described in **Section 2.4**. The effects of these physical changes on traffic operations analyses along existing US 74 are addressed in **Section 2.5.3**.

As noted in **Table 2-3**, the 2035 No-Build traffic forecast documented in Document C was discovered to be incorrect and was corrected and replaced by the 2035 No-Build traffic forecast documented in Document F. This error appears in Draft EIS Table 2-7 and was discovered through public comments prior to publication of the Final EIS. The corrected data is presented in the Final EIS Appendix A – Errata. The forecasting error that generated the incorrect no-build data presented in Document C occurred in a forecasting step outside of the MRM regional model, and does not have any connection to the inputs used (including socioeconomic data sets) in the MRM model or the MRM output. NCTA met with the consulting firm responsible for the error in the 2035 No-Build forecast to investigate the cause of the error, but the source was not immediately apparent. At the time of the investigation, the consulting firm was no longer involved in that aspect of the project. Staff responsible for developing the original 2035 No-Build forecast are no longer employed by that

consulting firm. Following the investigation, HNTB North Carolina, (HNTB) was contracted by NCTA to prepare an update to the No-Build traffic forecast (Document A). The HNTB forecast update was not based on the No-Build forecasts that were determined to be in error. The forecast update methodology is provided in the *NCDOT STIP Project R-3329 & R-2559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (HNTB, March 2010)(Document F).

In the Draft EIS, the erroneous 2035 No-Build forecasts included in Draft EIS Table 2-7 were used only in a general comparison to the 2030 No-Build forecasts to determine if trends would change or if the No-Build Alternative traffic operations analysis (*Existing and Year 2030 No-Build Traffic Operations Technical Memorandum*, PBS&J, March 2008) needed to be updated in the Draft EIS, since this analysis was used to help document the purpose and need for the project (see Section 1.8.4.2 of the Draft EIS). The erroneous 2035 No-Build traffic volumes were not used in any technical memoranda associated with the EIS process. As noted above, the No-Build traffic operations analysis used the 2030 No-Build traffic forecasts.

The Draft EIS (Section 2.6.1) concluded that since 2035 No-Build traffic forecasts (the incorrect forecasts) showed increased volumes along existing US 74 compared to the 2030 No-Build traffic forecasts, it was not necessary to update the operational analysis for the No-Build Alternative from 2030 to 2035 since an updated analysis would just show worse traffic operations on existing US 74, which were already shown to be below acceptable levels of service using the 2030 No-Build forecasts (Draft EIS Section 1.8.4). In the Final EIS – Appendix A Errata, the corrected 2035 No-Build traffic forecasts are presented, and there still would be higher volumes along existing US 74 under the corrected 2035 No-Build traffic forecasts compared to the 2030 No-Build traffic forecasts, and the conclusions made in the Draft EIS remained valid. Therefore, the incorrect 2035 No-Build traffic forecasts do not affect the alternatives analysis.

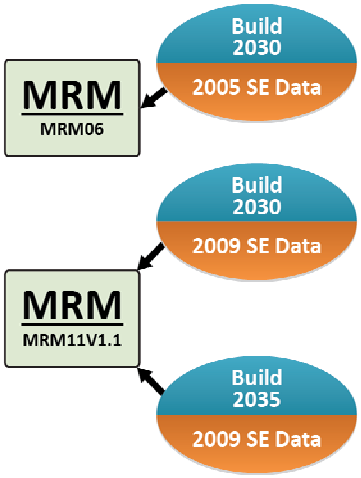
In conclusion, the correct No-Build traffic forecasts remain valid for the purposes they were used. An updated No-Build forecast that uses the latest MRM model and SE Data Set versions would be expected to have equal or higher volumes along existing US 74 compared to the current forecasts, continuing to support the need for the project. See also the answer to **Question 6** and **Section 2.5.3**.

### Question 5 - Are the current Build traffic forecasts still valid for the purposes they were used?

The current 2035 Build scenario traffic forecasts used in the EIS process are described in Document C and Document E listed in **Table 2-3**. The Build scenario forecasts include forecast volumes for the Monroe Connector/Bypass and for the existing US 74 corridor with the Monroe Connector/Bypass in place. In addition, a forecast was prepared (Document B) for upgrading US 74 to a toll facility in place of the Monroe Connector/Bypass (addressed as alternatives PSA G and Revised PSA G in the Draft EIS). This forecast was based upon the Build scenario forecasts documented in Document C and the volumes forecast for the new location Monroe/Connector Bypass.

The 2035 Build scenario forecast volumes were used in the traffic operations analyses for elements along the Monroe Connector/Bypass. The traffic operations analyses were then used to help prepare the functional designs of the Monroe Connector/Bypass. The 2035 traffic forecasts along the Monroe Connector/Bypass also were used in the traffic noise analysis.

The 2035 Build scenario forecasts of traffic volumes along the existing US 74 corridor were used to evaluate the effects of the Monroe Connector/Bypass on US 74 volumes compared to the 2035 No-Build scenario forecasts. They were also used to evaluate traffic operations along existing US 74 under the Build scenario for comparison to operations under the No-Build scenario (Draft EIS Section 2.6.3.2).




**MRM conditions modeled for Question 5**

To determine the validity of the current Build scenario forecasts for the project, a comparison of the raw model output from the 2030 MRM06 (2005 SE Data) model used in developing the Build scenario forecasts was made with the most recent MRM version (MRM11v1.1) using the most recent SE data set (2009 SE Data) for years 2030 and 2035.

**Table 2-7** presents the effects of different combinations of MRM version and SE Data on the Build scenario using VMT for the Monroe Connector/Bypass corridor and the existing US 74 Corridor.

**TABLE 2-7: Comparisons of Build Scenario MRM Model Output**

| Corridor | *Column 1* Corridor VMT 2030 Build MRM06 2005 SE Data | *Column 2* Corridor VMT 2030 Build MRM11 2009 SE Data | % Change Column 1 to Column 2 | *Column 3* Corridor VMT 2035 Build MRM11 2009 SE Data | % Change Column 2 to Column 3 |
|---|---|---|---|---|---|
| Monroe Connector/Bypass | 813,920 | 757,400 | -7 % | 822,160 | 9 % |
| Existing US 74 | 614,340 | 729,910 | 19 % | 782,050 | 7 % |

VMT – vehicle miles traveled (road segment volume x length)
Source: *Monroe Connector/Bypass Traffic Forecast Summary* (HNTB, November 2013)

For the Monroe Connector/Bypass, the results of the comparison in **Table 2-7** show that MRM model output for the Monroe Connector/Bypass is relatively consistent through different versions of the MRM and SE data sets, varying up to 7 percent.

Growth in traffic volumes from 2030 to 2035 is expected, and is reflected in the reasonable 9 percent increase in VMT on the Monroe Connector/Bypass and 7 percent increase in VMT along existing US 74 shown in the table when the model and SE Data versions are held constant and the year increases from 2030 to 2035.

Based on these comparisons, and keeping in mind the MRM output is just one of many factors that go into creating a traffic forecast, the current 2035 Build scenario forecasts for segments along the

Monroe Connector/Bypass would not be expected to change substantially with updated MRM versions or SE Data and remain valid for the purposes for which they are used. Likewise, the forecasts prepared for Upgrade Existing US 74 as a toll facility in Document B (used for PSA G and Revised PSA G) would not be expected to change substantially for the mainline volumes. However, the frontage roads likely would have higher traffic volume assignments, as described below, since they would become the free US 74 alternative.

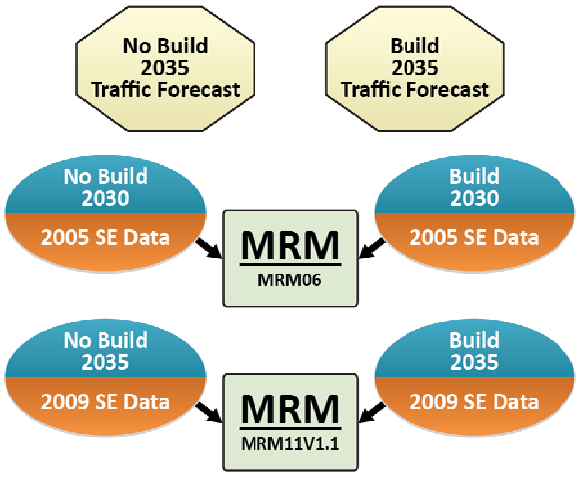
For existing US 74, the results of the comparison in **Table 2-7** show that 2030 MRM model output for existing US 74 under the Build scenario is 19 percent higher with MRM11v1.1 and 2009 SE Data compared to MRM06 with 2005 SE Data. The updated MRM model is assigning more demand for US 74 under the 2035 Build scenario, but it also is predicting more demand under the No-Build scenario, as discussed under **Question 4** and **Question 6**. The 2035 Build scenario forecasts for segments along existing US 74 likely would change using the most recent MRM model and SE Data, but these trends and patterns also occur under the No-Build scenario, and the conclusion that traffic volumes would be less on existing US 74 with the Monroe Connector/Bypass in place is still valid no matter which MRM versions/SE Data set versions are compared.

Regarding the traffic operations analysis for existing US 74 with the Build scenario described in Draft EIS Section 2.6.3.2, the traffic volumes on which this analysis is based likely would change with the latest MRM model and SE Data set. In addition, as mentioned previously, a number of improvements have been made to existing US 74 in recent years, as described in **Section 2.4**. The effects of these changes on traffic operations analyses along existing US 74 are addressed in **Section 2.5.3.**

### Question 6 – How would the Monroe Connector/Bypass affect traffic volumes on the US 74 corridor?

Three comparisons were made to evaluate how traffic volumes might change on existing US 74 with the proposed project in place. These included reviewing the current 2035 No-Build and Build traffic forecasts and reviewing the raw MRM model output in VMT for the MRM model used to create the 2035 Build forecast and for the latest MRM model with the latest SE data (2009 SE Data).

**Table 2-8** presents the comparisons of VMTs along the existing US 74 corridor under the various No-Build and Build scenarios. In every case, traffic volumes are expected to be less along the existing US 74 corridor with the Monroe Connector/Bypass in place, thereby improving traffic flow conditions along existing US 74 compared to the No-Build scenario.




**Comparisons used for Question 6**

**TABLE 2-8: Effects of the Monroe Connector/Bypass on US 74 Traffic**

| Comparison Tool | Existing US 74 Corridor VMT No-Build | Existing US 74 Corridor VMT Build | % Change No-Build to Build |
|---|---|---|---|
| 2035 Traffic Forecasts* | 1,095,700 | 760,460 | -31 % |
| 2030 MRM06 2005 SE Data | 888,020 | 614,340 | -31 % |
| 2035 MRM11v1.1 2009 SE Data | 965,940 | 782,050 | -19 % |

VMT – vehicle miles traveled
*2035 No-Build Traffic Forecasts - from *NCDOT STIP Project R-3329 & R02559 Revised Monroe Connector Bypass No-Build Traffic Forecast Memorandum* (HNTB, March 2010)
*2035 Build Traffic Forecasts – from *Traffic Forecast for TIP Projects R-3329 & R-2559 Monroe Connector/Bypass* (Wilbur Smith and Associates, September 2008)

### 2.5.3 TRAFFIC OPERATIONS ANALYSES

Traffic operations analyses prepared for the EIS process for the project are listed in **Table 2-9**. Each of these analyses are discussed below in light of the information included in **Section 2.5.2** above, **Section 1.2.4**, and the recent improvements implemented along existing US 74.

**TABLE 2-9: Summary of Monroe Connector/Bypass Project Traffic Operations Analyses**

| Document Name | | Date/ Prepared By | Traffic Forecast Used and Scenario* | Used in NEPA process? / Notes | |
|---|---|---|---|---|---|
| Document 1 | *Existing and Year 2030 No-Build Traffic Operations Technical Memorandum* | March 2008 PBS&J | Document A 2030 No-Build | Yes | Included in Draft EIS. |
| Document 2 | *Year 2035 Build Traffic Operations Technical Memorandum* | February 2009 PBS&J | Document C 2035 Build Toll | Yes | Included in Draft EIS. Evaluated operations along the Monroe Connector/Bypass and also along existing US 74 with the bypass in place. |
| Document 3 | Upgrade Existing US 74 Alternatives Study | March 2009 HNTB | Document B 2035 – Build a Toll Facility Along Existing US 74 | Yes | Evaluated preliminary study alternatives PSA G and Revised PSA G in the Draft EIS. |
| Document 4 | *Final Addendum to Year 2035 Build Traffic Operations Technical Memorandum* | February 2010 PBS&J | Document E 2035 Build Toll | Yes | Reevaluation of traffic operations for Monroe Connector/Bypass based on refined functional design of Preferred Alternative. Included in the Final EIS. |
| Document 5 | *US 74 Corridor Analysis Scenarios* | December 2010 HNTB | Document F 2035 No-Build | Yes | Planning level evaluation of upgrading US 74 to a superstreet, a 6-lane arterial, and a 6-lane superstreet. Prepared during the Section 404 permitting process. Included in the Draft Supplemental Final EIS. |

*See **Table 2-3** for title of forecast document and other related information.

Traffic operations analysis conducted for elements along the Monroe Connector/Bypass are documented in Documents 2 and 4 listed in **Table -9**. As discussed in the answer to **Question 5** above, the MRM model output for the Monroe Connector/Bypass is relatively consistent through different versions of the MRM and SE data sets. Therefore, the traffic operations analysis conducted in Documents 2 and 4 for elements along the Monroe Connector/Bypass are still valid, and therefore the refined functional designs and traffic noise analyses based on these analyses would not change.

As listed in **Table 2-9**, a number of traffic operations analyses were conducted for existing US 74. Each of the following analyses is discussed below.

- Document 1 - traffic operations on existing US 74 under a No-Build scenario (2007 and 2030).
- Document 2 - traffic operations on existing US 74 under the Build scenario (2035)
- Document 3 – traffic operations on existing US 74 if US 74 was upgraded to a toll facility with frontage roads (2035).
- Document 5 – traffic operations on existing US 74 if US 74 was improved as a Superstreet Existing, Superstreet 6-Lane, or a 6-Lane Arterial (2035).

Document 1 evaluated existing US 74 under the No-Build scenario for 2007 and 2030. The traffic operations results were summarized in Draft EIS Sections 1.8.3 and 1.8.4. As discussed in the answer to **Question 4**, an updated base year No-Build forecast (2012) would be expected to have volumes approximately equal to the current 2007 Base Year No-Build forecast. Updated future year No-Build forecasts would reasonably be expected to have volumes equal to or greater than the current 2030 No-Build scenario forecast and extrapolated 2035 No-Build scenario forecast. For the operations analysis of the base year conditions, the roadway and intersection configurations that existed at the time of the analysis were used. For the 2030 year, signals were optimized and improvements included in the STIP current at the time were assumed. Since that time, as discussed in **Section 2.4**, several improvements have been implemented or are soon to be constructed along existing US 74.

If the No-Build scenario traffic operations analyses were updated with an updated No-Build forecast and updated information on new and planned improvements on existing US 74, the updated forecast likely would have higher traffic volumes, thereby increasing congestion, but the physical improvements likely would improve operations at the physical improvement locations. However, desired levels of service (LOS D or better) likely would not be experienced in the design year due to the high volumes of traffic. Rather than updating the traffic operations analysis for the No-Build scenario, a new analysis of travel speeds along the corridor was conducted, as discussed in **Section 1.2.4**. For this project, an analysis of the travel speeds along the existing US 74 corridor for the No-Build scenario is appropriate since an element of the project's purpose and need is to provide a high-speed facility (50 mph or greater).

Document 2 evaluated traffic operations for intersections along existing US 74 under the 2035 Build scenario. The analysis was conducted to compare levels of service to the No-Build scenario, as summarized in Draft Section 2.6.3.2. The analysis showed fewer intersections along existing US 74 operating at undesirable LOS under the Build scenario, with the primary factor contributing to the LOS improvement being the lower traffic volumes along the existing US 74 corridor with the Monroe Connector/Bypass in place. As discussed in the answers to **Question 5** and **Question 6**, traffic volumes along the existing US 74 corridor are expected to be less with the Monroe Connector/Bypass in place even if forecasts were updated to the latest MRM model and SE Data. The general

conclusions in the Draft EIS that traffic operations would improve on existing US 74 with the project in place are still valid, and the traffic operations analysis included in Document 2 does not need to be updated.

Document 3 evaluated traffic operations along existing US 74 if US 74 was upgraded to a toll facility with frontage roads (Alternatives PSA G and revised PSA G). This operations analysis used the traffic forecast prepared in Document B listed in **Table 2-9**. As discussed in the answer to **Question 5**, the forecasts prepared for Upgrade Existing US 74 as a toll facility would not be expected to change substantially for the mainline volumes. However, the frontage roads likely would have higher traffic volume assignments. Since forecast volumes are expected to be the same for the mainline and higher for the frontage roads with an updated forecast, traffic operations for PSA G and Revised PSA G would be similar or worse, and do not generate a need to reconsider these alternatives.

Document 5 evaluated traffic operations at a planning level for existing US 74 if US 74 was improved as a Superstreet Existing, Superstreet 6-Lane, or Widened as 6 Lanes with no superstreet. The 2035 No-Build traffic forecasts in Document F listed in **Table 2-9** were used in the operations analysis. As summarized in **Section 2.4**, the results of the comparative analysis showed that in 2035, US 74 under these three improvement scenarios would exceed LOS D in the majority of the corridor. As discussed in the answer to **Question 4**, an updated No-Build forecast that uses the latest MRM model and SE Data Set versions would be expected to have equal or higher volumes along existing US 74 compared to the current forecasts. Therefore, an updated analysis of these three US 74 improvement options would show equal or worse levels of service. Therefore, there is no need to reconsider these alternatives.

## 2.6 CONCLUSION REGARDING THE ALTERNATIVES ANALYSIS PROCESS

As noted in the AASHTO *Practitioner Handbook for Defining the Purpose and Need and Determining the Range of Alternatives for Transportation Projects*, a key principle in NEPA is that agencies should apply a "rule of reason" when determining the appropriate range of alternatives considered in a NEPA document and the degree to which each alternative is considered. The NCDOT applied practical judgment and documented determinations at each stage of alternatives analysis. These decisions were reasonable and supported by extensive factual information in the record.

The public and local, state, and federal environmental resource and regulatory agencies were involved throughout the entire project development process. Agencies were involved via monthly agency coordination meetings, as discussed in Section 3.2 of the Final EIS. The public was involved via newsletters, workshops, the project website, and through as-requested small group meetings. The decisions relative to alternatives development and analysis were informed, open, and valid.

The NCDOT complied with its obligation to rigorously explore and objectively evaluate all reasonable alternatives and gave extensive treatment to preliminary and detailed study alternatives in their comparison. Poor existing and projected travel conditions in the project area are well-documented and demonstrated. The NCDOT examined "minor" improvements and evaluated and re-examined others (i.e. improve existing US 74 alternatives and TSM alternatives) with a "hard look" and subsequently determined that they were not reasonable and did not require more detailed study.

The NCDOT followed a widely-accepted screening process in alternatives evaluation for the Monroe Connector/Bypass. In addition, NCDOT generally conformed to legal principles and practitioner guidelines prescribed by the CEQ, FHWA, and AASHTO throughout the process.

The screening-level process and decisions in the Monroe Connector/Bypass EIS remain valid, and based on a review of new information and analyses and consideration of public and agency comments, there are no conditions that warrant re-considering new alternatives or updating previous screening decisions. As discussed in **Section 3**, DSA D still remains the best option due to its ability to meet all elements of the purpose and need and based on results of comparative analyses.

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| | 1st Qualitative Screening | 2nd Qualitative Screening | 3rd Qualitative Screening | Additional Examination of Alternatives | Detailed Study |
|---|---|---|---|---|---|
| **No-Build Alternative** | → | → | → | → | Retained and given full consideration in the Draft EIS for baseline comparison, in accordance with 40 CFR 1502.14(d) and FHWA Guidance (FHWA Technical Advisory T6640.8A, 1987). |
| **Trans. Demand Mgmt (TDM)** | Alternative eliminated due to its inability to fully meet the project's purpose and need | | | | |
| **Mass Transit/ Multi-Modal Alternative** | Alternative eliminated due to its inability to fully meet the project's purpose and need. | | | | |
| **Improve Existing US 74 Alternatives** | See Figure 2-1b | | | | |
| **New Location Build Alternatives** | Concept meets the project's purpose and need. | ❑ Compared Preliminary Corridor Segments and eliminated those which were unreasonable, impractical, or had higher impacts.<br>❑ Remaining corridor segments from 2nd screening were combined to form 25 Preliminary Study Alternatives (PSAs). | Calculated impacts from the 25 PSAs. Identified 16 Detailed Study Alternatives based on design considerations, impacts (20+ factors considered), and agency/public input. | ❑ 16 new location Detailed Study Alternatives (DSAs) were selected for further comparative study in the Draft EIS.<br>❑ DSA D was selected as the Preferred Alternative for implementation. | |

NORTH CAROLINA Turnpike Authority

STIP PROJECT
NO. R-3329/R-2559

Mecklenburg County and
Union County

**MONROE CONNECTOR/ BYPASS**

# ALTERNATIVE CONCEPTS AND DECISION POINTS

**Figure 2-1a**

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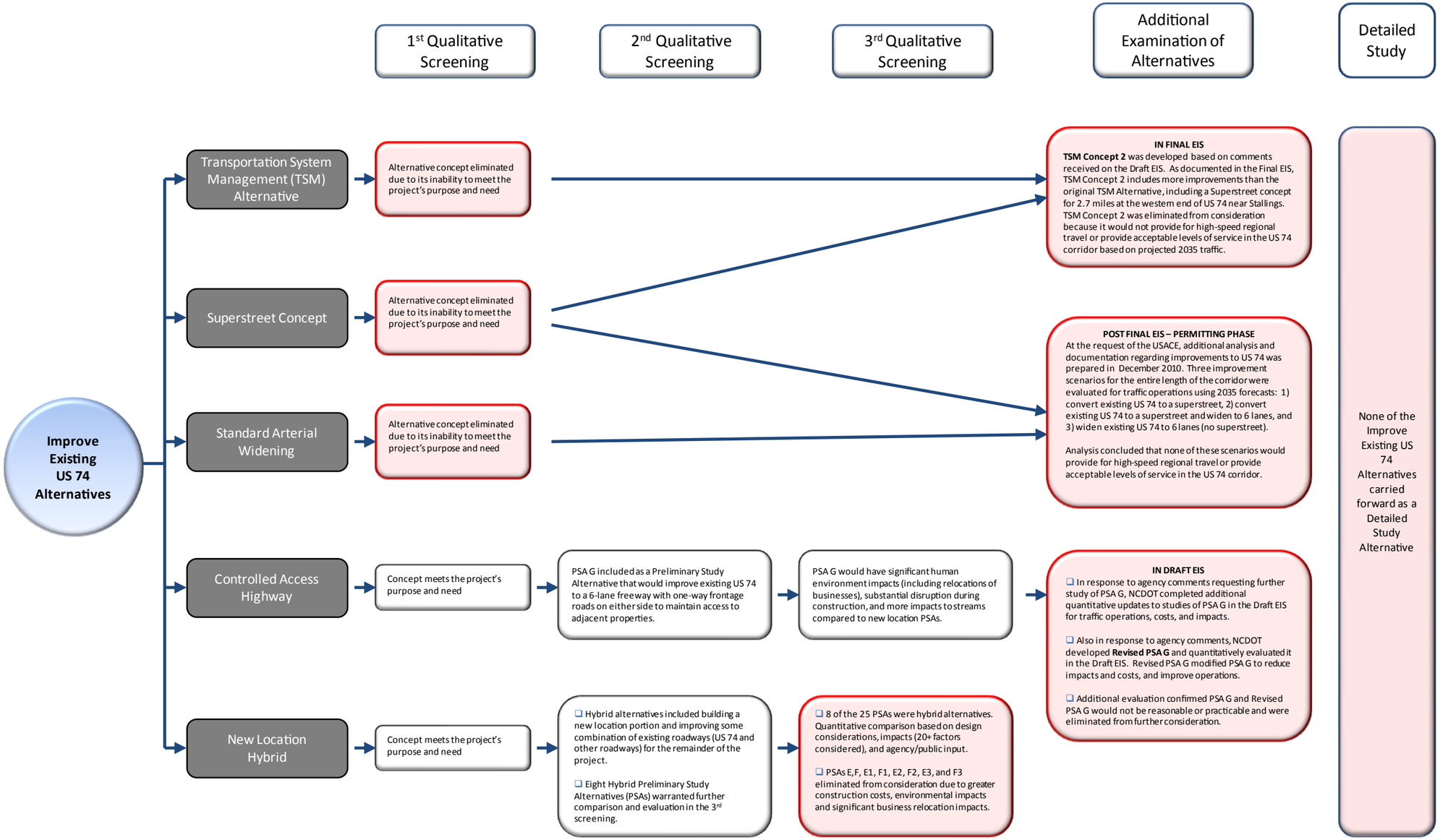


NORTH CAROLINA Turnpike Authority

STIP PROJECT NO. R-3329/R-2559

Mecklenburg County and Union County

**MONROE CONNECTOR/ BYPASS**

# ALTERNATIVE CONCEPTS AND DECISION POINTS

**Figure 2-1b**

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