Independence Boulevard Extension

New Hanover County, North Carolina
Federal-Aid Project No. STPDA-1209(5)
WBS Element 37764.1.1
STIP U-4434

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Submitted Pursuant to the National Environmental Policy Act (42 U.S.C. 4332(2)(c))
by U.S. Department of Transportation, Federal Highway Administration, and North Carolina Department of Transportation

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The documented needs for the transportation project in New Hanover County are presented in the report. The existing conditions of the study area are described, and the alternatives are assessed in terms of environmental impacts, compatibility with local planning goals, relative cost-effectiveness, and public opinion.

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Prepared by AECOM Technical Services, Inc. (URS Corporation – North Carolina)

9/30/2025
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Project Commitments

SR 1209 (Independence Boulevard)
From Randall Parkway to US 74 (Martin Luther King Jr. Parkway)
New Hanover County, North Carolina
Federal-Aid Project No. STPDA-1209(5)
WBS Element 37764.1.1
NCDOT STIP Project U-4434

The project commitments listed below are preliminary in nature and will be further evaluated upon selection of the least environmentally damaging practicable alternative and the development of more detailed designs and environmental impact analysis that is part of the Final Environmental Impact Statement (FEIS). The FEIS will include a more definitive list of project commitments that includes those listed below, as applicable, as well as other needs that come to light during the public and agency review process, as well as during the development of the FEIS.

Hydraulic Design Unit

The Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), the delegated state agency for administering the Federal Emergency Management Agency (FEMA) National Flood Insurance Program, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with FMP (dated December 14, 2020), or approval of a Conditional Letter of Map Revision and subsequent final Letter of Map Revision.

Division 3 Construction

This project involves construction activities on or adjacent to FEMA-regulated streams. Therefore, NCDOT Division 3 shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying the drainage structure(s) and roadway embankment located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

NCDOT Public Involvement

This project involves impacts to local families and communities. NCDOT Division 3 will continue coordination and outreach with impacted residences to identify appropriate mitigation for property impacts, relocations, and loss of community cohesion. NCDOT will work to keep residents within their existing communities and social support networks to the extent possible and desired. Early coordination among the City of Wilmington, Wilmington Housing Authority, Wave Transit, and NCDOT relocation assistance staff will occur to identify comparable housing near transit services and pedestrian infrastructure and may be beneficial in minimizing impacts to relocated residents. NCDOT is committed

to exploring enhanced relocation options and efforts. We aim to incorporate context-sensitive design and solutions derived from ongoing community engagement efforts into the project design. Additionally, NCDOT commits to collaborate with local agencies and the City of Wilmington to establish a community working group. This group will play a pivotal role in the development of mitigation measures, including the creation of a neighborhood plan.

Cultural Resources

If avoidance of archaeological site 31NH887 is unavoidable by the proposed project, the Department will complete data recovery excavations to mitigate impacts as noted in the letter from the North Carolina State Historic Preservation Office, dated March 31, 2020.

Summary

Proposed Action

The North Carolina Department of Transportation (NCDOT) is proposing to construct a multi-lane facility on new location in New Hanover County, North Carolina. Located within the urban core of the City of Wilmington, the proposed 1.7-mile-long project would be an extension of existing Independence Boulevard (State Route [SR] 1209) from the intersection with Randall Parkway and Mercer Avenue to Martin Luther King Jr. Parkway (United States [US] 74). The proposed action (or proposed project) is designated in the 2024-2033 NCDOT State Transportation Improvement Program (STIP) as project number U-4434 and described as "SR 1209 (Independence Boulevard Extension), Randall Parkway to US 74 (Martin Luther King Jr. Parkway) in Wilmington; multi-lanes on new location."

Federal Highway Administration

Administrative Action: Draft Environmental Impact Statement (DEIS).

The content of this DEIS conforms to the procedural provisions of National Environmental Policy Act of 1969 (NEPA) and the Federal Highway Administration's (FHWA) Guidance for Preparing and Processing Environmental and Section 4(f) Documents, Technical Advisory T 6640.8A. (FHWA 1987).

On January 20, 2025, President Trump signed Executive Order (EO) 14148 – *Initial Rescissions of Harmful Executive Orders and Actions* and EO 14154 – *Unleashing American Energy*. The EOs revoked EO 13990 – *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (January 20, 2021) and EO 14008 – *Tackling the Climate Crisis at Home and Abroad* (January 27, 2021). Subsequently on January 29, 2025, Secretary Duffy signed a Memorandum for Secretarial Offices and Heads of Operating Administrations – *Implementation of Executive Orders Addressing Energy, Climate Change, Diversity, and Gender*. On February 25, 2025, the Council on Environmental Quality (CEQ) published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, FHWA will not include greenhouse gas emissions and climate change analyses in the federal environmental review process. Any purported greenhouse gas emissions and climate change impacts will not be considered in the federal decision. Accordingly, no greenhouse gas emissions or climate change analyses are included in this DEIS.

The January 20, 2025 EOs also revoked EO 14096 – *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023). Subsequently on January 21, 2025, President Trump signed EO 14173 – *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*. This EO revoked EO 12898 – *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994). On February 25, 2025, the CEQ published an Interim Final Rule

removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, all federal environmental justice requirements are revoked and no longer apply to the federal environmental review process. FHWA, Federal Transit Administration, and Federal Railroad Administration's Joint NEPA regulations (23 Code of Federal Regulations [CFR] part 771) and the agencies Interim Final Guidance on *Section 139 Environmental Review Process: Efficient Environmental Reviews for Project Decision-making and One Federal Decision* (December 17, 2024) do not require an environmental justice analysis. Accordingly, no analysis of environmental justice is included in this DEIS. Any purported environmental justice impacts will not be considered in the federal decision. Social, economic, and community impacts will continue to be disclosed where applicable in accordance with 23 CFR 771.

FHWA and NCDOT are the lead agencies for the proposed project.

Contacts

The following individuals may be contacted for additional information regarding the DEIS:

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Overview

The process of completing a DEIS helps FHWA, NCDOT, and regulatory agencies make an informed decision on the selection of a preferred alternative. It assists them in developing alternatives that would meet the objectives of the proposed project, analyzing the pros and cons of each alternative, and selecting a preferred alternative. It is also a means of informing the public regarding how and why decisions were made.

For this project, the first step in the DEIS process was developing a purpose and need statement describing why the project is necessary and what objectives the project would meet or accomplish. During this process, NCDOT considered and evaluated alternatives developed in previous studies, as well as alternatives that were determined to be reasonable and met the purpose and need. In addition, a No-Build Alternative was included in the analysis as a baseline to measure the other alternatives against; the No-Build Alternative is considered a viable alternative throughout the DEIS process. The focus of the DEIS is providing an in-depth analysis of potential impacts from the project.

Within the framework of the DEIS development, the selection of the preferred alternative is often a complicated process. The preferred alternative must meet the purpose and need and comply with federal and state laws and regulations. These include the Endangered Species Act of 1973, Clean Water Act of 1977, National Historic Preservation Act of 1966, Section 4(f) of the US Department of Transportation Act of 1966, and various other federal, state, and local laws and regulations, which are

referenced throughout this document. Project decision makers, which include FHWA and NCDOT, also consider potential impacts to the social, physical, and natural environments and input received from regulatory agencies and the public.

The results of the alternatives analysis contained in this DEIS are being made available to regulatory agencies and the public for comments and feedback. No decision will be made on a preferred alternative until after the public hearing and comment period. All comments received will be considered in the selection of the preferred alternative.

The following summary provides a synopsis of the more detailed information presented in the body of the DEIS. At the end of this summary, Table S-1 presents a quantitative summary of the proposed project's impacts.

All technical studies for the proposed project can be accessed via the project website at https://www.ncdot.gov/projects/independence-boulevard/Pages/technical-reports.aspx.

Potential visualization mitigation is included in Appendix E3, Attachment 4 and a project flyover video is available on the project's website that details what the project would look like once constructed. The video can be viewed at https://www.ncdot.gov/projects/independence-boulevard/Pages/photos-videos.aspx.

Purpose and Need

What is the Independence Boulevard Extension project and where is it?

NCDOT is proposing to construct a multi-lane facility on new location in New Hanover County, North Carolina. The 1.7-mile proposed project would extend existing Independence Boulevard on a new location from Randall Parkway to Martin Luther King Jr. Parkway. The proposed project would consist of two travel lanes in each direction separated by a variable width median. A greenway is proposed along the east side of the proposed project that would connect the City of Wilmington Cross-City Trail to Maides Park.

Why is the Independence Boulevard Extension project needed?

The Independence Boulevard extension is needed to improve connectivity, traffic capacity, and system linkage in central Wilmington. The proposed project would enhance regional mobility, improve overall traffic capacity, provide needed north-south connectivity, and facilitate intrastate/intermodal linkage within central Wilmington in a way that is consistent with local and state transportation plans.

In addition to addressing the primary needs, the potential exists for additional benefits as a result of the proposed project. These secondary benefits were considered when evaluating alternatives but were not used as a basis for eliminating alternatives based on the purpose and need or used as a screening factor to determine which alternatives were advanced in the development of the project. Additional benefits include improvement to emergency evacuation routes, increased safety, and improvement to east-west traffic operations.

What is the history of the Independence Boulevard Extension?

The proposed project was included in Wilmington's first Thoroughfare Plan adopted in 1972 (NCSCH 1972). The plan showed Independence Boulevard as a proposed thoroughfare extending from Market Street to the proposed Smith Creek Parkway (current Martin Luther King Jr. Parkway) and continuing north to tie into 23rd Street. The proposed project was also included in the 1985 Thoroughfare Plan but altered to terminate at the proposed Smith Creek Parkway (NCDOT 1985). The 1985 version of the proposed project continued to be included in the Greater Wilmington Urban Area Transportation Plan presented to the public in November 1992 and adopted in September 1993 (NCDOT 1993). The proposed project was also included in the 1997 version of the Greater Wilmington Urban Area Transportation Plan, in which Independence Boulevard was identified as an over capacity corridor between Carolina Beach Road and Market Street (NCDOT 1997). The proposed project was then included in the Wilmington Urban Area Metropolitan Planning Organization (WMPO) Wilmington Urban Area 2030 Long-Range Transportation Plan adopted in 2005 (WMPO 2005). In 2008, the WMPO Transportation Advisory Committee voted to amend the functional classification map for the portion of Independence Boulevard from Shipyard Boulevard to Martin Luther King Jr. Parkway (including the portion contained within the proposed project) to the Urban Principal Arterial classification. The proposed project is currently included in the WMPO *Cape Fear Moving Forward 2045 Metropolitan Transportation Plan* (MTP) adopted in 2020 (WMPO 2020).

NCDOT completed a feasibility study for the proposed project in July 2002 (NCDOT 2002). The proposed project was then included in the NCDOT's 2004-2010 STIP and is currently included in the 2024-2033 STIP as project number U-4434. Funding updates will be addressed in future NEPA documentation for the proposed project.

How would traffic operate if the project is not built?

If the project is not built and traffic increases as projected, travel times would increase and the traffic level of service (LOS) would decrease. The 2040 No-Build LOS on the existing roadway corridor between the Montgomery Avenue/Market Street intersection and the Independence Boulevard/Randall Parkway intersection ranges from LOS E to LOS F (Figure 1-7).

All nine intersections (Figure 1-7) exhibited poor LOS of LOS E or F in one or both peak hours in the 2040 No-build conditions. Additionally, massive amounts of spillback queuing is observed at the westbound approach to the intersection of Market Street and Covil Avenue/Montgomery Avenue, which extends into and beyond the intersections upstream, including the intersections of Market Street and Evans Street, Market Street and Clay Street, and Market Street and Darlington Avenue/Henry Street. Therefore, several intersections do not adequately handle queues and need additional storage. This excessive level of congestion would hinder traffic flow and negatively impact the regional growth.

Alternatives

What alternatives are under consideration?

NEPA requires that a full range of reasonable alternatives be considered for the proposed project. Five types of alternatives were considered and were evaluated to determine whether they could meet the stated purpose and need. The No-Build Alternative assumes that the study area would evolve as currently planned without constructing the proposed project. Transportation System Management alternatives would coordinate the individual elements of the transportation system to achieve the maximum efficiency, productivity, and utility of the existing system while minimizing cost and inconvenience to motorists. They could include improving signal timing and coordination, minor realigning of intersections, and adding turning lanes. Travel Demand Management alternatives would improve the efficiency of the transportation system by reducing travel demand rather than increasing the capacity of the roadway. Measures such as ridesharing, flexible work schedules, telecommuting, bicycling, and walking are often used. Mass Transit alternatives would provide high-capacity, energy-efficient transportation through the use of bus or passenger rail facilities. Build alternatives would include construction of transportation facilities to improve the traffic operations of the transportation system. These could be located on existing roadway facilities or on new location.

What other alternatives were examined and then eliminated from further consideration?

The Transportation System Management, Travel Demand Management, and Mass Transit Alternatives were determined to not be reasonable because they would not meet the purpose of and need for the proposed project.

Five initial corridors were developed for the proposed project, with the Independence Boulevard Corridor moving forward for further study and design. The 16th/17th Street, 23rd Street, Kerr Avenue, and College Road Corridors were eliminated due to the high number of residential and business impacts and their inability to meet the purpose of and need for the proposed project.

Eight build alternatives (Alternatives 1 through 8) with various interchange configurations, resulting in a total of 48 options, were then developed and analyzed. Nine detailed study alternatives (DSA) were chosen from the 48 to be carried forward to the preliminary design phase. These included three variations each for Alternatives 2, 7, and 8.

A separate study investigating the feasibility of a raised rail option and a depressed facility option was completed prior to moving forward with the nine DSAs. The study found that the raised rail and depressed facility options are not feasible due to the significantly higher costs associated with each.

Alternatives 2, 7, and 8 were evaluated and Alternative 8 was eliminated due to the impact it would have to a new City of Wilmington police facility. Several design and interchange revisions were then made on Alternatives 2 and 7, resulting in a total of four DSAs. These included Alternative 2 with a Single Point Urban Interchange (SPUI), Alternative 2 with a Tight Urban Diamond Interchange (TUDI), Alternative 7 with a SPUI, and Alternative 7 with a TUDI.

The No-Build Alternative must be carried forward under NEPA to allow for a basis of comparison with the DSAs.

What alternatives were selected for detailed study?

Following the evaluation of the remaining four DSAs, two build alternatives were selected for detailed study, Alternative 7 with a SPUI and Alternative 7 with a TUDI. Alternative 2 with a TUDI and Alternative 2 with a SPUI were eliminated from further study due to high costs and human and environmental impacts.

How would traffic operate for each of the alternatives once the proposed project is constructed?

The 2040 build conditions for both DSAs show several improvements in the overall LOS within the study area. Both DSAs were found to have a LOS D or better in the 2040 build conditions.

How much would each alternative cost?

The cost for the DSAs includes the cost to purchase the right-of-way for the roadway, construct the roadway, and relocate utilities. The total cost for each is as follows:

- Alternative 7 with SPUI Option: $204,790,700
- Alternative 7 with TUDI Option: $214,649,000

Affected Environment and Environmental Consequences

Community Effects

How would the project impact community facilities and services?

There are six local parks within the study area. The proposed project would not impact the use of any of the parks in the study area. The proposed greenway along the east side of the roadway connects the Cross-City Trail at Randall Parkway to Maides Park.

There are two churches with the potential to be relocated as a result of the proposed project. One of the churches would be relocated with either alternative option, the Iglesia Vision 3D Trinidad Divina Pentecostes and their theological education center, Universidad Teologica Internacional. The Iglesia Vision 3D Trinidad Divina Pentecostes and Universidad Teologica Internacional consist of two buildings on a single parcel that are owned and operated by the Iglesia Vision 3D Trinidad Divina Pentecostes parish. The second church, Vino Nuevo Ministry, would be relocated with the TUDI Option only. The relocation report is located in Appendix D.

No schools, community centers, or cemeteries would be impacted as a result of the proposed project.

The proposed project would likely have an overall positive effect on police, fire, and other safety operations in the study area due to increased north-south mobility between Shipyard Boulevard and Martin Luther King Jr. Parkway.

How would the project affect neighborhoods and community cohesion?

There are several well-established neighborhoods throughout the study area that range from modest developments along Princess Place Drive, East Wilmington, and Creekwood neighborhoods to the more affluent Forest Hills neighborhood. There were a number of indicators of community cohesion in the study area. During site visits, visible community interactions and pedestrian activity were observed, particularly in the neighborhoods to the north of Market Street along Montgomery Avenue. City of Wilmington city planners indicated neighborhoods within the study area have a high occupancy rate partially due to a mix of price points, varied densities, and proximity to goods and services.

The construction of a thoroughfare on a new location through a residential area that is well-established is likely to impact community cohesion and stability. According to the relocation reports developed in March 2022 (Appendix D), the project would result in 59 residential relocations if the SPUI interchange is selected, and 71 residential relocations if the TUDI interchange is selected (NCDOT 2022a).

The proposed project would be elevated on a berm from approximately the intersection of Randall Parkway north to Market Street. While a new connection would be provided to cross via an extension of Darlington Avenue beneath the berm, this berm would change the physical makeup of the community and serve as a barrier, particularly if the proposed project includes noise walls along the roadway. Community cohesion impacts are likely to be most acute to the residents who remain on the east side of Covil Avenue and the west side of Mercer Avenue to the south of Market Street, and to the residents whose property would not be purchased along 31st and Evans Streets north of Market Street. However, given that the surrounding area is flat, the introduction of an elevated roadway through established neighborhoods is likely to cause impacts to community cohesion. An elevated roadway providing no access while reducing connectivity would likely reduce housing values within its vicinity.

How would the project affect concentrations of low-income or minority populations?

Notably adverse community impacts are anticipated with the proposed project and these effects appear to affect Title VI populations more than the general population. Benefits and burdens resulting from the proposed project are not anticipated to be equitably distributed throughout the community. Disparate impacts are anticipated under Title VI of the Civil Rights Act of 1964.

Due to the location and length of the proposed project, impacts to Title VI populations are not avoidable. Five build alternative corridors were identified and investigated at the onset of the conceptual design phase in 2011. These included the 16th/17th Street Corridor, 23rd Street Corridor, Independence Boulevard Corridor, Kerr Avenue Corridor, and College Road Corridor. Although the 23rd Street Corridor and College Road Corridor would have less impacts to Title VI communities, these corridors were eliminated for other fatal flaws. The 23rd Street Corridor would have high relocations and cut off access to several residential streets. It also would require that the intersection with Martin Luther King Jr. Parkway be constructed on an existing bridge. This would require the closure of Martin Luther King Jr. Parkway during construction. This corridor was eliminated due to relocations, cost, and engineering constraints. The College Road Corridor was found to not meet the purpose of and need for the proposed project. It is part of another existing NCDOT STIP project and will continue to experience capacity issues even after the planned improvements.

The Independence Boulevard build alternative corridor was selected because it would have the least number of relocations and meet the purpose of and need for the proposed project.

Upon selection of the Independence Boulevard Corridor in 2011, eight alternative alignments were developed. All eight alternative alignments would have the same impacts to Title VI populations.

Modifications have been incorporated into the project design to alleviate and/or minimize impacts to the community that would be impacted by the proposed project. These modifications include the reduction of the typical section for the roadway, design type, and proposed speed limit as well as the addition of grade-separated crossings to maintain connectivity beneath the elevated roadway. Preliminary designs for the DSAs did not allow for connectivity beneath Independence Boulevard between North 30th Street and Maides Avenue. To provide more east-west connectivity, a grade separation at both Darlington Avenue and Hurst Street was included in revised designs.

Finding comparable housing for the affected community would be challenging in Wilmington, where rents are rising and there is a shortage of affordable housing. Many residents may be forced to move away from the area to find comparable housing.

NCDOT's standard right-of-way process would be used to assist residents and businesses relocated by the proposed project. This would include a real estate appraisal and an offer at current market value of the property at its highest and best use when appraised. NCDOT would provide assistance on locations of comparable housing and/or commercial establishments, moving procedures, and moving aid. Additional monetary compensation is available to help homeowners cope with mortgage increases, increased value of comparable homes, and other such expenses. NCDOT cannot require a resident to move unless at least one comparable dwelling is made available to the resident and the resident has been given at least a 90-day notice in writing. Programs are also available to assist business owners.

Tenants being relocated are also provided assistance through the standard right-of-way process in the form of rental assistance payments. The payments are designed to help tenants rent a comparable dwelling. If relocation rental costs are higher than current rental costs, further rental assistance may be provided.

The standard right-of-way process represents the minimum that is provided to relocatees. However, NCDOT is committed to ensuring that adequate compensation and aid is made available for the community and would be working closely with residents and businesses to develop mitigation measures.

Door-to-door outreach was conducted in February 2022 for EJ residences along streets within the study area with the potential to be impacted and/or relocated by the proposed project. The purpose of the outreach was to inform residents about the project, answer any questions they may have, and begin having conversations about the type of mitigation measures they would like to see included with the project. NCDOT would continue coordination and outreach with potentially impacted EJ residences to identify appropriate mitigation measures for property impacts and relocations throughout the life of the proposed project. Community concerns and potential mitigation strategies are included in Section 3.1.4 and in Appendix E.

Would the project be consistent with local and regional plans?

The proposed project has been considered by local and regional plans since 1972. It is included in the current WMPO Cape Fear Moving Forward 2045 MTP (WMPO 2020).

How would the project affect bicycle and pedestrian transportation?

The proposed project would have a positive effect on bicycle and pedestrian transportation in the study area by providing additional bicycle and pedestrian connection through the area. The addition of the mixed-use path adjacent to the proposed project would provide an extension of the existing Cross-City Trail. This supports the recommendation in the Wilmington-New Hanover County Comprehensive Greenway Plan to construct a greenway connection between McCrary Park and Maides Park (City of Wilmington 2013). It would also address the recommendation for crossing facilities at the current intersection of Covil Avenue and Market Street made in Walk Wilmington: Wilmington Pedestrian Plan Update (City of Wilmington 2023).

Would the project require relocating any houses, businesses, or cemeteries?

The proposed project would require the relocation of houses and businesses under both DSAs. Alternative 7 with the SPUI Option would require the relocation of 59 residences, 31 businesses, and 1 church for a total of 91 relocations. Alternative 7 with the TUDI Option would require the relocation of 71 residences, 37 businesses, and 2 churches for a total of 110 relocations.

There are two churches with the potential to be relocated as a result of the proposed project. One of the churches would be relocated with either alternative option, the Iglesia Vision 3D Trinidad Divina Pentecostes (and its associated Universidad Teologica Internacional). The second church, Vino Nuevo Ministry, would be relocated with the TUDI Option only. The relocation report is located in Appendix D.

No cemeteries would be impacted as a result of the proposed project.

How would the existing business community be affected?

Existing businesses along Covil Avenue and the Covil Avenue/Market Street intersection would be impacted by relocation and/or traffic diversion resulting from the construction of an interchange. Those not directly affected may be temporarily affected during construction due to traffic delays or detours.

Physical Characteristic Effects

How would traffic noise levels change?

To identify noise-sensitive receptors potentially affected by traffic noise, predicted noise levels for the DSAs in 2040 were calculated and compared to the existing noise levels. The term “affected” is defined as the noise-sensitive receptors that are predicted to experience noise levels that approach or exceed the Noise Abatement Criteria (NAC) or that substantially exceed existing noise levels with the DSAs.

Noise impacts are predicted for 182 receptors for Alternative 7 with the SPUI Option and 195 receptors for Alternative 7 with the TUDI Option.

Would the project include noise abatement?

Because noise levels at locations within the study area were determined to approach or exceed the NAC, the feasibility and reasonableness of noise abatement measures was evaluated. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures, establishment of buffer zones, noise barriers, and noise insulation. For each of these measures, benefits versus allowable abatement quantity (reasonableness), engineering feasibility and effectiveness, and other factors were included in the noise abatement considerations.

The only abatement measure determined to be a viable option for the proposed project is noise barriers. A traffic noise evaluation was performed in 2019 that identified six locations for Alternative 7 with the SPUI Option and seven locations for Alternative 7 with the TUDI Option where noise barriers preliminarily meet feasibility and reasonableness criteria found in the NCDOT Traffic Noise Policy (NCDOT 2016b).

How would the project affect air quality?

All areas within North Carolina are designated as attainment, non-attainment, or unclassifiable with respect to each of the six criteria pollutants under the National Ambient Air Quality Standards (NAAQS). New Hanover County is in attainment with the NAAQS. The proposed project is not anticipated to create any adverse effects on the air quality of this attainment area.

How would the visual quality be changed?

Temporary visual impacts would affect properties adjacent to areas where construction, staging, and stockpiling operations occur. Upon project completion, the contractor would be required to remove all equipment and excess materials and reseed any disturbed areas. Visual quality would be enhanced or improved for those using the roadway and degraded for those viewing the roadway from surrounding communities.

The proposed project would result in a moderately high level of impact to viewers. Adverse effects would likely result from the location, proximity, and size of the proposed infrastructure relative to potential viewers. Mitigation measures with input from the public such as landscaping, street tree plantings, and context-sensitive design solutions could decrease the level of adverse effects on viewers.

How would the project affect hazardous material sites?

Based on preliminary evaluations of hazardous materials within the study area, 31 sites of concern were identified within the study area including sites that may contain underground storage tanks (17 sites), automotive repair facilities (5 sites), dry cleaning facilities (0 sites), hazardous waste producing sites (2 sites), Superfund sites (2 sites), landfills (1 site), and other potentially contaminated sites (4 sites).

Of the 31 sites identified, 11 would be impacted by the proposed project.

How would the project affect floodplains?

Due to the linear nature of the project and the existing roadway configurations, no practicable alternative exists that would completely avoid impacts to floodplains and floodways. Impacts to

floodplains and floodways would be minimized to the greatest extent possible. Floodplain impacts anticipated for the DSAs are very similar, with Alternative 7 with the SPUI Option calculated at 4.9 acres and Alternative 7 with the TUDI Option calculated at 5.0 acres for the 100-year floodplain and 0.4 acre of floodway impacts for both DSAs.

How would the project affect traffic during construction?

Detours and road closures may be required in locations where the proposed project utilizes or crosses existing roadways. Maintenance of traffic and construction sequencing would be planned and scheduled to minimize traffic delays within the project limits. Temporary lane closures and detours may be required at times during construction. A traffic control plan would be prepared during the final design phase of the proposed project, which would detail impacts to existing traffic patterns and road closures or realignments.

Cultural Resource Effects

Would historic architectural resources be affected?

No historic resources would be affected by the proposed project.

Would archaeological resources be affected?

One archaeological resource has been recommended as eligible for the National Register of Historic Places within the study area. Site 2 (31NH887) is a prehistoric site on the south side of Martin Luther King Jr. Parkway that produced numerous ceramic sherds. The site was found to consist of artifacts from at least four different time periods.

Site 31NH887 would be impacted by either DSA. The entirety of the site (1.53 acres) falls within the proposed project footprint.

The archaeological assessment recommends avoidance of 31NH887 if possible. If not possible, it is recommended that adverse effects to the site be mitigated as appropriate prior to any ground disturbing activities.

In a letter dated March 31, 2020, the North Carolina Historic Preservation Office concurred with the findings of the archaeological assessment and recommended “mitigation in the form of additional data recovery be conducted.”

Natural Resource Effects

How would biotic resources be affected?

Terrestrial communities found along the DSAs serve as shelter, nesting, and foraging habitat for a number of wildlife species. Both DSAs would result in direct impact to both natural and altered terrestrial communities through clearing of vegetation, grading, and paving. Fragmentation and loss of forested habitat may impact wildlife in the area by reducing potential nesting and foraging areas, as well as displacing animal populations.

What impacts would occur to waters under the jurisdiction of the United States Army Corps of Engineers?

The US Army Corps of Engineers has jurisdiction over wetlands and streams within the study area. Alternative 7 with the TUDI Option would impact approximately 1,919 linear feet of streams and 3.9 acres of wetlands, while Alternative 7 with the SPUI Option would impact approximately 1,900 linear feet of streams and 3.8 acres of wetlands.

Would habitat used by threatened and endangered species be affected?

The study area was evaluated for the potential presence of federally protected threatened and endangered species, under the Endangered Species Act of 1977, using the US Fish and Wildlife Service's (USFWS) IPaC (Information for Planning and Consultation) web tool on December 23, 2024 (USFWS 2024a). No waterways within the study area are identified as habitat by the National Oceanic and Atmospheric Administration (NOAA) Southeast Region ESA Section 7 Mapper (NOAA 2024).

Of the 14 species, 11 received the biological conclusion of "No Effect." One species, the American Alligator, was listed as protected due to its similarity in appearance with another protected species that was not listed for the study area, and no biological conclusion is required. The proposed endangered tricolored bat received the biological conclusion of "May Affect – Likely to Adversely Affect," although certain impacts may be allowable under a programmatic conference opinion from USFWS and affecting all NCDOT projects with a federal nexus. A biological conclusion for the proposed threatened monarch butterfly will be determined following surveys for host plants within the study area.

Alternative Comparison Matrix

Estimated environmental impacts associated with the DSAs are provided in the following table.

Table S-1: Alternative Comparison Matrix

Resource	Alternative 7 with SPUI Option	Alternative 7 with TUDI Option
Project Features		
Length of Corridor (miles)	1.7	1.7
Number of Interchanges	2	2
Number of Railroad Crossings	2	2
Number of Major Power Easement Crossings	1	1
Level of Service at Market Street Interchange (a.m., p.m.)	D, D	C, C
Construction Cost	$130,500,000	$122,350,000
Right-of-way Cost	$70,350,000	$88,667,000
Utility Cost	$3,940,700	$3,632,000
Total Cost	**$204,790,700**	**$214,649,000**
Socioeconomic Features		
Parks (number)	1	1
Places of Worship (number)	2	2

Resource	Alternative 7 with SPUI Option	Alternative 7 with TUDI Option
Cemeteries (number)	0	0
Schools (number)	2	2
Daycares (number)	1	1
Libraries (number)	0	0
Community Centers (number)	0	0
Greenways (number)	1	1
Fire Stations (number)	0	0
Hospitals (number)	0	0
Relocations		
Business Relocations (number)	31	37
Residential Relocations (number)	59	71
Church / Non-Profit (number)	1	2
Total (number)	**91**	**110**
Physical Environment		
Potential Noise Receptor Impacts (number)	174	183
Farmland Soils (acres)	N/A	N/A
Hazardous Materials Sites (number)	11	11
Floodplains – 100-year including Floodway (acres)[a]	4.9	5.0
Floodplains – 500-year (acres)[a]	1.3	1.3
Floodway (acres)[a]	0.4	0.4
Preservation Areas[b] (number)	1	1
Cultural Resources and Section 4(f)/6(f)		
Archaeological Sites (number)	1	1
Historic Properties (number)	0	0
Section 4(f) Resources (number)	1	1
Section 6(f) Resources (number)	0	0
Natural Environment		
Forested Land (acres)[c,d,e]	77.3	78.3
Stream Crossings (number)	5	5
Streams (linear feet)[a,f]	1,900	1,919
Wetlands (acres)[a]	3.8	3.9
Ponds (number)	0	0
Federally Protected Species Habitat Present	Yes	Yes
Terrestrial Communities		
Coastal Plain Bottomland Hardwoods	1.4	1.4
Cypress Gum Swamp	1.3	1.3
Maintained Disturbed	93.2	100.7

Resource	Alternative 7 with SPUI Option	Alternative 7 with TUDI Option
Mesic Mixed Hardwood Forest	0.3	0.9
Pine Flatwoods	68.3	68.7
Pine Scrub Oak Sandhill	3.9	3.9
Tidal Cypress Gum Swamp	2.0	2.0
Total Terrestrial Communities (acres)	**170.4**	**178.9**

Reasonably Foreseeable Effects

What reasonably foreseeable effects could be expected within the study area as a result of the project?

The scope of development, development intensity, and future shift of regional population growth is not anticipated to change because the proposed project includes full control of access and would not result in new access to undeveloped parcels. If built, the proposed project is likely to increase the rate of commercial development in the probable development areas, potentially creating a future shift in regional employment. Considering the scope of the project, annual population growth in the Future Land Use Study Area, and the amount of economic growth expected in the area, a determination of "indirect land use impacts not likely" resulted from NCDOT's Land Use Scenario Assessment Matrix.

What are the long-term and short-term uses of the environment and anticipated benefits?

The short-term effects on and uses of the environment in the vicinity of the DSAs are related to the long-term effects and maintenance and enhancement of long-term productivity. Short-term relates to the total duration of construction of the proposed project. Long-term refers to an indefinite period after construction of the proposed project and includes the long-term mitigation measures that may be implemented, as well as the ongoing operation and maintenance of the newly constructed roadway.

The most disruptive short-term impacts associated with the proposed project would occur during land acquisition and project construction, such as construction hauling, noise, lighting, and/or dust. However, these short-term uses of human, physical, economic, cultural, and natural resources would contribute to the long-term productivity of the study area.

It is anticipated that the proposed project would enhance long-term access and connectivity in New Hanover County and would support local, regional, and statewide commitments to transportation improvement and economic viability.

Required Permits and Actions

What permits would be required for the Independence Boulevard Extension project?

The project is anticipated to require the following permits:

- North Carolina Division of Water Resources: Section 401 Water Quality Certification

- US Army Corps of Engineers: Section 404 and Section 10 Permits
- North Carolina Division of Coastal Management: Coastal Area Management Act Major Permit

What are the unresolved issues for the Independence Boulevard Extension project?

Unresolved items include additional coordination, investigation, and documentation relating to archaeological resources, additional hazardous material investigations, coordination with permitting and regulatory agencies, and ongoing coordination and evaluation of impacts to the local community. Once a preferred alternative is identified, additional coordination would take place regarding archaeological resources, hazardous material investigations, and community cohesion to further investigate ways to avoid, minimize, and mitigate impacts. This coordination would be ongoing and continue throughout the development of the project and into final design. Coordination efforts could include, but are not limited to, public meetings, targeted outreach efforts, the development of a neighborhood plan, and identification of mitigation measures. Coordination would continue with permitting and regulatory agencies, and issues would be resolved prior to authorization of construction.

Sections 6(f) and 4(f)

Would resources that are protected by Section 6(f) of the Land and Water Conservation Act of 1965 be used?

Empie Park, at the southern end of the study area, is a Section 6(f) resource. The park received a grant from the Land and Water Conservation Fund in 1967 for the development of the park. There would be no impact to Empie Park because of the proposed project. While within the study area, the park is outside of any proposed right-of-way or construction areas.

Would resources that are protected by Section 4(f) of the Department of Transportation Act of 1966 be used?

Section 4(f) provides protection to cultural resources and public parks/recreation areas. Section 106 coordination is currently underway for the archaeological resources identified during surveys. The proposed greenway along the east side of the proposed roadway connects the Cross-City Trail at Randall Parkway to Maides Park. In order to make the connection, minor impacts are anticipated; however, the impacts anticipated include minor ground disturbance and would not impact the use of the park.

Would any of the impacts to resources protected by Section 4(f) be de minimis impacts?

A *de minimis* finding is anticipated for Maides Park due to the minor impacts proposed to the property that would not affect its intended use.

Public and Agency Involvement

What are the opportunities for public involvement in the Independence Boulevard Extension project?

Three public workshops have been held to present information, answer questions, and receive comments regarding the project. The first was held in June 2011 and the second was held in July 2019. The third was an event targeted to the community that would be relocated by the project and included door-to-door outreach and an open-house style meeting in February 2022. A public hearing will be held following the publication of this document and the public is strongly encouraged to attend, ask questions, and provide comments on the alternatives presented. Following the public hearing, outreach would continue in the form of ongoing small group meetings, neighborhood meetings, and engagement efforts for the community to develop mitigation measures for the proposed project.

As a result of EO 14148, EO 14154, EO 14173, and the removal of the Council on Environmental Quality's regulations, all federal environmental justice requirements are revoked and no longer applicable to the federal environmental review process. Accordingly, this DEIS does not consider public comments regarding environmental justice.

How do I provide comments on the Independence Boulevard Extension project?

Comments can be provided as either written or oral comments. Oral comments will be taken at the public hearing and through the project hotline at 601-300-5186, project code 4173. Written comments can be made in one of three ways: by e-mail at IndependenceBlvd@PublicInput.com, through the project website at www.ncdot.gov/projects/independence-boulevard/, or through mail to:

Alex D. Stewart, P.E., CPM
Highway Division 3 Project Manager
North Carolina Department of Transportation
5501 Barbados Boulevard
Castle Hayne, NC 28429

What comments and concerns have been expressed by the environmental resource and regulatory agencies?

Coordination with environmental resource and regulatory agencies has occurred throughout the project development process. Currently, no major comments and concerns have been raised by the agencies.

Next Steps

When will a preferred alternative be selected and how will the decision be made?

Following the publication of this DEIS, NCDOT will conduct a public hearing and collect comments from the public and regulatory agencies. At the end of the comment period, NCDOT would hold an internal meeting to review the comments and determine whether any additional studies need to be completed. Following the evaluation, FHWA and NCDOT would meet with regulatory agencies to recommend a

preferred alternative based upon an analysis of the alternatives from technical studies and the DEIS, and public input.

Will there be more information provided on the preferred alternative once it is selected?

Once a preferred alternative is identified for the project, any additional studies required for the project would be completed and a Final Environmental Impact Statement disclosing the impacts for the preferred alternative would be developed and presented to the public and agencies for comments.

When will construction on the Independence Boulevard Extension project begin?

NCDOT's 2024-2033 STIP shows construction for the project beginning in 2031. Funding updates will be addressed in future NEPA documentation for the proposed project.

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List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ACS	American Community Survey
ADT	Average daily traffic
AEC	Area of environmental concern
APE	Area of potential effect
CAC	Community Advisory Council
CAMA	Coastal Area Management Act
CBD	Central business district
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CIA	Community Impact Assessment
CIW	Citizen informational workshop
CO	Carbon monoxide
CO_2e	Carbon dioxide equivalent
CRA	Career Readiness Academy
CTP	Comprehensive Transportation Plan
CWA	Clean Water Act of 1977
dB(A)	A-weighted decibel
DBE	Disadvantaged Business Enterprise
DDI	Diverging Diamond Interchange
DEIS	Draft Environmental Impact Statement
DOT	US Department of Transportation
DSA	Detailed study alternative
EMS	Emergency medical service
EO	Executive Order

EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLUSA	Future Land Use Study Area
FPPA	Farmland Protection Policy Act
GIS	Geographic information system
HC	Hydrocarbons
HCM	Highway Capacity Manual
HEI	Health Effects Institute
ILM	Wilmington International Airport
LEP	Limited English proficiency
LOS	Level of service
LUSA	Land Use Scenario Assessment
LWCF	Land and Water Conservation Fund Act of 1965
mph	Miles per hour
MSAT	Mobile Source Air Toxics
MTP	Metropolitan Transportation Plan
NAAQS	National Ambient Air Quality Standard
NAC	Noise Abatement Criteria
NC HPO	North Carolina State Historic Preservation Office
NCAC	North Carolina Administrative Code
NC	North Carolina
NCDEQ	NC Department of Environmental Quality
NCDOT	North Carolina Department of Transportation
NCDWQ	North Carolina Division of Water Quality
NCNHP	North Carolina Natural Heritage Program
NCSHC	North Carolina State Highway Commission
NCWAM	NC Wetland Assessment Method

NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NHS	National Highway System
NLEB	Northern long-eared bat
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of intent
NO_x	Nitrogen Oxides
NRHP	National Register of Historic Places
NRTR	Natural Resources Technical Report
NSA	Noise Study Area
O_3	Ozone
Pb	Lead
PBO	Programmatic biological opinion
PCO	Programmatic conference opinion
PDA	Probable development areas
PM	Particulate matter
PM2.5	Particulate matter 2.5 micrometers in aerodynamic diameter and smaller
PM10	Particulate matter 10 micrometers in aerodynamic diameter and smaller
RCW	Red-cockaded woodpecker
ROD	Record of Decision
SO_2	Sulfur dioxide
SPUI	Single Point Urban Interchange
SR	State Route
STI	Strategic Transportation Investments law
STIP	State Transportation Improvement Program
TDM	Transportation demand management
TNM	Traffic Noise Model
TRB	Transportation Research Board
TSM	Transportation system management

TUDI	Tight Urban Diamond Interchange
UNCW	University of North Carolina at Wilmington
US	United States
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VMT	Vehicle miles travelled
WMPO	Wilmington Urban Area Metropolitan Planning Organization

1 Purpose of and Need for the Project

1.1 Introduction

In accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, a Draft Environmental Impact Statement (DEIS) is being prepared for the Independence Boulevard Extension project (proposed project). The DEIS is intended for use as an informational document by the decision-makers and the public. As such, it represents a disclosure of relevant environmental information concerning the proposed project.

On January 20, 2025, President Trump signed Executive Order (EO) 14148 – *Initial Rescissions of Harmful Executive Orders and Actions* and EO 14154 – *Unleashing American Energy*. The EOs revoked EO 14096 – *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023). Subsequently on January 21, 2025, President Trump signed EO 14173 – *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*. This EO revoked EO 12898 – *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994). On February 25, 2025, the Council on Environmental Quality (CEQ) published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, all federal environmental justice requirements are revoked and no longer apply to the federal environmental review process. FHWA, Federal Transit Administration, and Federal Railroad Administration's Joint NEPA regulations (23 Code of Federal Regulations [CFR] part 771) and the agencies Interim Final Guidance on *Section 139 Environmental Review Process: Efficient Environmental Reviews for Project Decision-making and One Federal Decision* (December 17, 2024) do not require an environmental justice analysis. Accordingly, no analysis of environmental justice is included in this DEIS. Any purported environmental justice impacts will not be considered in the federal decision. Social, economic, and community impacts will continue to be disclosed where applicable in accordance with 23 CFR 771.

The content of this DEIS conforms to the Federal Highway Administration's (FHWA) Guidance for Preparing and Processing Environmental and Section 4(f) Documents (FHWA 1987).

1.2 Project Description

The North Carolina Department of Transportation (NCDOT) is proposing to construct a multi-lane facility on a new location in New Hanover County, North Carolina. The 1.7-mile proposed project would extend existing Independence Boulevard (State Route [SR] 1209) on a new location from Randall Parkway to Martin Luther King Jr. Parkway (United States [US] 74). The proposed project would consist of two travel lanes in each direction separated by a variable width median. As part of the proposed project, a greenway would be constructed along the east side of the proposed project that would connect the City

of Wilmington Cross-City Trail to Maides Park. The proposed project is currently included in NCDOT's 2024-2033 State Transportation Improvement Program (STIP) as project number U-4434.

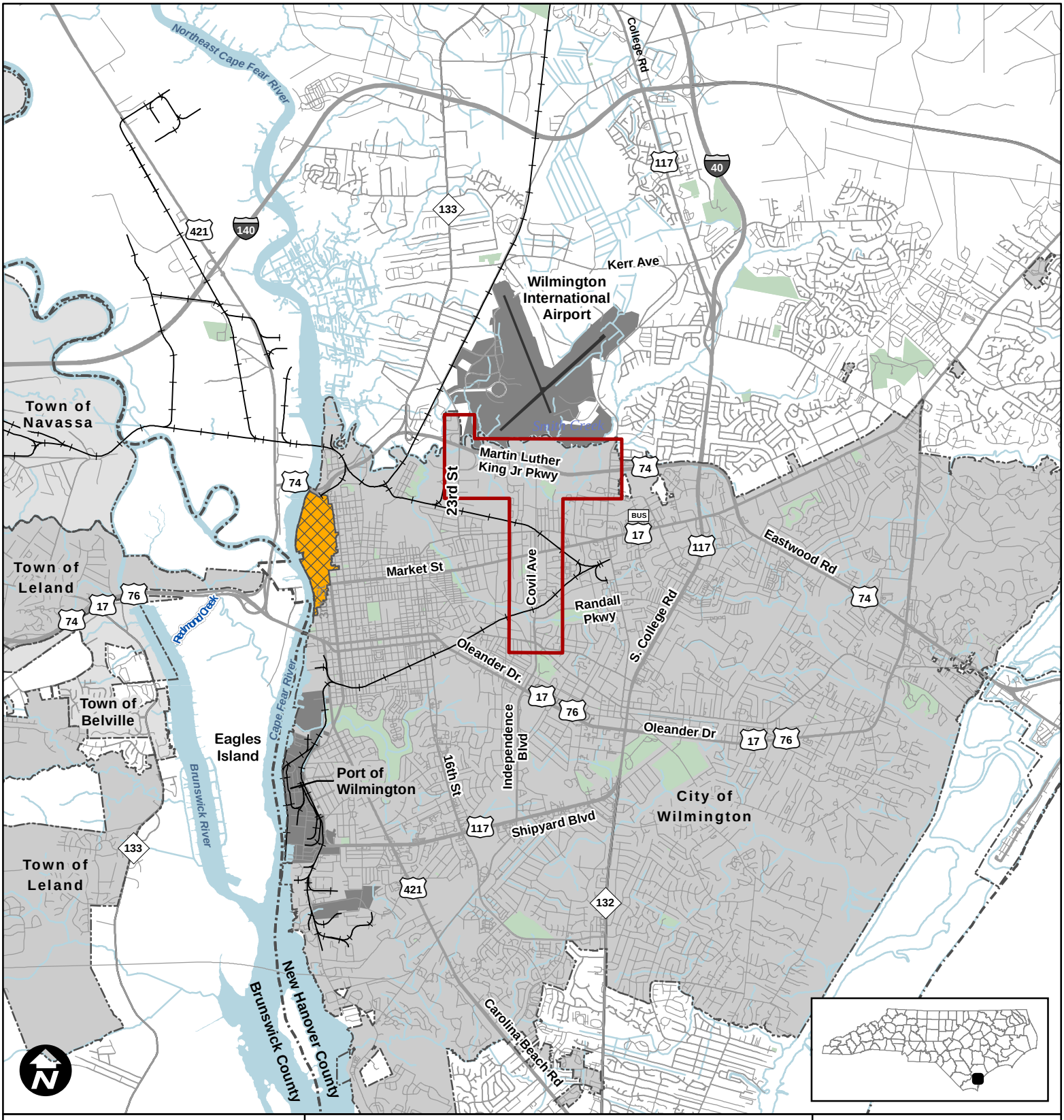
1.2.1 Project Setting

New Hanover County is situated in the coastal plain of North Carolina. The coastal plain physiographic province is characterized by flat land to gently rolling hills and valleys, with elevations ranging from sea level near the coast to 600 feet in the Sandhills (NC Department of Environmental Quality [NCDEQ] 2015). The Cape Fear River forms the western border of the county, while the east is bordered by the Atlantic Ocean. Major municipalities in New Hanover County include Wilmington, Carolina Beach, Kure Beach, and Wrightsville Beach.

The City of Wilmington is the most populated municipality in New Hanover County. It is the largest city in eastern North Carolina and has grown rapidly in recent years. Wilmington's central business district (CBD) is west of the proposed project and extends roughly from the Cape Fear River to 4th and 5th Streets (Figure 1-1).

The study area is located on the northern edge of the urban core of the city, just south of the Wilmington International Airport (ILM) and is a transition point to the rapidly developing area in northern New Hanover County. The study area boundaries are approximately Martin Luther King Jr. Parkway to the north, Randall Parkway to the south, Barclay Hill Drive to the east, and 30th Street to the west (Figure 1-2).

The study area consists of several land use types, including commercial, residential, and industrial properties. These land use types occur within the central and southern portions of the study area and along its major routes, including US 17 Business (Market Street) and Randall Parkway. The northern portion of the study area along Martin Luther King Jr. Parkway is largely undeveloped with the remainder of the study area including a mix of residential and open space.



Legend

- Railroad
- Study Area
- Central Business District
- Park
- Municipal Boundary
- County Boundary

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 1-1
Project Vicinity

Date: December 2024

0 0.5 1 2
Miles

1 inch = 8,000 feet

1.2.2 Project Details

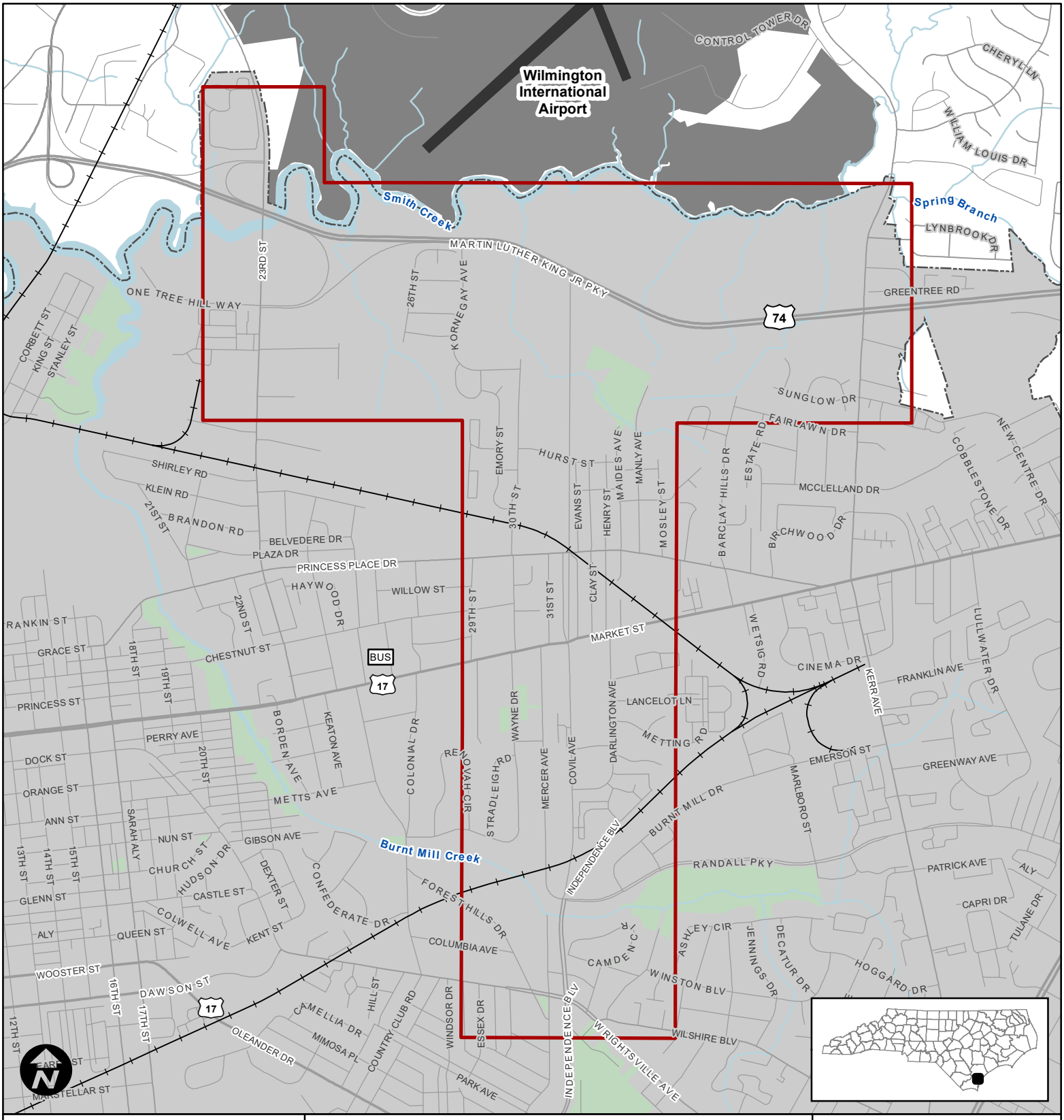
The proposed project would consist of two travel lanes in each direction separated by a variable width median. The project proposes new interchanges at Market Street and Martin Luther King Jr. Parkway, as well as bridge overpasses for both CSX railroad crossings within the study area – one at Princess Place Drive and the other at Hurst Street. Due to the anticipated high traffic volumes along the corridor and the need to bridge over railroads and Market Street, the proposed roadway would be elevated for much of its length.

The proposed project would begin at Randall Parkway with a reconstructed signalized intersection with Mercer Avenue. The roadway would be elevated over the CSX rail line just north of Randall Parkway. In order to maintain neighborhood connectivity in the southern portion of the study area, Darlington Avenue would be extended from Covil Avenue to Mercer Avenue. Due to heavy traffic predicted to enter the Independence Boulevard and Market Street intersection, an overpass and interchange would be used at this location.

There are currently two interchange options under consideration for the Independence Boulevard/Market Street intersection – a tight urban diamond interchange (TUDI) and a single-point urban interchange (SPUI). The proposed project would then continue (elevated) northward over Princess Place Drive, the CSX rail line, and Hurst Street until it reaches a new interchange with Martin Luther King Jr. Parkway. A trumpet interchange configuration is proposed at Martin Luther King Jr. Parkway.

A greenway is proposed along the east side of the proposed project that would connect the City of Wilmington Cross-City Trail to Maides Park.

The study area is shown on Figure 1-2.



Legend

- Railroad
- Stream
- Study Area
- Park
- Municipal Boundary
- County Boundary
- Municipal Boundary

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 1-2
Study Area

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

1.2.3 Existing Road Network

The existing roadway network that was analyzed for the proposed project includes the major transportation facilities within the study area. The roadway network in the Wilmington area consists of two interstate highways, several primary US and North Carolina (NC) routes, and numerous secondary and local streets. Most roadways vary from two-lane to six-lane segments and carry both local and regional traffic. The primary north-south routes in the project vicinity are I-40/NC 132 (College Road), existing Independence Boulevard, SR 1175 (Kerr Avenue), and 23rd Street, while the primary east-west roadways are Martin Luther King Jr. Parkway, Market Street, Randall Parkway, and US 76 (Oleander Drive). Princess Place Drive is a secondary route that carries east-west local traffic, and Covil Avenue, Mercer Avenue, and Montgomery Street are secondary routes that carry north-south traffic (Figure 1-1).

In addition to the roadways summarized in this section, CSX railroad has a major rail line that crosses through the study area twice. This rail line begins at the Port of Wilmington and stretches westward to a major train route intersection in Hamlet and Monroe before arriving in Charlotte.

Table 1-1 summarizes the typical sections and the presence of sidewalks along the roadways in the study area.

Table 1-1: Existing Road Network

Roadway Name	Typical Section	Sidewalks
North-South		
Independence Boulevard	4-lane divided	No
Covil Avenue	2-lane undivided	Yes, partial
Mercer Avenue	2-lane undivided	No
Montgomery Street	2-lane undivided	No
Kerr Avenue	4-lane divided	Yes, partial
College Road	4/6-lane divided	No
23rd Street	2-lane undivided	Yes, partial
East-West		
Martin Luther King Jr. Parkway	6-lane divided	No
Market Street	5-lane with center turn lane	Yes
Randall Parkway	4-lane divided	Yes
Oleander Drive	4/6-lane divided	Yes, partial
Princess Place Drive	2-lane with center turn lane	Yes, partial

1.2.3.1 Primary US Routes and NC Routes

US 17 / US 17 Business (Market Street)

US 17 is a north-south route that extends along the Atlantic Coast from Winchester, Virginia, to Fort Myers, Florida, and traverses New Hanover County. Currently, US 17 merges with US 421 (Carolina Beach Road) and travels north-south along the Cape Fear River just west of the study area before traveling along the I-140 corridor towards Hampstead. US 17 Business begins at the US 17 split slightly west of the Cape Fear River in Brunswick County and continues across the Cape Fear River by way of the Cape Fear Memorial Bridge in an east-west direction (as does US 76 and US 421). US 17 Business travels north along 3rd Street and then east/west along Market Street until it terminates at Military Cutoff Road. From the Cape Fear Memorial Bridge, US 17 continues along the one-way Wooster and Dawson Streets and continues along Oleander Drive and Military Cutoff Road and follows Market Street towards Hampstead. Within the vicinity of the project, US 17 Business is multi-lane with no control of access.

US 74 (Martin Luther King Jr. Parkway)

US 74 is an east-west route that runs from Chattanooga, Tennessee, to Wrightsville Beach, North Carolina (in New Hanover County). This is a major route for travelers coming from the Charlotte metropolitan region to the beaches of southeastern North Carolina. US 74 merges with US 76 in Columbus County, North Carolina, and then merges with US 17 Business before following the US 421 corridor to the Isabel Holmes Bridge crossing of the Cape Fear River. US 74 continues along Martin Luther King Jr. Parkway through the study area before continuing as Eastwood Road and terminating at Wrightsville Beach. The roadway is multi-lane with controlled access west of the proposed project and partially controlled access east of the proposed project.

US 76 (Oleander Drive)

US 76 is an east-west route that runs from Chattanooga, Tennessee, through the foothills of Georgia and South Carolina, to Wilmington, North Carolina. US 76 merges with US 74 in Columbus County, North Carolina, and US 17 Business in Brunswick County, near the Cape Fear River. It crosses the Cape Fear Memorial Bridge and enters Wilmington on the one-way Wooster and Dawson Streets. US 76 then veers south and is identified as Oleander Drive through much of the City of Wilmington. The roadway is multi-lane with no control of access within the vicinity of the proposed project.

US 117/NC 132 (College Road)

US 117 is a north-south route that begins at the Port of Wilmington and ends at US 301 near Wilson, North Carolina. US 117 exits the Port of Wilmington as Shipyard Boulevard and travels in the east-west direction before turning in the north-south direction and combining with NC 132 as College Road. The combined US 117/NC 132 roadway continues through the study area as College Road before US 117 connects to the eastern terminus of I-40, before splitting and running parallel to I-40 in the northwest direction. NC 132 is a north-south route that runs from US 117 to the eastern terminus of I-40, entirely within New Hanover County. The combined US 117/NC 132 (College Road) is a major route that serves as the terminus point for I-40, provides access to the urban core of Wilmington, and passes by the

University of North Carolina at Wilmington (UNCW). The roadway is multi-lane with no control of access within the vicinity of the proposed project.

1.2.3.2 Secondary Routes and Local Roads

Independence Boulevard (SR 1209)

Independence Boulevard is a north-south route that runs from River Road (SR 1576) to Randall Parkway. The roadway is a two-lane roadway with no control of access from River Road to Carolina Beach Road. Independence Boulevard is a four-lane, divided roadway with partial control of access from Carolina Beach Road to Randall Parkway.

Kerr Avenue (SR 1175)

Kerr Avenue is a north-south route that runs from College Road to Murrayville Road (SR 1322) before turning and continuing in an east-west direction to NC 133 (Castle Hayne Road). The roadway is a four-lane divided highway from Randall Parkway to Martin Luther King Jr. Parkway. An interchange at the intersection of Martin Luther King Jr. Parkway and Kerr Avenue has been proposed (U-3338C) with construction to begin in 2028.

Randall Parkway

Randall Parkway is an east-west route that runs from Independence Boulevard to Reynolds Drive and is maintained by the City of Wilmington as a major thoroughfare. The roadway is four-lane divided from Independence Boulevard to College Road.

Covil Avenue

Covil Avenue is a north-south route that runs from the Randall Parkway/Independence Boulevard intersection to Market Street. The roadway is a two-lane local road with no control of access.

Mercer Avenue

Mercer Avenue is a north-south route that parallels Covil Avenue to the west and turns eastward to intersect opposite Randall Parkway at the Independence Boulevard/Covil Avenue intersection. The roadway is a two-lane divided roadway with no control of access that utilizes speed humps to calm traffic.

Montgomery Avenue

Montgomery Avenue is a north-south route that runs from Market Street to Princess Place Drive. The roadway is a two-lane local road with no control of access.

Princess Place Drive

Princess Place Drive is an east-west route entirely within the study area that runs from 17th Street to Market Street. It is a three-lane road with a center turn lane and has no control of access.

23rd Street

23rd Street is a north-south route that begins at Market Street and ends at Castle Hayne Road just north of the study area. The roadway is a two-lane local road with no control of access and includes an interchange at Martin Luther King Jr. Parkway.

1.2.4 Project History

The proposed project was included in Wilmington's first Thoroughfare Plan adopted in 1972 (North Carolina State Highway Commission [NCSHC] 1972). The plan showed Independence Boulevard as a proposed thoroughfare extending from Market Street to the proposed Smith Creek Parkway (current Martin Luther King Jr. Parkway) and continuing north to tie into 23rd Street. The proposed project was also included in the 1985 Thoroughfare Plan but altered to terminate at the proposed Smith Creek Parkway (NCDOT 1985). The 1985 version of the proposed project continued to be included in the Greater Wilmington Urban Area Transportation Plan presented to the public in November 1992 and adopted in September 1993 (NCDOT 1993). The proposed project was also included in the 1997 version of the Greater Wilmington Urban Area Transportation Plan, in which Independence Boulevard was identified as an over capacity corridor between Carolina Beach Road and Market Street (NCDOT 1997b). The proposed project was then included in the Wilmington Urban Area Metropolitan Planning Organization (WMPO) Wilmington Urban Area 2030 Long Range Transportation Plan adopted in 2005 (WMPO 2005). In 2008, the WMPO Transportation Advisory Committee voted to amend the functional classification map for the portion of Independence Boulevard from Shipyard Boulevard to Martin Luther King Jr. Parkway (including the portion contained within the proposed project) to the Urban Principal Arterial classification. The proposed project was included in the WMPO Cape Fear Transportation 2040 Metropolitan Transportation Plan (MTP) adopted in 2015 (WMPO 2015) and is currently included in the WMPO Cape Fear Moving Forward 2045 MTP (WMPO 2020).

NCDOT completed a feasibility study for the proposed project in July 2002 (NCDOT 2002). The proposed project was then included in the NCDOT 2004-2010 STIP and is currently included in the 2024-2033 STIP as project number U-4434. Funding updates will be addressed in future NEPA documentation for the proposed project.

1.3 Proposed Action

NCDOT is proposing to construct a multi-lane facility on new location in New Hanover County, North Carolina. Located within the urban core of the City of Wilmington, the proposed 1.7-mile-long project would be an extension of existing Independence Boulevard from the intersection with Randall Parkway and Mercer Avenue to Martin Luther King Jr. Parkway. The proposed action (or proposed project) is designated in the 2024-2033 NCDOT STIP as project number U-4434 and described as "SR 1209 (Independence Boulevard Extension), Randall Parkway to US 74 (Martin Luther King Jr. Parkway) in Wilmington; multi-lanes on new location."

1.4 Need for the Proposed Action

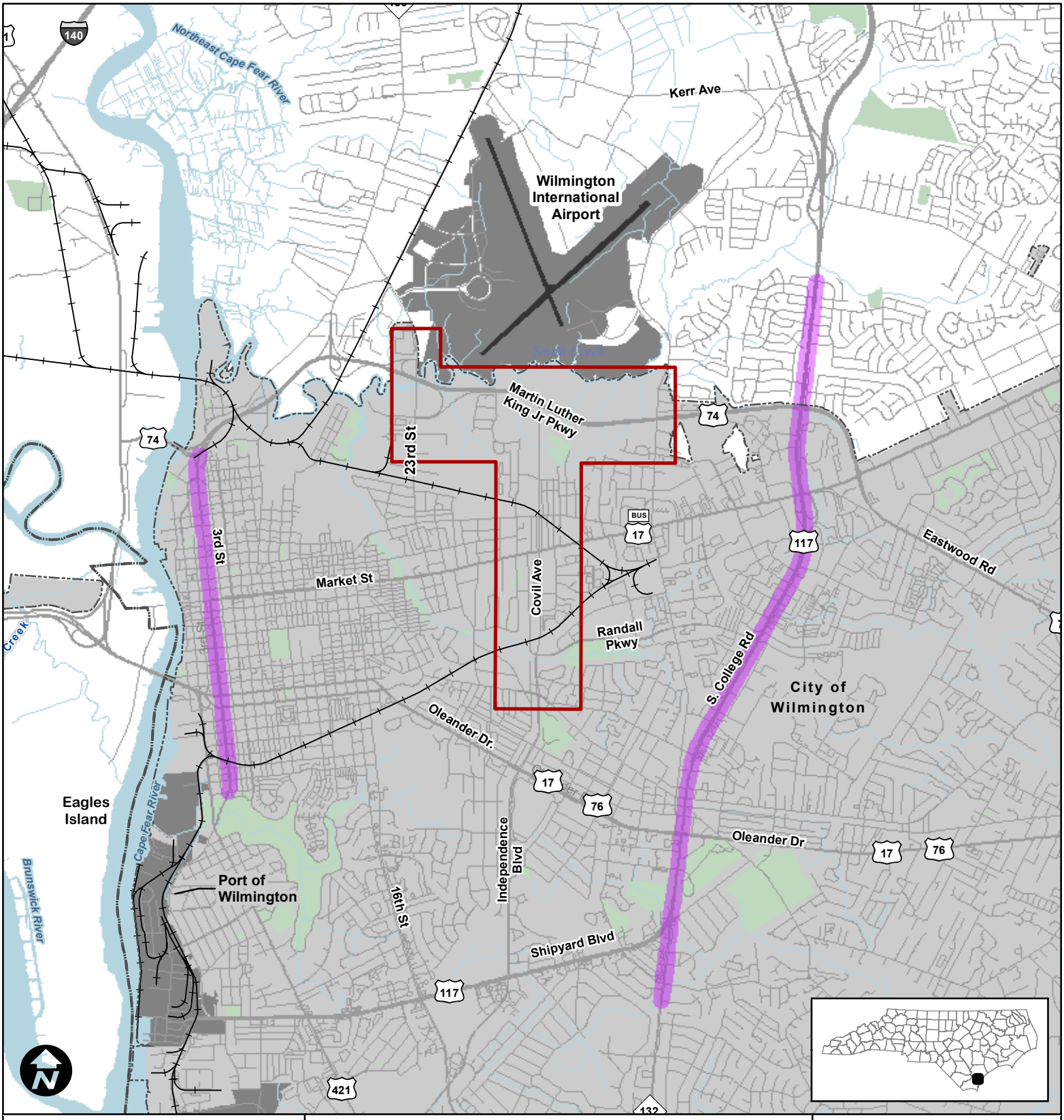
The need for the proposed project is demonstrated by the following:

- Deficient north-south regional roadway connectivity
- Deficient north-south system capacity
- Deficient linkage within and through New Hanover County

1.4.1 Connectivity

Deficient North-South Regional Roadway Connectivity

Figure 1-3 presents the existing network of regional routes in Wilmington, with north-south routes highlighted. The network consists primarily of continuous east-west roadways, including Martin Luther King Jr. Parkway, Market Street, Randall Parkway, Oleander Drive, and Shipyard Boulevard. However, Wilmington offers only two continuous north-south routes on the Cape Fear peninsula: 3rd Street and College Road. 3rd Street runs through the CBD and Wilmington Historic District adjacent to the Cape Fear River, whereas College Road runs along the peninsula center. The distance between the two routes varies from 3 to 4 miles. NCDOT completed the widening of Kerr Avenue (U-3338B) in 2019. Kerr Avenue is an additional north-south roadway in the project vicinity; but the purpose of U-3338B was to improve traffic capacity only, not to satisfy the demand for improved north-south roadway connectivity. The improved Kerr Avenue, along with the remaining north-south roadways in the project vicinity, offer short, discontinuous segments that force commuters to redirect from one north-south route onto east-west roadway segments that connect to the next north-south route. This weaving or "stair-step movement" north or south places considerable pressure on already full east-west routes, as well as signalized intersections in the network. The stair-step travel pattern causes additional left and right-turn movement volumes at intersections, which diminishes overall intersection capacity. Improving north-south connectivity would reduce the stair-step travel pattern, reduce turning movements, and increase capacity by promoting increased signal green-time to east-west and north-south through movements.



Legend

- Railroad
- North-South Roadway
- Study Area
- Central Business District
- Park
- Municipal Boundary
- County Boundary

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 1-3
North-South Regional Roadway Connectivity

Date: January 2025

0 0.25 0.5 1
Miles

1 inch = 5,000 feet

1.4.2 Capacity

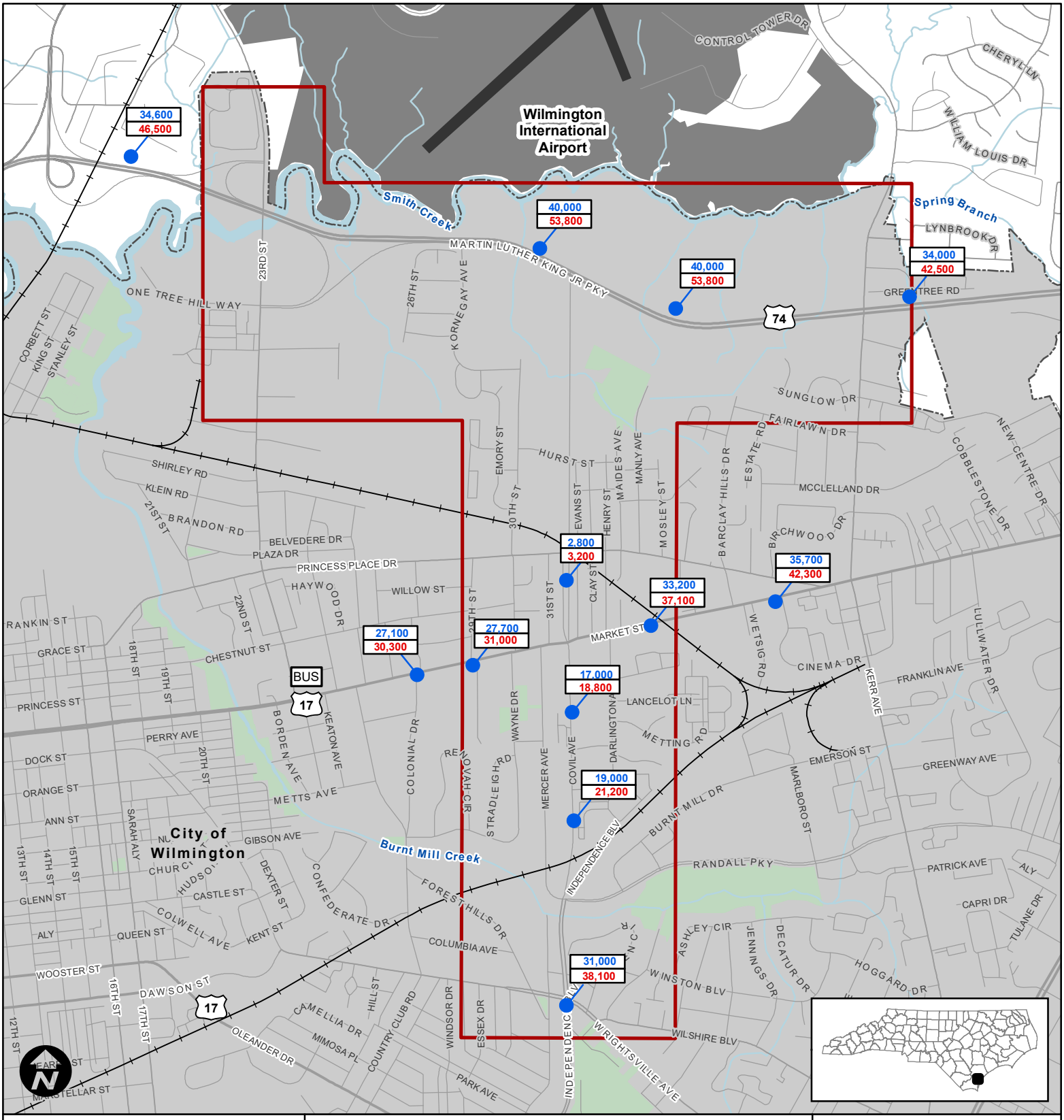
Deficient North-South System Capacity

Traffic modeling and capacity analyses for the transportation network show that additional traffic capacity is needed within the study area (NCDOT 2018a). System modeling confirms a high demand for north-south travel within central Wilmington from Independence Boulevard to College Road. The modeled demand exceeds the capacity of existing and planned improvements for the area. Numerous traffic generators to the north, south, and within the study area use the north-south routes in central Wilmington. The primary traffic generators and destinations to the north of the study area include I-40, Wilmington International Airport (ILM), the residential areas of northeast Wilmington, and access to the east and west along Martin Luther King Jr. Parkway. The primary traffic generators in the immediate vicinity of the study area include the businesses and residential areas along Market Street. To the south and east of the study area, the major traffic generators include Independence Mall, the Port of Wilmington, businesses along College Road, UNCW, the beaches of southern New Hanover County, and Fort Fisher.

Traffic forecasts (dated July 2017) provided average daily traffic (ADT) volumes for the transportation network within the study area for the Existing No-Build Conditions (year 2017), Future No-Build Conditions (year 2040), and Future Build Alternatives (year 2040) (NCDOT 2017b). Using this forecast and NCDOT's Intersection Analysis Utility tool, a.m. and p.m. peak hour volumes were developed for all of the scenarios being evaluated. The ADT volumes for existing roadways within the study area are shown on Figure 1-4. Traffic volumes for this scenario on Independence Boulevard within the study area range from 2,800 ADT to 31,000 ADT. Volumes on Market Street range from 27,700 ADT to 33,200 ADT.

The procedures used to define the operational qualities of the roadways are based on the concepts of capacity and level of service (LOS) as set forth in the Highway Capacity Manual (HCM) and range from LOS A to LOS F (Transportation Research Board [TRB] 2010). LOS A represents the best operating conditions along a road or at an intersection, while LOS F represents the worst conditions. A summary of the LOS results for unsignalized and signalized intersections for the Existing No-Build Conditions are included in Table 1-2, and the LOS results are shown on Figure 1-5. The intersection numbers in the table correspond to those assigned within the Synchro analysis. The results of the analysis show that eight of the nine intersections are currently operating at LOS E or worse (and a volume to capacity ratio of 0.85 or worse) during the a.m. peak hour, p.m. peak hour, or both. LOS results for the Future No-Build Conditions are shown on Figure 1-6.

The methodologies contained in the HCM were used to determine the existing LOS for the unsignalized and signalized intersections within the study area. The analyses were conducted in accordance with the latest *NCDOT Congestion Management Capacity Analysis Guidelines,* dated July 2015 (NCDOT 2015).



Legend

- Railroad
- Stream
- Study Area
- Park
- Municipal Boundary
- County Boundary

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 1-4
2017 Base Year / 2040 Future Year No-Build Average Annual Daily Traffic

Date: January 2025

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

Table 1-2: 2017 No-Build Alternative – Intersection Level of Service

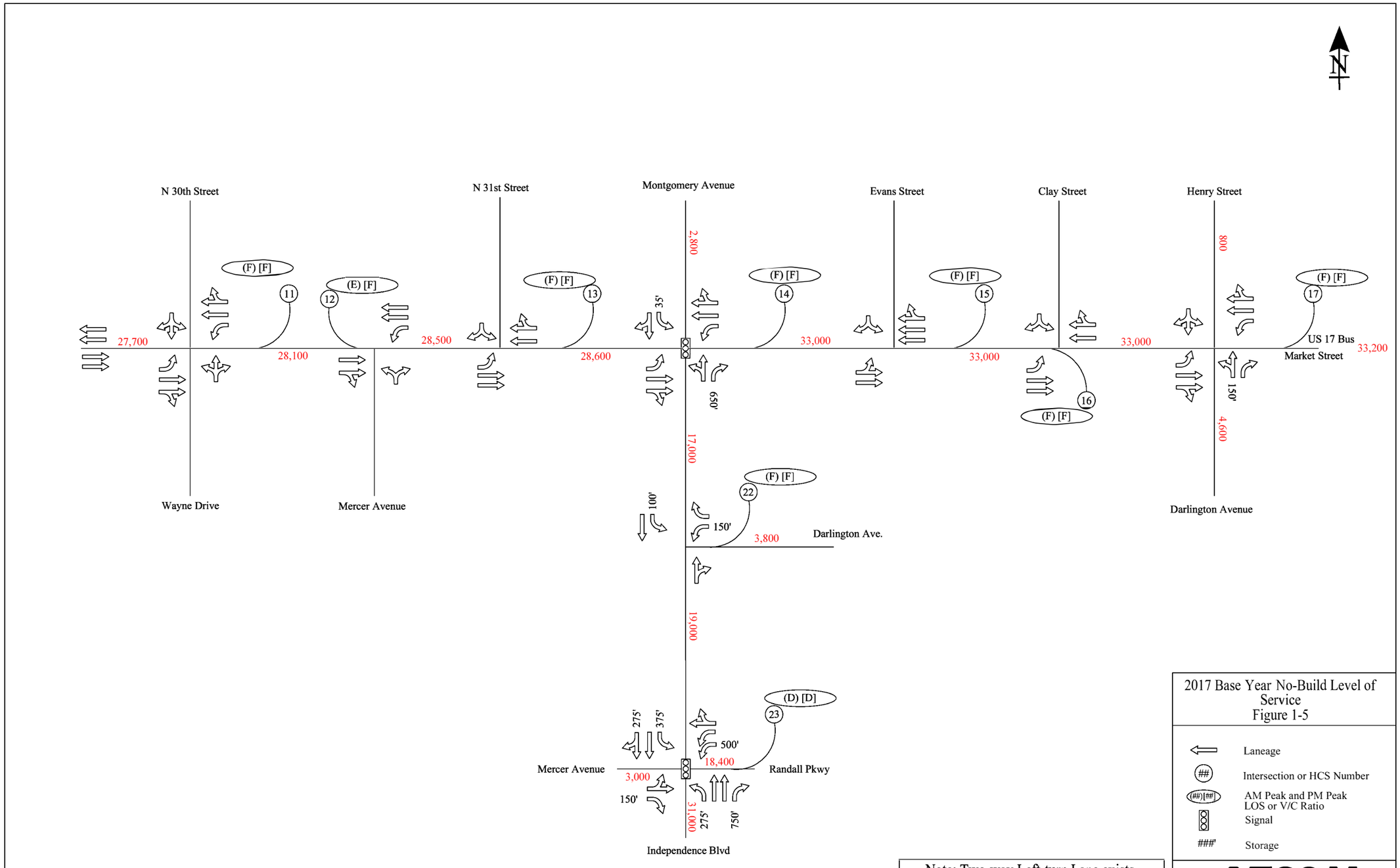
ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
11[a]	**Wayne Drive/30th Street at Market Street**	**F**	**F**
	Eastbound left	B	B
	Westbound Left	B	B
	Northbound left/through/right	F	F
	Southbound left/through/right	F	F
12[a]	**Mercer Avenue at Market Street**	**E**	**F**
	Westbound left	B	B
	Northbound left/right	E	F
13[a]	**Market Street at 31st Street**	**F**	**F**
	Eastbound left	B	B
	Southbound left/right	F	F
14	**Covil Avenue/Montgomery Avenue at Market Street**	**F**	**F**
	Eastbound left	D	D
	Eastbound through/right	F	F
	Westbound left	F	F
	Westbound through/right	C	D
	Northbound left/through	F	F
	Northbound right	C	B
	Southbound left	F	F
	Southbound through/right	F	F
15[b]	**Market Street at Evans Street**	**F**	**F**
	Eastbound left/through	A	A
	Southbound left/right	F	F
16[b]	**Market Street at Clay Street**	**F**	**F**
	Eastbound left	C	B
	Southbound left/right	F	F
17[b]	**Darlington Avenue/Henry Street at Market Street**	**F**	**F**
	Eastbound left	C	B
	Westbound left	B	C
	Northbound left/through	F	F
	Northbound right	B	B
	Southbound left/through/right	F	F
22[b]	**Covil Avenue and Darlington Avenue**	**F**	**F**
	Westbound left	F	F
	Westbound right	C	D
	Southbound left	B	B

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
23	**Independence Boulevard/Covil Avenue at Mercer Avenue/Randall Parkway**	**D**	**D**
	Eastbound left/through	E	E
	Eastbound right	E	E
	Westbound left	D	D
	Westbound through/right	C	C
	Northbound left	D	C
	Northbound through	D	D
	Northbound right	B	C
	Southbound left	E	F
	Southbound through/right	C	B

Source: Traffic Forecast for STIP No. U-4434 (NCDOT 2017b)

[a] Refer to Figure 1-6.

[b] Unsignalized Intersections



2017 Base Year No-Build Level of Service
Figure 1-5

Laneage

Intersection or HCS Number

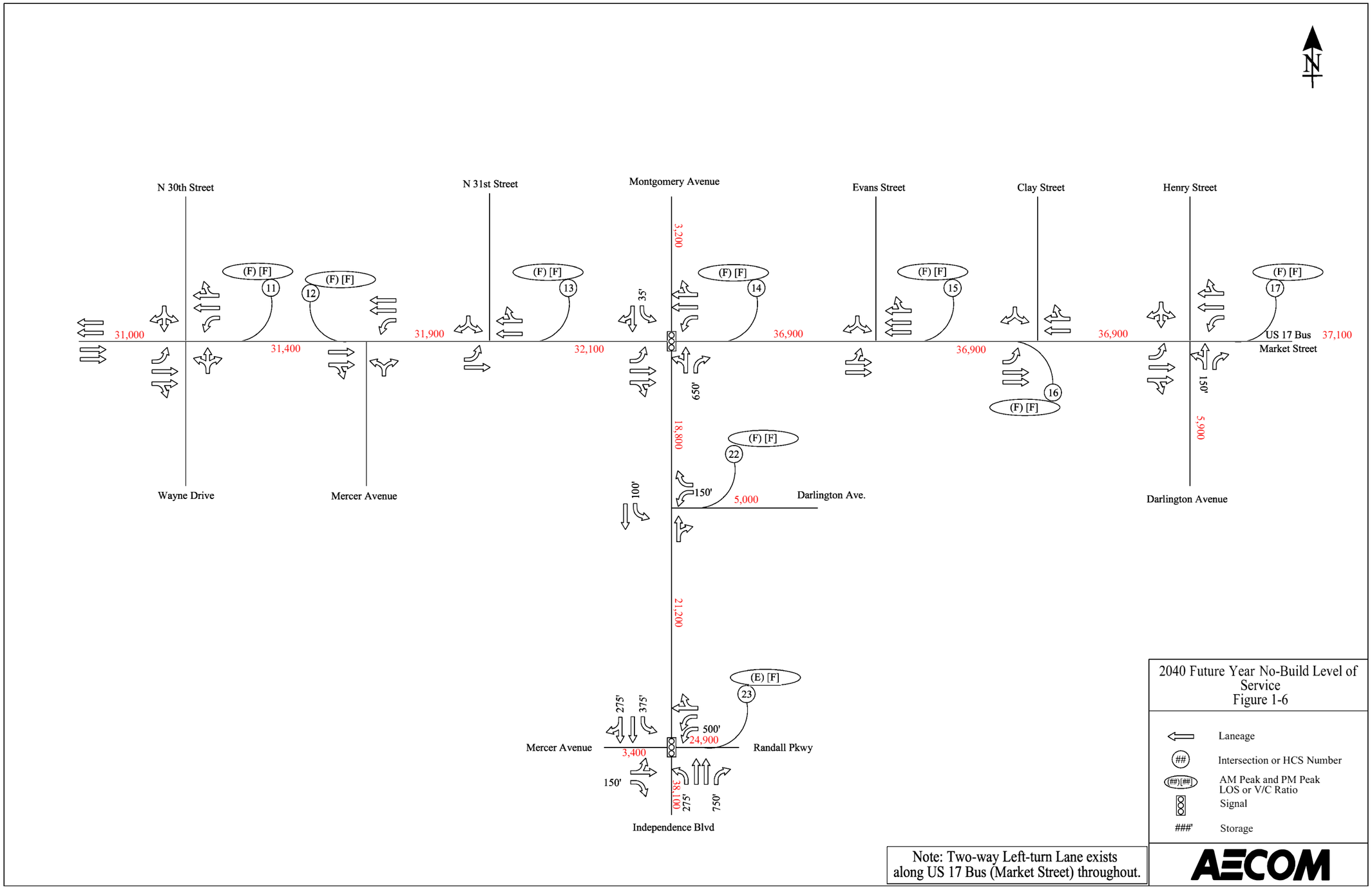
(##)[##] AM Peak and PM Peak LOS or V/C Ratio

Signal

###' Storage

Note: Two-way Left-turn Lane exists along US 17 Bus (Market Street) throughout.

AECOM


N
N 30th Street
N 31st Street
Montgomery Avenue
Evans Street
Clay Street
Henry Street
(F) [F]
11
12
13
14
15
16
17
22
23
31,000
31,400
31,900
32,100
36,900
36,900
36,900
37,100
US 17 Bus
Market Street
3,200
35'
650'
18,800
150'
5,000
Darlington Ave.
100'
21,200
150'
5,900
Darlington Avenue
Wayne Drive
Mercer Avenue
(E) [F]
275'
375'
500'
24,900
Mercer Avenue
3,400
Randall Pkwy
150'
100'
275'
750'
Independence Blvd
2040 Future Year No-Build Level of Service
Figure 1-6
Laneage
##
Intersection or HCS Number
(##)(##)
AM Peak and PM Peak LOS or V/C Ratio
Signal
###'
Storage
Note: Two-way Left-turn Lane exists along US 17 Bus (Market Street) throughout.
AECOM

1.4.3 System Linkage

Deficient Linkage Within and Through New Hanover County

The proposed project was identified in the Wilmington Urban Area Transportation Plan for 1999-2025 as a facility that would "complete a major north-south corridor from River Road in the south to Smith Creek Parkway (now Martin Luther King Jr. Parkway) in the north" (City of Wilmington 1999). The plan notes that the Independence Boulevard corridor "is listed in the Transportation Advisory Committees adopted Priority Needs list as the number one project since 1995."

Further, the proposed project is included in the WMPO Cape Fear Moving Forward 2045 MTP (WMPO 2020). The WMPO 2045 MTP calls for a safe, realistic, efficient, and reliable multimodal transportation network that embraces innovation and is environmentally and socially responsible. The proposed project is listed in the fiscally constrained roadway project list.

One of the goals for the greater Wilmington area is to develop an integrated regional transportation system by providing an intrastate link between designated activity centers. The WMPO 2040 MTP noted that the proposed project is an important connector for freight movement and important in promoting intermodal connections between the ports, highways, and rail networks.

Within the WMPO's 2016 Comprehensive Transportation Plan (CTP) (WMPO 2016a) the proposed project appears as a Recommended Boulevard, and within the City of Wilmington's Create Wilmington Comprehensive Plan (City of Wilmington 2016), Independence Boulevard and Market Street are designated as major corridors and regional parkways that would prioritize motor vehicle mobility with some walkable qualities such as buffered sidewalks and crosswalks. The plan focuses on growing Wilmington inward and upward by concentrating on infill and redevelopment, job growth, and housing options and integrating land uses to reduce traffic congestion.

1.5 Purpose of the Proposed Action

The primary purpose of the proposed project is to improve regional mobility, system traffic capacity, north-south connectivity, and transportation system (intrastate/intermodal) linkage from Randall Parkway, in the vicinity of Independence Boulevard, to Martin Luther King Jr. Parkway that is consistent with local and state transportation plans.

The proposed project would enhance regional mobility, improve overall traffic capacity, provide the needed north-south connectivity, and facilitate intrastate/intermodal linkage within central Wilmington. The proposed project would provide a solution that addresses the desired outcomes prescribed in the WMPO 2016 CTP (WMPO 2016a) and 2045 MTP (WMPO 2020).

Detailed study alternatives (DSA) for the proposed project were evaluated against the following performance measures, which were established to provide a quantifiable measure for determining the feasibility of an alternative relative to the purpose of the project:

- *Direct and Continuous North-South Connectivity*: To fulfill this purpose, the DSAs must provide a continuous north-south connection between the east-west major arterials in the

City of Wilmington – Shipyard Boulevard, Oleander Drive, Market Street, and Martin Luther King Jr. Parkway.

- *Improve Regional Mobility and System Traffic Capacity*: To fulfill this purpose, the DSAs must provide a systemic increase in the overall traffic capacity for north-south travel within central Wilmington.
- *Transportation System Linkage Consistent with Local and State Transportation Plans*: To fulfill this purpose, the DSAs must be consistent with the WMPO 2016 CTP and 2045 MTP.

1.6 Secondary Benefits

The potential exists for additional benefits as a result of the proposed project. These secondary benefits were considered when evaluating alternatives but were not used as a basis for eliminating alternatives based on the purpose and need or used as a screening factor to determine which alternatives were advanced in the project development. Additional benefits are described in the following sections.

1.6.1 Improvement to Emergency Evacuation Routes

Options are currently limited for emergency evacuation of the central Wilmington area. According to NCDOT, NC 133, US 74/76, US 17, US 117/NC 132, and US 421 are designated hurricane evacuation routes (NCDOT 2021).

The US 117/NC 132 (Shipyard Boulevard/College Road) corridor serves as the start point for the I-40 lane reversal for emergency evacuation during hurricanes. In addition, the I-40 lane reversal plan includes the use of Martin Luther King Jr. Parkway and Kerr Avenue to move traffic to I-40. The projected deficiencies in capacity on these routes and the predicted increase in hurricane evacuation clearance time for 2040 pose a threat to residents and visitors. Without improvements to the network, emergency evacuation would be hampered.

The State of North Carolina's statewide hurricane evacuation clearance time goal is 18 hours (North Carolina General Statutes Section 136-102.7), which is applied to a Category 3 hurricane with 75 percent tourist occupancy. Clearance time begins when the first vehicle enters the road network and ends when the last vehicle leaving reaches a point of safety. In this case, I-95 (at I-40) is considered the inland point of safety. The proposed project would provide an additional opportunity for connecting the currently designated evacuation routes, including better access to I-40 and US 421.

1.6.2 Safety

Providing a roadway with a high level of access management (minimizing driveways, median openings, left-over turn lanes in the median, etc.) is an effective means of improving safety by reducing conflicts between vehicles. Crash rates for primary routes in North Carolina show that the accident rate for a four-lane roadway without any control of access is 319 crashes per million vehicle miles traveled (VMT), while the rate for a controlled access facility drops to 121 crashes per million VMT (NCDOT 2019a). The proposed project would have a higher level of access control than the adjacent roadways. Safety of users improves when there is a high level of access control.

1.6.3 Improvement to East-West Traffic Operations

Options are currently limited for traveling in the north-south direction in Wilmington, with only one existing route connecting the four major arterials. Due to the limited connectivity of north-south corridors, motorists on these routes must also utilize main east-west routes and neighborhood streets in a "stair step" pattern. The development of an additional north-south route would likely consolidate much of the north-south traffic onto a single route and reduce the pressure that north-south commuters place onto east-west routes – which would improve the flow of traffic along the east-west corridors.

1.7 Relationships with Other Modes of Transportation

1.7.1 North Carolina State Ports

The Port of Wilmington (Port) is situated on the eastern bank of the Cape Fear River, southwest of the proposed project. A 42-foot- deep navigational channel provides access to the Port from the Atlantic Ocean. Existing Independence Boulevard intersects with Shipyard Boulevard, which is the primary access to the Port.

The Port offers terminal facilities serving military, container, bulk, breakbulk, and specialty cargo operations. The Port is one of the few South Atlantic ports with readily available berths and storage areas for containers and cargo. CSX railroad provides daily rail service for boxcar, tanker, and general cargo services.

The number of trucks entering and exiting the Port is expected to grow based on projected cargo forecasts. Future growth projections suggest that congestion levels on the local transportation network could hamper the Port's growth plans and competitiveness. Deficiencies in the existing transportation network diminish the ability to efficiently distribute goods and services from the Port.

1.7.2 Railroads

Freight rail service is provided to and from Wilmington by CSX railroad. CSX railroad has an interchange line with the Wilmington Terminal Railroad, L.P., which serves the Port south of the proposed project. The CSX railroad ACB-line and the CSX track to State Port line are the two rail lines present within the study area and crossed by the proposed project (Figure 1-2). The first crossing is along Covil Avenue slightly north of Randall Parkway. The second crossing is near Princess Place Drive, north of Market Street. The two rail lines currently carry two to four trains per day at 10 miles per hour (mph) (Harris 2017).

The number of trains crossing this rail line is subject to increase in the future and is dependent on freight demands associated with the Port. In 2017, CSX railroad in association with North Carolina Ports began a daily, intermodal rail service between Wilmington and Charlotte known as the Queen City Express. The double-stacked train was included in the Cape Fear Commutes 2035 Transportation Plan to create a more efficient rail route linking Mid-Atlantic ports with Midwestern markets (WMPO 2011).

As of December 2024, there is no passenger rail service serving the Wilmington area or southeastern North Carolina. In 2005, the NCDOT Rail Division completed a study that evaluated the possibility of

restoring passenger rail service to the Wilmington area (NCDOT 2005). The study recommended implementing passenger rail service from Raleigh to Wilmington via Fayetteville and Goldsboro in phases as funding becomes available. In 2004, NCDOT completed a feasibility study for southeastern North Carolina that provides conceptual level capital costs, operating costs, and a range of ridership and revenue associated with a new intercity passenger service connecting Wilmington with the existing state-supported passenger services in Raleigh (NCDOT 2024). The study recommends a route for service through Goldsboro.

1.7.3 Airports

ILM is located just northeast of the City of Wilmington and north of the proposed project. ILM can be accessed from NC 133 (via 23rd Street and Airport Boulevard). The airport is operated by the New Hanover County Airport Authority and provides 24 non-stop flights to destinations including Atlanta, Boston, Charlotte, Chicago, Dallas, Denver, Miami, New York City, Nashville, Newark, Orlando, Philadelphia, and Washington, DC. In addition, the airport has international charter, corporate, military, and recreational flights (ILM 2024).

ILM is designated as an international airport because it provides a port of entry through the International Arrivals Facility, which is a separate facility from the domestic passenger terminal. According to the 2045 MTP, ILM has seen an increase in both passenger and cargo enplanements every year since 2015. Fiscally constrained projects included in the 2045 MTP include runway extensions, taxiway expansions, airport expansion, terminal improvements, and rehabilitation of existing facilities, among other projects.

1.7.4 Public Transportation

Public transportation is provided through Wave Transit (previously known as Wilmington Transit Authority). Wave Transit provides shuttle services on and around the UNCW campus, trolley service around downtown Wilmington, point-to-point RideMICRO service, and bus and charter bus services. The Medical Center (105) fixed route serves Independence Boulevard to Wilshire Boulevard. The Shipyard Boulevard (106) fixed route serves Independence Boulevard and Covil Avenue to Market Street and the eastern portion of the study area. The Market Street Express (108) and Shipyard Boulevard (106) fixed routes serve Independence Boulevard north of Independence Mall, College Road, the shopping centers off New Centre Drive (between Market Street and College Road), and UNCW. The Oleander West (202) fixed route serves Independence Boulevard and Wrightsville Avenue. The Princess Place (101) fixed route serves the northern portion of the study area, the US Housing and Urban Development housing development just north of Prince Place Drive, downtown Wilmington, and the shopping center off Sigmon Road. All bus routes run between 6:00 a.m. and 8:00 p.m. Monday through Friday and 9:00 a.m. to 6:00 p.m. Saturday, and 9:00 a.m. to 5:00 p.m. Sunday. Ride-sharing is coordinated through RideMICRO. RideMICRO offers point-to-point service to anyone traveling within the designated service network. Passengers can book an on-demand ride from a virtual stop within a RideMICRO zone and be connected to Wave Transit's fixed-route service or brought to a destination within a zone.

The 36,000-square foot Wave Transit Operations Center opened in June 2015. The Wilmington Multimodal Transportation Center/Downtown Transfer Station (Padgett Station) opened in January 2020. Padgett Station is the first phase of a large multimodal transportation project. The upgraded amenities offer customers and visitors a safe, convenient, and accessible location while using public transportation services. The station is a collaborative effort among the City of Wilmington, WMPO, and Wave Transit.

1.7.5 Pedestrians and Bicycles

Currently, within the Wilmington urban area, there are 694.1 miles of sidewalks, 56.1 miles of bicycle lanes, 35.6 miles of multi-use paths, and 5.0 miles of sharrow-marked roadways. The 2045 MTP includes 200 proposed bicycle and pedestrian projects. The 2045 MTP calls for bicycle and pedestrian facilities to be included in all new roadway and bridge projects within the Wilmington urban area.

The City of Wilmington adopted the Create Wilmington Comprehensive Plan (City of Wilmington 2016) in early 2016. The Covil Avenue and Market Street intersection area was identified as an Urban Mixed-Use Center and encourages moderate to high-density development patterns. Concentrated investment and revitalization are proposed to accommodate walkability, improve vitality, and create a sense of place. The plan further identified the area around Market Street and Covil Avenue as an area for suburban commercial retrofit, which would seek to encourage infill development in surface parking lots, improved pedestrian movement, and use of access management techniques to reduce the number of driveways along corridors. The plan also identified several roads in the project vicinity as corridors and complete streets. Independence Boulevard and Market Street were designated as major corridors and regional parkways that would prioritize motor vehicle mobility with some walkable qualities such as buffered sidewalks and crosswalks. Mercer Avenue, 30th Street, Princess Place Drive, and a small southern portion of Darlington Avenue (from Frog Pond Place south to Covil Avenue) were designated as community connectors. Community connectors are used to protect existing residential character and to create transitions from regional-scale roadways (such as major corridors) to neighborhood areas. Finally, Darlington Avenue, from Market Street to Frog Pond Place, is designated as a Main Street, which prioritizes pedestrians and encourages a mixture of land uses.

According to the 2013 Wilmington/New Hanover County Comprehensive Greenway Plan (City of Wilmington 2013), a greenway is proposed along the east side of Independence Boulevard from Randall Parkway to just south of Martin Luther King Jr. Parkway. This would tie into the existing Cross-City Trail that runs along Independence Boulevard for over 2 miles between Shipyard Boulevard and Park Avenue.

The Walk Wilmington: Wilmington Pedestrian Plan Update outlines a plan to improve existing and install new pedestrian facilities to upgrade safety, quality, and connectivity (City of Wilmington 2023). The study area falls within the plan's Priority Focus Area F: Market Street. It recommends sidepaths along the entirety of Independence Boulevard and Covil Avenue, continuing on to Montgomery Avenue and Evans Street. It also recommends crossing improvements at the intersections with Randall Parkway, Broad Avenue, Market Street, and Princess Place Drive.

1.8 Relationship to Other Designated Systems

There are currently two interstate routes in New Hanover County, I-40 and I-140. I-40 enters New Hanover County from the north and terminates just north of the Wilmington city limits where it becomes College Road. I-140, also known as the Wilmington Bypass, is currently open to traffic from US 17 northeast of Wilmington in New Hanover County to US 17 west of Leland in Brunswick County.

Martin Luther King Jr. Parkway is designated at the federal level as part of the National Highway System (NHS). The federal-aid highway system, which includes the interstate system and the NHS, is defined in 23 Code of Federal Regulations (CFR) 470.107. The NHS includes approximately 160,000 miles of roadway that are important to the nation's economy, defense, and mobility (FHWA 2016).

1.9 Transportation Demand

The study area is located within New Hanover County and is within the planning jurisdiction of the City of Wilmington. Documents and data relevant to population and employment trends, land use planning and zoning, and economic development planning for the project area are presented in this section.

The City of Wilmington is in southeastern North Carolina in New Hanover County and is the most populated municipality in the county. Wilmington is home to a historic downtown, a university, beaches, and other tourist destinations that draw visitors every year, particularly in the summer.

The U-4434 Community Impact Assessment Update Memo (NCDOT 2022a) uses US Census Tracts and Block Groups to delineate a study area that best illustrates the demographic characteristics of the community. This study area, called the demographic study area, is described in further detail in Chapter 3. Table 1-3 shows population growth for the demographic study area, the City of Wilmington, New Hanover County, and the State of North Carolina. Between 2010 and 2020, the demographic study area experienced a decline in population growth with an annualized growth rate of −0.7 percent, compared to an 0.8 percent annualized growth rate in Wilmington, and a 1.1 percent annualized growth rate in New Hanover County.

Table 1-3: Population Trends, 2010–2020

Area	2010 Population	2020 Population	Difference in Growth	% Change Growth	Annualized Growth Rate
Demographic study area	8,120	7,591	-529	-6.5%	-0.7%
Wilmington	106,476	115,451	8,975	8.4%	0.8%
New Hanover County	202,667	225,702	23,035	11.4%	1.1%
North Carolina	9,535,483	10,439,388	903,905	9.5%	0.9%

Source: U.S. Census Bureau, 2010 and 2020 Census Redistricting Data (Public Law 94-171)

1.10 Transportation Plans

Land use around the study area is a mixture of single-family residential communities, multi-family complexes, commercial and office centers, small stand-alone retail establishments, auto service shops, and vacant undeveloped land.

Several transportation plans, including local, regional, and statewide, relate to the study area. These include highway plans, transit plans, bicycle/pedestrian plans, coastal management plans, and freight plans. These plans would be considered throughout the design and development of the proposed project. The following plans are discussed in more detail in Chapter 3:

- NCDOT 2024-2033 STIP
- WMPO 2045 MTP (2020)
- Gary Shell Cross-City Trail Master Plan (2012)
- Wilmington/New Hanover County Comprehensive Greenway Plan (2013)
- Walk Wilmington: Wilmington Pedestrian Plan Update (2023)
- WMPO CTP (2016)
- Wilmington—New Hanover County Joint Coastal Area Management Plan 2006 Update
- WMPO US 17 Business Corridor Study, 3rd Street to Covil Avenue (2007)
- WMPO Market Street Corridor Study (2010)

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2 Description of Alternatives Considered

The alternatives considered for the proposed project are described in this chapter. Each alternative considered is evaluated with respect to its ability to meet the purpose of and need for the proposed project. Several preliminary alternatives were developed and evaluated during the early phases of the project studies, including the No-Build Alternative, transportation system management (TSM) alternatives, transportation demand management (TDM) alternatives, and build alternatives. A discussion of the alternatives considered for the proposed project, the process of elimination of those alternatives not determined reasonable, and the basis for the selection of the alternatives carried forward for detailed study are provided in this chapter.

The evaluation of alternatives for the proposed project was accomplished through a phased approach that allowed for a full range of alternatives to be considered, ultimately resulting in the selection of DSAs to be carried forward. The three phases included:

- Qualitative Screening of Alternative Concepts
- Conceptual Design Alternative Evaluation
- Detailed Study Alternative Evaluation

A general description of the methodology is shown on Figure 2-1. Figure 2-2 contains an overall summary of the progression of alternatives and reasons for retention or elimination of each. Additional details are discussed throughout this chapter.

Figure 2-1: Alternative Evaluation Methodology

					Justification for Elimination
Phase I					
Qualitative Screening 2011	No-Build Alternative		✓		
	Transportation System Management Alternatives		✗		Does not provide north-south connectivity or system linkage
	Mass Transit/Multi-Modal Alternatives		✗		Won't divert enough traffic, does not provide north-south connectivity or system linkage
	Transportation Demand Management Alternatives		✗		Low usage, does not provide north-south connectivity or system linkage
	Build Alternatives (overall concept, no corridor locations identified)		✓		
Screening Conceptual Design Corridors 2011	No-Build Alternative		✓		
	Build Alternative Corridors (5 Corridors)	16th/17th Street Corridor	✗		High residential and business impacts, high natural resource impacts, connection with Martin Luther King Jr. Parkway and NC 133 is problematic
		23rd Street Corridor	✗		High residential impacts. Skewed rail crossing, many cross streets would be cut off, long and circuitous route - doubles project length, would require additional lanes at interchange with Martin Luther King Jr. Parkway. Martin Luther King Jr. Parkway interchange would occur on an existing bridge; many cost and engineering constraints.
		Independence Boulevard Corridor	✓		
		Kerr Avenue Corridor	✗		Already included as part of existing STIP projects to improve capacity only. Would not provide improved north-south connectivity. Very high residential and business relocations.
		College Road Corridor	✗		Already included as part of existing STIP projects to improve capacity only. Capacity along the corridor is already very poor. Would not provide improved north-south connectivity.
Phase II					
Screening Conceptual Study Alternatives 2011	Alternative Alignments (Alternatives 1-8): Covil Avenue Corridors (Alts 1, 2, 3, and 5); Mercer Avenue Corridors (Alts 4 and 8); New Location Corridors (Alts 6, 7). *One option from each of the three corridors was chosen to move forward as DSA.	Alternative 1	✗		Alternative 2 carried forward because of better alignment, reduced relocations, more compact footprint
		Alternative 2	✓		
		Alternative 3	✗		Alternative 2 carried forward because of better alignment, reduced relocations, more compact footprint
		Alternative 4	✗		Alternative 8 carried forward because of improved access and reduced relocations
		Alternative 5	✗		Alternative 2 carried forward because of better alignment, reduced relocations, more compact footprint
		Alternative 6	✗		Alternative 7 carried forward due to a straighter alignment and fewer relocations
		Alternative 7	✓		
		Alternative 8	✓		
	Market Street Intersection Options	Tight Urban Diamond Interchange (TUDI)	✓		
		Diverging Diamond Interchange (DDI)	✗		Tight footprint would cause queuing issues, long travel time, high relocations
	Market Street Intersection Options	Quadrant Interchange	✓		
		Quadrant Interchange	✗		Required signal location would delay traffic on roadway, traffic operation delay, increased travel times
	Martin Luther King Jr. Parkway Intersection Options (4 Interchange Options)	Option A	✗		Large ramp radius
		Option B	✓		
		Option C	✗		Low design speed
		Option D	✗		Low design speed

Phase III

					Justification for Elimination
Evaluation Detailed Study of Alternatives 2012	Alternatives 2, 7, and 8 with Market Street Intersection Options (Tight Urban Diamond Interchange (TUDI), Quadrant AC, and Quadrant BC)	Alternative 2 with TUDI	✓		
		Alternative 2 with AC	✗		Quadrants AC and BC at the Market Street interchange provide minimal traffic improvement. Eliminated due to lack of traffic improvement and number o f relocations.
		Alternative 2 with BC	✗		Quadrants AC and BC at the Market Street interchange provide minimal traffic improvement. Eliminated due to lack of traffic improvement and number of relocations.
		Alternative 7 with TUDI	✓		
		Alternative 7 with AC	✗		Quadrants AC and BC at the Market Street interchange provide minimal traffic improvement. Eliminated due to lack of traffic improvement and number of relocations.
		Alternative 7 with BC	✗		Quadrants AC and BC at the Market Street interchange provide minimal traffic improvement. Eliminated due to lack of traffic improvement and number of relocations.
		Alternative 8 with TUDI	✗		Alternative 8 would require the acquisition of the newly developed City of Wilmington Police Firing Range Facility
		Alternative 8 with AC	✗		Quadrants AC and BC at the Market Street interchange provide minimal traffic improvement. Eliminated due to lack of traffic improvement and number of relocations.
		Alternative 8 with BC	✗		Quadrants AC and BC at the Market Street interchange provide minimal traffic improvement. Eliminated due to lack of traffic improvement and number of relocations.
	Martin Luther King Jr. Parkway Interchange Option B		✓		
Further Evaluation Detailed Study of Alternatives (DSAs) 2018	Alternative 2 and 7		✗		Number of relocations
	Market Street Interchange with TUDI Option		✓		
Additional Design Revisions on Remaining DSAs 2018	Darlington Avenue Grade Separation		✓		
	Bridging Market Street to Hurst Street		✓		
	Narrower Typical Section		✓		
	Market Street Interchange with Single Point Urban Interchange (SPUI) Option		✓		
Current DSAs 2018	Alternative 7 with TUDI Interchange at Market Street		✓		
	Alternative 7 with SPUI Interchange at Market Street		✓		

Icon Key

- ✓ Carried forward to next step
- ✗ Not carried forward to next step
- Low impact on local community
- Moderate impact on local community
- High impact on local community
- Impact on local community varies

2.1 Phase I: Qualitative Screening of Alternative Concepts

The Qualitative Screening of Alternative Concepts included the evaluation of the range of alternative concepts presented in FHWA's Technical Advisory T6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents (FHWA 1987). The qualitative first screening was used to determine which alternative concepts have the potential to meet the purpose of the proposed project. Alternative concepts that did not have the potential to meet the project purpose were eliminated from further consideration.

The screening criteria used for the evaluation were based on the following performance measures included in the purpose and need statement for the proposed project:

- Is the alternative concept able to improve regional mobility and system traffic capacity?
- Is the alternative concept able to provide direct and continuous north-south connectivity?
- Does the alternative concept provide transportation system linkage consistent with local and state transportation plans?

2.1.1 No-Build (No Action) Alternative

The No-Build Alternative normally includes short-term, minor restoration types of activities (safety and maintenance improvements, etc.) that maintain continuing operation of the existing roadway. The No-Build Alternative assumes the current transportation system evolves as planned for in the 2045 MTP and STIP without implementation of the proposed project. Except for routine maintenance, no changes would take place along the proposed corridor within the study area. The No-Build Alternative also serves as the baseline comparative alternative for the design year (2040).

2.1.2 Transportation System Management Alternative

The TSM Alternative includes low-cost, minor transportation improvements that maximize the efficiency of the existing system. There are two main types of TSM improvements: operational and physical. Operational TSM improvements include traffic law enforcement, access control, signal coordination, turn prohibitions, speed restrictions, and signal phasing or timing changes. Physical TSM improvements include turn lanes, intersection realignment, improved warning and information signs, new signals or stop signs, and signalization.

Many TSM improvements are incorporated into the transportation system over time as population and congestion levels increase. There are several locations where additional TSM measures could be implemented to improve localized problem areas; however, it is not likely that implementation of TSM measures would alleviate congestion in the area given that the volumes exceed the capacity of the existing transportation network.

2.1.3 Mass Transit or Multi-Modal Alternative(s)

The Mass Transit or Multi-Modal Alternative includes reasonable and feasible transit options (bus systems, rail, etc.). A major advantage of mass transit is that it can provide high-capacity, energy-efficient movement in densely traveled corridors. It also serves high-density areas by offering an option

for automobile owners who do not wish to drive, as well as service to those without access to an automobile.

Public transportation is provided through Wave Transit (previously known as Wilmington Transit Authority). In addition to fixed-route bus service, Wave Transit operates dial-a-ride paratransit services, Wave Pool (commuter van and carpool program), shuttle services on and around the UNCW campus, trolley service around downtown Wilmington, and bus and charter bus services. The 36,000-square foot Wave Transit Operations Center opened in June 2015. The Wilmington Multimodal Transportation Center/Downtown Transfer Station (Padgett Station) opened in January 2020. Padgett Station serves Wave, Greyhound, the downtown trolley, and taxis. The 2018-2022 Wave Transit 5-Year Short Range Transit Plan notes the inclusion of on-demand bus/transit services as something being considered for certain service areas. The areas being considered at this time do not fall within or near the study area (Wave Transit 2018).

2.1.4 Transportation Demand Management Alternative

The TDM Alternative includes measures to improve the efficiency of the existing transportation system by changing traveler behavior, but typically do not involve major capital improvements. The TDM Alternative does include demand management strategies currently implemented in New Hanover County, such as staggered work hours, flex-time (employee focused), and ridesharing.

Ridesharing, such as carpools and vanpools, is generally viewed as more convenient than bus transit with regard to access, door-to-door travel times, and comfort. However, the ability of these voluntary programs to reduce traffic volumes on particular roadways is minimal.

In December 2001, the City of Wilmington entered into a cooperative agreement with NCDOT to establish the Cape Fear Breeze Program, with a goal to develop and promote transportation alternatives for the community's residents and visitors.

In November 2004, the Cape Fear Breeze Program installed a statewide internet-based ride matching software program called Share-the-Ride NC. Share-the-Ride NC was completed by NCDOT and other municipal partners. The software facilitates the matching of potential ridesharing partners throughout the region. Match lists enable registrants to identify carpooling partners, form or join vanpools, connect with bicycling partners, and locate suitable transit lines and park-and-ride facilities (Share-The-Ride NC 2022).

2.1.5 Build Alternatives

The build alternatives include both improvement of existing roadways and alternatives on new location. This initial screening considers the overall concept of constructing a roadway and does not differentiate between alternative corridor locations.

2.1.6 Results of Qualitative First Screening

Each of the alternative concepts listed previously was evaluated for its ability to meet the screening criteria defined in Section 1.5. Table 2-1 presents the results of the qualitative first screening. It lists

each alternative concept and whether each alternative concept meets or does not meet the screening criteria. If the alternative concept meets or could be designed to meet a purpose and need element, there is a ✓ next to the text. If it would not meet the purpose and need, then there is a ✗ next to the text.

Table 2-1: Qualitative Screening – Ability of Concepts to Meet Purpose and Need

Alternative Concept	Improve Regional Mobility and System Traffic Capacity	Provide North-South Connectivity	Provide System Linkage Consistent with Local and State Transportation Plans
No-Build	✗	✗	✗
Transportation Demand Management	✓	✗	✗
Transportation System Management	✓	✗	✗
Mass Transit/Multi-Modal	✓	✗	✗
Build	✓	✓	✓

2.1.6.1 Retain the No-Build (No Action) Alternative

The No-Build Alternative does not meet any of the screening criteria; however, in accordance with NEPA (40 CFR 1502.14(c)) and FHWA guidance (FHWA 1987), the No-Build Alternative will be given full consideration in the DEIS to provide a baseline for comparison with the DSAs.

2.1.6.2 Eliminate the TSM Alternative

In general, TSM improvements present low-cost measures that are effective in solving localized or site-specific capacity, safety, and operational problems in urban areas. Alone, they do not meet the proposed project's regional purpose of providing improved connectivity and system linkage throughout the urban core of Wilmington. Although signal coordination and intersection improvements within the transportation network are likely to modestly improve traffic flow, this alternative does not provide the desired north-south connectivity or the desired system linkage included in the local and state transportation plans and has been eliminated from further consideration.

2.1.6.3 Eliminate the Mass Transit or Multi-Modal Alternative

Improved transit service could provide increased mobility and capacity within the study area by providing an alternative mode choice for commuters and other intra-county travelers. However, this alternative (new rapid transit, on-demand, or expanded bus service) would not divert enough vehicular traffic to improve traffic flow to a substantial degree, nor would it provide the desired north-south connectivity or the desired system linkage included in local and state transportation plans. Elimination of this alternative does not preclude consideration of design parameters that support mass transit or multi-modal efficiency, such as bus turnouts, multi-use paths, etc.

2.1.6.4 Eliminate the TDM Alternative

TDM measures provide increased transportation choices in the area, but only for a small percentage of travelers that take advantage of them. For example, according to the US Census, only 2.1 percent of people in the Wilmington area carpool with three or more persons per vehicle and only 11.9 percent use other modes of transportation (US Census Bureau 2020). TDM measures potentially improve traffic flow slightly, but do not provide the desired north-south connectivity or the desired system linkage included in the local and state transportation plans. It has been eliminated from further consideration.

2.1.6.5 Retain the Build Alternatives

This alternative concept meets the purpose of and need for the proposed project and was therefore carried forward to the quantitative Conceptual Design Alternative Evaluation.

Table 2-2 lists the alternative concepts that were carried forward to the Conceptual Design Alternative Evaluation, as well as those eliminated from further consideration based on the evaluations described in the previous sections.

Table 2-2: Results of Qualitative Screening of Alternative Concepts

Alternative Concepts Retained for Conceptual Design Alternative Evaluation	Alternative Concepts Eliminated from Further Consideration
No-Build	Transportation Demand Management
Build	Transportation System Management
	Mass Transit/Multi-Modal

2.2 Phase II: Conceptual Design Alternative Evaluation

Based on the results of Qualitative Screening of Alternative Concepts, both the no-build and build alternative concepts were carried forward to the Conceptual Design Alternative Evaluation. The No-Build Alternative will be given full consideration in the DEIS to provide a baseline for comparison with the build alternative concepts.

The Conceptual Design Alternative Evaluation included the development of conceptual designs for each of the alternative concepts advanced from the Qualitative Screening of Alternative Concepts. Conceptual design is a low-level design that is used to fully evaluate a large set of alternatives at a moderate level of detail. The level of design allows for the quantitative evaluation of direct impacts, based primarily on Geographic Information System (GIS) data, and the qualitative evaluation of the effects of the alternative on the natural, human, and cultural environments.

This phase includes the initial corridor selection process within which the build alternatives would be designed, the project logical termini and independent utility, the determination of the design features for the build alternatives, and the evaluation of the conceptual designs developed for the build alternatives.

2.2.1 Initial Corridor Selection

As discussed in Section 1.5, a viable alternative must provide a continuous north-south connection between the east-west major arterials of Shipyard Boulevard, Oleander Boulevard, Market Street, and Martin Luther King Jr. Parkway. The five north-south corridors listed below and shown on Figure 2-3 were identified and analyzed on their ability to provide a continuous north-south connection. Although 3rd Street is a north-south corridor, expansion of this route is not a feasible alternative due to potential impacts to the Wilmington Historic District and CBD. For screening of potential corridors, unless otherwise noted, a 150-foot corridor width was used to accommodate 2035 projected traffic volumes. **2035 was the design year at the time the initial corridor studies took place.**

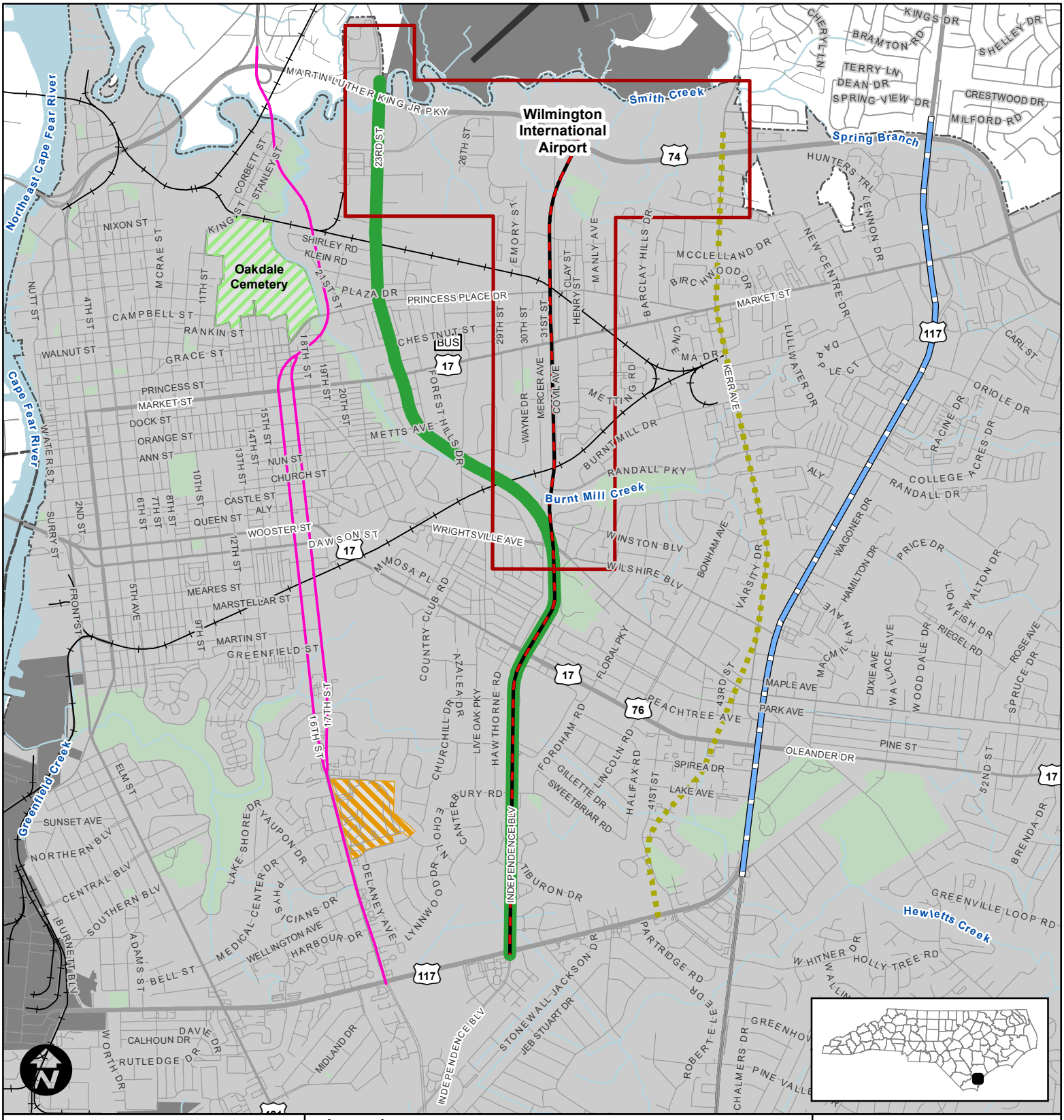
- 16th/17th Street Corridor
- 23rd Street Corridor
- Independence Boulevard Corridor
- Kerr Avenue Corridor
- College Road Corridor

2.2.1.1 16th/17th Street Corridor

The 16th/17th Street Corridor southern terminus is located at the existing 17th Street intersection with Shipyard Boulevard. From here, the corridor travels north along existing 17th Street past New Hanover Regional Medical Center. North of the medical center, the corridor diverges into two 75-foot wide corridors and follows the existing one-way pair of 16th Street (for southbound traffic) and 17th Street (for northbound traffic) through downtown Wilmington. North of their existing intersections with Market Street, the 16th/17th Street one-way pair corridors converge back into one 150-foot wide corridor. North of Market Street, the corridor continues on new location, skirts to the east around Oakdale Cemetery, crosses Burnt Mill Creek twice and Smith Creek once before tying into the existing Martin Luther King Jr. Parkway/NC 133 interchange at the corridor's northern terminus. The existing interchange would need to be expanded to accommodate this corridor. This corridor crosses over the CSX railroad three times.

2.2.1.2 23rd Street Corridor

The 23rd Street corridor starts at the existing intersection of Shipyard Boulevard and Independence Boulevard and utilizes existing Independence Boulevard up to Wrightsville Avenue. The corridor veers off to the west and north on new location after the Wrightsville Avenue intersection and ties into existing 23rd Street at its intersection with Market Street. The corridor continues north along existing 23rd Street and ends at the existing Martin Luther King Jr. Parkway interchange. It is anticipated that no major interchange modifications would be required at the existing interchange to accommodate this corridor. The corridor crosses over the CSX railroad twice.



Legend

- Railroad
- 16th / 17th Street Corridor
- 23rd Street Corridor
- Independence Boulevard Corridor
- Kerr Avenue Corridor
- College Road Corridor
- Stream
- Study Area
- Park
- Municipal Boundary
- County Boundary
- New Hanover Regional Medical Center
- Oakdale Cemetery

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 2-3
Alternative Corridors

Date: December 2024

0 0.2 0.4 0.8
Miles

1 inch = 3,500 feet

2.2.1.3 Independence Boulevard Corridor

The Independence Boulevard corridor starts at the existing intersection of Shipyard Boulevard and Independence Boulevard and uses existing Independence Boulevard and Covil Avenue up to Market Street. North of the Market Street intersection, the corridor follows along Montgomery Avenue extends on new location over vacant land before tying into Martin Luther King Jr. Parkway. An interchange would be constructed at Martin Luther King Jr. Parkway. This corridor crosses over the CSX railroad twice.

2.2.1.4 Kerr Avenue Corridor

The Kerr Avenue corridor begins at a proposed intersection with Shipyard Boulevard just west of 41st Street and traverses north on new location through several neighborhoods, crosses over Oleander Drive, and ties into existing Kerr Avenue north of Wrightsville Avenue. The corridor then follows existing Kerr Avenue north to Martin Luther King Jr. Parkway. An interchange would replace the existing Kerr Avenue/Martin Luther King Jr. Parkway intersection (already designated as a separate project, STIP U-3338C). This corridor does not cross over the CSX railroad.

2.2.1.5 College Road Corridor

The College Road corridor starts at the Shipyard Boulevard/College Road intersection and travels north along existing College Road all the way to the existing intersection at Martin Luther King Jr. Parkway. An interchange would replace the existing College Road/Martin Luther King Jr. Parkway intersection. This corridor does not cross over the CSX railroad.

2.2.2 Screening of Alternative Corridors

An alternative constraints map was developed using data layers obtained from a variety of GIS databases, resource agency files, aerial photography, and knowledge obtained from field visits. Constraints identified within the study area included, but are not limited to, the following: wetlands, streams, floodplains, riparian buffers, conservation land, existing and proposed residential developments and neighborhoods, schools, parks, churches, cemeteries, and major utilities. Table 2-3 provides an impact analysis to the human, natural, and cultural environment resulting from each of the alternative corridors.

Table 2-3: Alternative Corridors Impact Analysis

Impact Type	16th/17th Street Corridor	23rd Street Corridor	Independence Boulevard Corridor	Kerr Avenue Corridor	College Road Corridor
Length (miles)	5.0	4.9	4.2	4.2	4.1
Widening (miles)	3.1	3.5	3.4	2.6	4.1
New location (miles)	1.9	1.4	0.8	1.6	0.0
Railroad crossings (number)	3	2	2	0	0
Human Environment					
Relocations					
Residences (number)	73	75	43	157	0
Businesses (number)	28	1	7	68	23
Schools (number)	0	1	0	0	0
Parks (number)	0	1	1	0	1
Churches (number)	2	1	1	0	0
Cemeteries (number)	0	0	0	0	0
Hazardous materials sites	1	1	0	3	3
Natural Environment					
Known federal listed species occurrences (number)	0	0	0	0	0
100-year floodplain impacts (number)	16.1	8.2	0.2	0.3	2.6
National Wetlands Inventory wetland impacts (acres)	7.3	9.9	9.6	0.1	0.2
Stream impacts (number/linear feet)	5/635	4/1,450	4/705	2/620	2/385
Potential riparian buffer impacts (yes/no)	no	no	no	no	no
Nature preserves (number)	0	0	0	0	0
Significant Natural Heritage areas (number/acres)	0	0	0	0	0
Water supply critical areas (yes/no)	no	no	no	no	no

2.2.3 Results of Quantitative Second Screening

Based upon the quantitative screening, the 16th/17th Street Corridor was not recommended for further consideration due to high residential and business impacts, high impacts to the natural system

associated with Burnt Mill Creek and Smith Creek, and complications associated with connecting to the existing Martin Luther King Jr. Parkway interchange with NC 133.

The College Road Corridor and Kerr Avenue Corridor were not recommended for further consideration as these corridors are already included as a part of existing NCDOT STIP projects being developed to improve traffic capacity only. STIP project U-3338 is the widening of Kerr Avenue from Randall Parkway to Martin Luther King Jr. Parkway, and STIP project FS-0203C is the widening of College Road from New Centre Drive to Gordon Road. The College Road Corridor and Kerr Avenue Corridor would not meet the purpose of and need for the proposed project as they are not intended to satisfy the demand for improved north-south roadway connectivity. The improved Kerr Avenue, along with the remaining north-south roadways in the project vicinity, offer short, discontinuous segments that force commuters to redirect from one north-south route onto east-west roadway segments that connect to the next north-south route.

As a result, two corridors were identified as potential build alternatives that would meet the purpose of and need for the proposed project, the 23rd Street Corridor and the Independence Boulevard Corridor.

2.2.4 Refined Screening of Alternative Corridors

Both the 23rd Street Corridor and the Independence Boulevard Corridor would use existing Independence Boulevard, which is a four-lane roadway divided by a median from Shipyard Boulevard to Randall Parkway. As such, this existing roadway would be retained and employed to the greatest extent possible, which would reduce the amount of roadway improvements required and ultimately allow for avoidance and minimization of impacts to the surrounding human, natural, and cultural environment. Additional minimization efforts that were incorporated into designs to represent more refined corridors are discussed in further detail in the following sections.

2.2.4.1 23rd Street Corridor

The 23rd Street Corridor would begin along existing Independence Boulevard, slightly south of Wrightsville Avenue, where Independence Boulevard would turn to the west and create the new roadway alignment. Randall Parkway would be extended westward to intersect the 23rd Street Corridor alignment with an at-grade intersection. The 23rd Street Corridor included a standard 150-foot right-of-way width except at grade separations and interchanges. At the time of the screening, the Cape Fear Commutes 2035 Transportation Plan included an interchange between the proposed roadway connection and Market Street (WMPO 2011). Therefore, the corridor would be widened out to 500 feet at Market Street with a taper that begins 1,000 feet prior to the crossing. The corridor would also include two crossings of the CSX railroad that serves the Port of Wilmington and would require grade separation. To accommodate the grade separation, the corridor would be widened to 350 feet with a taper beginning 1,200 feet in advance of the crossing. The existing interchange at 23rd Street would remain unchanged for the corridor.

2.2.4.2 Independence Boulevard Corridor

The Independence Boulevard Corridor was modeled after the corridor presented within the Cape Fear Commutes 2035 Transportation Plan (WMPO 2011). The corridor begins slightly south of the Randall Parkway intersection, which would remain an at-grade intersection and would continue to the north along the west side of Covil Avenue. The Independence Boulevard Corridor would include a standard 150-foot right-of-way width except at grade separations and interchanges. The Cape Fear Commutes 2035 Transportation Plan included an interchange between the proposed roadway connection and Market Street. Therefore, the corridor was widened out to 500 feet at Market Street with a taper that would begin 1,000 feet prior to the crossing. The corridor would also include two crossings of the CSX railroad that serves the Port of Wilmington and would require grade separation. To accommodate the grade separation, the corridor would be widened to 350 feet with a taper beginning 1,200 feet in advance of the crossing. The Independence Boulevard Corridor would include a new interchange with Martin Luther King Jr. Parkway.

2.2.5 Results of Refined Screening of Alternative Corridors

Table 2-4 provides an impact analysis to the human, natural, and cultural environment of the refined alternative corridors. Impacts were calculated using GIS data.

Table 2-4: Refined Alternative Corridors Impact Analysis

Feature	23rd Street Corridor	Independence Boulevard Corridor
Length (miles)	3.1	1.9
Road crossings (number)	18	5
Railroad crossings (number)	2	2
Human Environment		
Relocations		
Residences (number)	143	62
Businesses (number)	11	24
Schools (number)	0	0
Parks (number)	0	0
Churches (number)	1	1
Cemeteries (number)	1	0
Hazardous materials sites	1	0
Natural Environment		
Known federal listed species occurrences (number)	0	0
100-year floodplain impacts (acres)	9.5	0.7
Wetland impacts (acres)	2.4	16.7

Feature	23rd Street Corridor	Independence Boulevard Corridor
Stream impacts (number/linear feet)	3/1,225	2/320
Nature preserves (number)	0	0
Significant Natural Heritage areas (number/acres)	0	0
Water supply critical areas (yes/no)	No	No
Cultural Resources		
Recorded historic sites (number)	0	0
Potential Section 4(f) impacts (yes/no)	No	No

2.2.5.1 23rd Street Corridor

The 23rd Street Corridor has several positive attributes; namely that it already has an existing interchange with Martin Luther King Jr. Parkway and would provide the most direct access to ILM. However, the corridor does have numerous negatives from an engineering and operations standpoint. From an engineering standpoint, the corridor would be difficult because it would run parallel to Burnt Mill Creek for a substantial portion of the proposed project and would include a severely skewed railroad crossing, potentially increasing the need for bridges and raising the construction cost. In addition, the ability to maintain partial or full control of access along the corridor would be extremely difficult as numerous cross streets and direct driveway connections would need to be eliminated, many of which would require relocations as adequate alternate access is not available or would not be feasible. From an operation standpoint, the corridor would result in a much longer, more circuitous route, adding approximately 1.5 miles to the length of a trip traveling along the corridor. This would nearly double the length of the proposed project. In addition, it is not likely that the existing interchange at Martin Luther King Jr. Parkway could provide for adequate traffic operations and would require modifications and potentially the addition of lanes along 23rd Street. The inclusion of additional lanes would be extremely difficult as a majority of 23rd Street within the interchange is located on a bridge that does not have adequate horizontal clearance to provide for additional through-lanes due to the Martin Luther King Jr. Parkway bridge piers. Reconstruction of both 23rd Street and Martin Luther King Jr. Parkway to expand the interchange would not be a reasonable solution due to the cost and impact of closing Martin Luther King Jr. Parkway to re-build the bridges.

2.2.5.2 Independence Boulevard Corridor

The Independence Boulevard Corridor would provide the shortest and most direct route. The corridor also has adequate undeveloped land at Martin Luther King Jr. Parkway to construct a full movement, free-flow interchange to accommodate the projected traffic volumes without passing through a traffic signal. The corridor would also provide for near perpendicular crossings at both railroad crossings. One of the main benefits of the corridor is that it allows for partial or full control of access as relatively few cross streets would intersect the corridor and three of the five would either be grade separated or have an interchange with only one crossing requiring the cross street to be closed. The corridor would also include an impact to wetlands, although coordination with representatives from the US Army Corps of

Engineers (USACE) at that time indicated that many of the wetlands near Martin Luther King Jr. Parkway had been ditched and drained and were no longer high-quality systems.

Based on the results of the Conceptual Design Alternative Evaluation screening presented in Table 2-4 and the additional qualitative considerations, it was determined that the Independence Boulevard Corridor minimizes impacts to the greatest extent possible. The Independence Boulevard Corridor would provide a shorter, more direct route with substantially lower relocations than the 23rd Street Corridor. Therefore, the 23rd Street Corridor was eliminated from further consideration as a build alternative, and the Independence Boulevard Corridor was carried forward for additional evaluation.

2.3 Development of Build Alternatives

Build alternatives were developed within the Independence Boulevard Corridor using the parameters outlined in the following sections. The Independence Boulevard Corridor was first screened for logical termini and independent utility as described in Section 2.3.1.

2.3.1 Logical Termini / Independent Utility

The FHWA regulations at 23 CFR 771.111(f) state that a project must connect logical termini and be of sufficient length to address environmental matters on a broad scope; not restrict consideration of alternatives for other reasonably foreseeable transportation improvements; and have independent utility or independent significance.

The build alternatives for the proposed project begin at Randall Parkway, where Independence Boulevard terminates. The proposed project would extend existing Independence Boulevard to the north, along or parallel to the existing Covil Avenue and Montgomery Avenue corridors. North of Princess Place Drive, the proposed project would create a new roadway connection to Martin Luther King Jr. Parkway through the addition of an interchange. The total length of the project would be approximately 1.7 miles.

The proposed project's termini, as described, end at logical nodes. The proposed project would not force substantive transportation improvements beyond the termini or along the connecting roads. Thus, the proposed project would have independent utility and its construction would be a useful and reasonable expenditure of funds, even if no other transportation improvements are made in the area. The proposed project would be of sufficient length to allow for evaluation of alternatives and environmental issues on a broad basis and would neither restrict consideration of reasonable and practicable alternatives nor prohibit implementation of other reasonably foreseeable transportation improvement projects.

2.3.2 Build Alternative Design Features

Before the development of build alternatives, NCDOT must establish design features. The first step in the design process is to determine the role that the roadway would serve with respect to the needs established for the proposed project. The role of the roadway is typically described as the functional classification of the roadway. Once the role is determined, the design features are established to meet the needs of the road.

The development of design features, presented in the following sections, includes the functional classification of the roadway, the design LOS, intersection treatments, typical section(s), and the level of access control for the build alternatives. Based on these features, design criteria (presented in Section 2.3.3) for the proposed project were established.

2.3.2.1 Functional Classification

The functional classification of a roadway is the grouping of highways by the character of service they provide and was developed for transportation planning purposes by the American Association of State Highway and Transportation Officials (AASHTO) Functional Classification system (AASHTO 2004).

FHWA Functional Classification Procedures

The Federal-Aid Highway Act of 1973 requires the use of functional highway classification to update and modify the Federal-Aid highway systems by July 1, 1976. This legislative requirement is still effective today. The NCDOT Transportation Planning Branch is responsible for processing updates to the Federal Functional Classification System in North Carolina. While the US Department of Transportation has no direct role in the designation of these areas, they are used in the planning and administration of the surface transportation program. FHWA has developed procedures for classifying roadways, and the procedures for functional classification in urbanized areas should be developed within the framework of the continuing, comprehensive, and cooperative planning process carried out pursuant to Section 134 of Title 23, U.S. Code.

Classification of Independence Boulevard on Local and State Transportation Plans

The 1997 Greater Wilmington Urban Area Transportation Plan noted the functional classification for the proposed project as an urban minor arterial (NCDOT 1997b). In October 2008, WMPO voted to amend the Functional Classification Map for the portion of Independence Boulevard from Shipyard Boulevard to Martin Luther King Jr. Parkway (including the proposed project) to the Urban Principal Arterial classification. The proposed project is classified as an urban principal arterial under the FHWA functional classification system.

An urban principal arterial is defined as a system that serves the major centers of activity of urbanized areas, the highest traffic volume corridors, and the longest trip desires. Arterials carry a high proportion of the total urban area travel even though they constitute a relatively small percentage of the total roadway network.

2.3.2.2 Selection of Design Level of Service

As noted in Section 1.4.2, the LOS of a facility ranges from LOS A to LOS F. LOS A represents the best operating conditions along a roadway or at an intersection, while LOS F represents the worst conditions. The selection of the appropriate LOS for the design of a facility is important so that the facility would meet its intended purpose. AASHTO provides principles for acceptable degrees of congestion and the determination of the appropriate LOS (AASHTO 2004).

The policy does provide for some flexibility in the selection of the appropriate LOS, as follows:

"As may be fitting to the conditions, highway agencies should strive to provide the highest level of service practical. For example, in heavily developed sections of metropolitan areas, conditions may make the use of LOS D appropriate for freeways and arterials; however, this level should be used sparingly and at least LOS C should be sought."

The area and terrain type for the proposed project are considered urban and occur within a heavily developed section of a metropolitan area.

Based on the available data relating to the selection of an LOS for the design of the proposed project, the minimum acceptable LOS for the design year at that time (2035) was determined to be LOS D due to the proposed project's location within a metropolitan area; however, LOS C is sought as the priority. The LOS D threshold applies to all roadway elements and signalized intersections included in the construction of the proposed project. The LOS D threshold does not apply to minor unsignalized intersections and locations beyond the limits of construction.

2.3.2.3 Intersection Treatments

Based on the urban principal arterial functional classification the next step in developing the design features is to determine how the proposed project would interact with the existing transportation network. An urban principal arterial calls for a high level of mobility and the ability to accommodate major traffic movements. The urban principal arterial designation includes three subsets that are stratified as follows: (1) interstate, (2) other freeways, and (3) other principal arterials (with partial or no control of access). As a principal arterial, it is strongly recommended that the roadway minimize interruptions to the flow of traffic, such as at-grade full movement intersections with other roadways, or at-grade crossings of obstructions such as railroad lines.

There are intersecting transportation uses along the Independence Boulevard Corridor that required evaluation to determine how the proposed project would interact with the existing feature. Specifically, concerns emerged that the proposed project might have to pass over these uses, possibly resulting in several grade separations, or bridges. Each of these features presents a project constraint and is discussed in the following sections.

Randall Parkway/Mercer Avenue Intersection

The southern terminus of the proposed project is the existing intersection of Independence Boulevard and Randall Parkway/Mercer Avenue. The existing signalized at-grade intersection is the northern extent of existing Independence Boulevard that was constructed in the early 2000s as a four-lane boulevard with a 16-foot median under NCDOT STIP Project U-3116. The existing northern approach to the intersection is currently Covil Avenue. The primary constraint related to the intersection improvement is the location of the CSX railroad crossing approximately 600 feet to the north. While an improved at-grade intersection would operate at an acceptable LOS, due to the grade separation of the proposed project over the railroad (see next section) the intersection was reviewed to determine whether the construction of an overpass or interchange was viable. Based on a review of the constraints in the area, it was determined that a standard grade separation (with Independence Boulevard being constructed over the existing Randall Parkway/Mercer Avenue roadway) would not be viable as it would sever the

important connection to Randall Parkway, a minor arterial and important east-west route. The construction of an interchange, while feasible, was not recommended due to the magnitude of the construction that would be required and the likelihood that it would extend the proposed project farther south on existing Independence Boulevard, thereby requiring a substantial portion of the existing roadway to be reconstructed. Therefore, the recommended treatment for this location would be to reconstruct the existing intersection in a manner that would provide an adequate LOS for traffic operations.

CSX Railroad

The build alternatives for the proposed project would cross existing CSX railroad rail lines that provide access to the Port of Wilmington twice. The lines are part of a network of rail lines in the Wilmington area. The CSX railroad ACB-line and the CSX track to State Port line are the two tracks that would be crossed. Both are single track and a total of 5.5 miles long. The proposed project would cross the CSX track to State Port at Covil Avenue, approximately 600 feet north of the Randall Parkway/Mercer Avenue intersection, and the ACB line just north of Princess Place Drive. The NCDOT Board of Transportation has set forth guidelines for the treatment of highway-railroad intersections on new construction projects. The Rail Grade Separation Guidelines are based on use of an exposure index, which is the product of the number of trains per day and the projected average daily highway traffic at the end of the design period (NCDOT 1994). Separations are justified in urban areas when the exposure index is 30,000 or more. Unless information to the contrary is available, such as a pending abandonment of the railroad, the number of trains at the end of the design period should be assumed to be the same as at the time of the evaluation.

The two rail lines currently carry two to four trains per day at 10 mph (Harris 2017). The projected average daily traffic for the project ranges from 47,500 vehicles per day at the northern crossing to 52,000 vehicles per day at the southern crossing. Therefore, the exposure index for the southern crossing (assuming only two trains per day) would be 95,000 (or 3.17 times the threshold for urban areas), with the northern crossing being 104,000 (or 3.47 times the threshold). Based on this evaluation, it was determined that both rail crossings would be grade-separated, with a minimum clearance of 23 feet over the railroad line.

Local Streets

Depending on the location of the build alternatives, the proposed project would intersect or cross numerous roadways that fall into the functional classification of local streets including Darlington Avenue, Broad Street, and Wakefield Road. Because the functional classification for Independence Boulevard is an urban primary arterial whose primary purpose is to provide travel service to major traffic movements, connections to local streets would only be made if they would not have a negative effect on the roadway's ability to provide a high level of mobility. Therefore, any local street connection would include right-in/right-out operations and would be evaluated on a case-by-case basis to determine whether the connection is acceptable from a traffic operation and design standpoint.

Market Street

The proposed project would cross Market Street, which is designated as an urban primary arterial with the sub-classification of other principal arterial. The recommended treatment for the intersection of two principal arterials would be an interchange; however, due to the developed nature of the area, a range of low impact options was also evaluated to develop a design that was context sensitive.

The first intersection treatment evaluated was a standard at-grade intersection. The intersection was analyzed based on the methodologies presented in the HCM for the 2035 traffic volumes assuming a four-lane, six-lane, and eight-lane roadway for the proposed project and dual exclusive left turn and single exclusive right turn lanes on all four approaches. The results of the analysis showed that none of the standard at-grade intersection options would operate at an acceptable LOS, with all but the eight-lane roadway operating at LOS F during both the a.m. and p.m. peak periods (NCDOT 2011c). The p.m. peak period for the eight-lane roadway option resulted in LOS E, which would not meet the design LOS threshold of LOS D or better.

The second intersection treatment evaluated was an at-grade intersection with quadrant roadways connecting Market Street and the proposed project. For this analysis, eight configurations were evaluated that included two quadrant connections, one on the east side of Independence Boulevard and one on the west side of Independence Boulevard. The results of the analysis show that all eight of the configurations would include intersections that operate at LOS F in the a.m. peak hour, p.m. peak hour, or both. Therefore, none of the at-grade intersections with quadrant connections would meet the design LOS threshold of LOS D or better.

The concept of providing a one-way pair was also investigated briefly with northbound traffic being routed along Covil Avenue and southbound traffic being routed along Mercer Avenue. However, this concept would be difficult as Mercer Avenue does not continue north of Market Street, and the grade separation over the railroads may result in a similar number of relocations. Therefore, the one-way pair concept was eliminated from further consideration.

Based on the conclusions that at-grade intersection options would not result in acceptable traffic operations for the design year traffic volumes, it was determined that only grade-separated options would be considered at the Market Street crossing.

Princess Place Drive

The build alternatives for the proposed project would cross Princess Place Drive between 50 and 400 feet south of the CSX railroad ACB Line northern crossing, depending on the location of the build alternative alignments. Due to the proximity to the grade-separated railroad crossing (with the proposed project crossing over the railroad), it would not be possible to connect to Princess Place Drive or provide any access to the roadway. Due to this constraint, the proposed project would be grade-separated over Princess Place Drive for any of the build alternative alignments.

Hurst Street

The build alternatives for the proposed project would cross Hurst Street (functionally classified as a local street) approximately 1,200 to 1,300 feet north of the CSX railroad ACB Line northern crossing, depending on the location of the build alternative alignments. The crossing was evaluated to determine whether it would be possible to provide a connection from the proposed project to Hurst Street in a manner that would not have a substantial negative effect on the traffic operations along the corridor. Due to the roadway being a local street, a full movement signalized intersection would not be viable as it would likely result in the substantial degradation of the traffic operations. A right-in/right-out configuration was also evaluated, and while determined to be feasible from a traffic operations standpoint, it was not viable from a design standpoint. Once determined that a connection to Hurst Street was not viable, the next decision was to determine whether the roadway would be maintained with the proposed project being bridged over Hurst Street, or if Hurst Street would be severed with a cul-de-sac at each side of the proposed project. It was determined that, due to the need for east-west neighborhood connectivity in the northern portion of the study area, the construction of a grade separation would be the most reasonable approach.

Martin Luther King Jr. Parkway

The northern terminus of the proposed project would be at Martin Luther King Jr. Parkway, a roadway classified as an urban principal arterial. Due to the portion of Martin Luther King Jr. Parkway west of the proposed project being an expressway and the plans to upgrade the portion to the east to an expressway, including the construction of an interchange at Kerr Avenue (STIP U-3338C), a signalized intersection would not be consistent with the rest of the roadway. Therefore, it was determined that the only reasonable alternative for this intersection would be the construction of an interchange.

2.3.2.4 Elevated Highway

The results of the evaluation of the intersection treatments show that the proposed project would cross over both CSX railroad lines, Market Street, Princess Place Drive, Hurst Street, and Martin Luther King Jr. Parkway. Due to the number of grade-separated crossings in such a short distance, it was determined that the majority of the proposed project should be an elevated highway.

2.3.2.5 Typical Section

Based on the functional classification of the proposed project, the intersection treatments, and the design LOS for traffic operations, a typical section was developed for the build alternatives. The typical section for a roadway is developed to allow the safe and efficient operation for all users of the transportation facility.

Based on the determination of the intersection treatments in Section 2.3.2.3, the build alternatives north of the Randall Parkway/Mercer Avenue intersection would result in a roadway that does not include any at-grade impediments to the flow of traffic, such as traffic signals or gated railroad crossings. This type of facility is known as an uninterrupted flow roadway. The southern portion of the proposed project, south of the southern CSX railroad crossing (including the intersection with Randall Parkway/Mercer Avenue) is known as an interrupted flow roadway due to the signalized intersection.

The evaluation of uninterrupted flow facilities is relatively straightforward as the relationship between the variables is predictable and general HCM methodologies can be used to determine flow rates for each LOS. The evaluation of interrupted flow facilities is more difficult to evaluate in generalized terms, as the LOS provided does not remain stable with the passage of time and tends to deteriorate in an unpredictable manner. Therefore, the typical section for the proposed project north of the Randall Parkway/Mercer Avenue intersection can be determined based on general parameters; however, the portion of the proposed project near the Randall Parkway/Mercer Avenue intersection needs to be evaluated based on a detailed analysis of the intersection configuration.

The first step in the development of a typical section for the uninterrupted flow portions of the build alternatives is to determine the number of lanes required for the proposed project. In order to meet the AASHTO objective for design, the number of lanes on the roadway must allow for an acceptable LOS.

The minimum LOS for the proposed project was determined to be LOS D. The determination of the number of lanes for the proposed project is based on the traffic volume that can be accommodated on the facility such that it meets LOS D or better. The traffic volume used in the analysis of traffic operations is the peak hour traffic volume for the roadway. The peak hour volume is adjusted to a flow rate based on elements such as terrain, truck percentages, driver familiarity, and roadway characteristics. The flow rate is then used to calculate the density and LOS for the roadway.

To determine the number of lanes required, the peak hour volumes for the roadway are compared to the maximum volumes that can be accommodated for each lane configuration and LOS. The maximum peak hour volumes for each LOS and lane configuration are presented in Table 2-5.

Table 2-5: Maximum Peak Hour Volumes to Achieve LOS

Typical Section	LOS A	LOS B	LOS C	LOS D	LOS E
Two-lane	530	870	1,250	1,570	1,780
Four-lane	1,080	1,780	2,560	3,280	3,650
Six-lane	1,640	2,690	3,860	4,970	5,520

Source: Conceptual Design Traffic Analysis Report (NCDOT 2011a)
Analysis Values:
Peak Hour Factor = 0.90
Terrain = Level
Truck Percentage = 5 percent Base Free Flow Speed = 60 mph
Lane Width = 12 feet
Shoulder Lateral Clearance = 6 feet
Access Points = 10 per mile

The next step in determining the number of travel lanes is to compare the projected peak hour volumes for the build alternatives to the maximum peak hour volume to achieve LOS D or better. The maximum peak hour volume for the build alternatives ranges from 2,110 vehicles per hour on the southern portion of the proposed project to 2,290 vehicles per hour on the northern portion of the proposed project. Therefore, to attain LOS D or better for the build alternatives, a four-lane typical section would be required for the portion of the proposed project north of the Randall Parkway/Mercer Avenue intersection.

The NCDOT Roadway Design Manual includes criteria for selecting the appropriate median width for a four-lane divided roadway (NCDOT 2018b). The minimum median width for a new location, non-freeway divided facility is 46 feet, measured between the inside edges of the travel lanes (NCDOT 2018b).

Based on the determination made above, the recommended typical section for the build alternatives was determined to be a four-lane typical section with 12-foot travel lanes and a 46-foot median. The outside of the median would be bordered with 4-foot paved shoulders and the outside of the roadway would be bordered with 10-foot paved shoulders.

2.3.2.6 Access Control

There are currently four different levels of access control incorporated on NCDOT roadways; full control, limited control, partial control, and no control. Full control of access requires all crossings to be grade separated, only allowing access via ramps at interchanges. Full control of access is most common on freeways and interstate routes. Limited control of access and partial control of access both allow at-grade access to the roadway, with limited control of access only allowing connections to public streets, while partial control allows one driveway connection per parcel. Roadways with no control of access have no physical restrictions; however, private driveway connections are defined as one connection per parcel.

The NCDOT Typical Highway Cross Sections notes that four-lane divided facilities with 46-foot medians typically include either full or limited control of access (NCDOT 2010). Based on the urban principal arterial functional classification of the proposed project, high traffic volume projections, and that the proposed project would be elevated for most of its length, it was determined that limited control of access would be the most appropriate level of access control.

2.3.2.7 Multi-Modal Implementation

The build alternatives for the proposed project would include the implementation of multi-modal transportation, such as bicycle, pedestrian, and transit amenities, in accordance with NCDOT and FHWA regulations. The detailed evaluation of existing local plans and the determination of which elements would be included in the design of the build alternatives is included in the Multi-modal Transportation Evaluation (NCDOT 2011b).

2.3.3 Design Criteria

Roadway design criteria used to develop the build alternatives for the proposed project are presented in Table 2-6. The criteria were developed based on the following design standards and took into account the proposed project's functional classification and design speed:

- AASHTO – A Policy on Geometric Design of Highways and Streets, 2004 Edition
- NCDOT – Roadway Design Manual 2002, as amended

Table 2-6: Roadway Design Criteria

Design Element	Roadway	Design Criteria
Functional Classification	Independence Boulevard Randall Parkway Market Street Princess Place Hurst Avenue Martin Luther King Jr. Parkway	Principal Urban Arterial Urban Minor Arterial Principal Urban Arterial Urban Collector Local Street Principal Urban Arterial
Design Speed	Independence Boulevard Ramps/Flyovers Loops Randall Parkway Market Street Martin Luther King Jr. Parkway Minor Cross Streets	60 mph 50 mph 30 mph 40 mph 40 mph 60 mph In accordance with functional classification
Right-of-Way Width	All Construction	Variable to maintain construction and maintenance
Lane Width	Independence Boulevard Ramp – single lane Loop – single lane Cross Street	12 ft 16 ft 20 ft 12 ft (desirable)
Shoulder Width	Independence Boulevard Ramp Loop	12 ft outside (10 paved)/6 ft inside (4 paved) 14 ft outside (10 paved)/12 ft inside (4 paved) 12 ft outside (4 paved)
Median Width	Independence Boulevard Randall Parkway Market Street Martin Luther King Jr. Parkway	46 ft 23 ft (proposed) – Widening by City 23 ft 30 ft (existing)
Vertical Grades	—	In accordance with AASHTO design standards based on level terrain in urban area
Superelevation Rate[a]	Roadways Bridges	e_{max} = 8 percent e_{max} = 6 percent
Vertical Clearance	—	Railroad – 23 ft Local Roads – 15 ft

[a] Superelevation rate (emax) is the maximum slope from one side of a highway to the other on a curve.

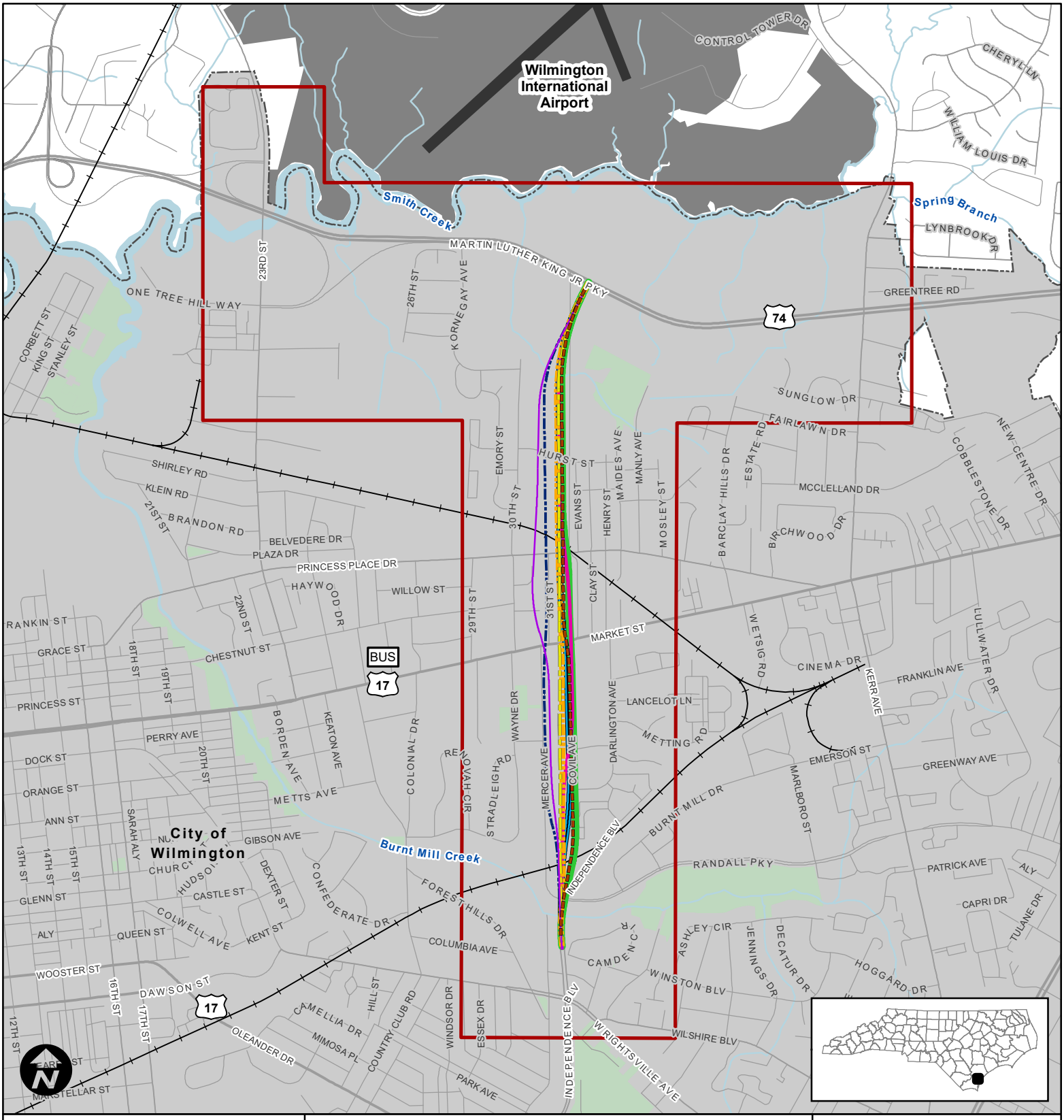
2.4 Conceptual Alternative Alignments

The evaluation of conceptual build alternatives was developed based on two general parameters; the location or alignment of the roadway and the intersection options at the Market Street crossing. The conceptual build alternatives included in this section are a combination of each alignment with each of the intersection options. In addition, a separate evaluation of the interchange at Martin Luther King Jr. Parkway was completed to determine the preferred configuration for the northern terminus of the proposed project.

The alignments for each of the build alternatives were developed to evaluate a full range of options that would minimize the overall impact to the study area. In general, the alignments fall into three categories based on the roadways that they parallel. Alternatives 1, 2, 3, and 5 follow a similar alignment along existing Covil and Montgomery Avenues and are referred to as the eastern, or Covil Avenue, corridors. Alternatives 4 and 8 follow a similar alignment along Mercer Avenue and North 31st Street and are referred to as the western, or Mercer Avenue, corridors. Between the eastern and western corridors lie Alternatives 6 and 7, which run parallel to the existing north-south roadways and form a new roadway that would maintain portions of the existing roadways. The Alternative 6 and 7 alignments are referred to as the central, or new location, corridors. The conceptual alternative alignments (without the Market Street intersection options shown) are included on Figure 2-4.

2.4.1 Alternative 1

The alignment for Alternative 1 would utilize the existing centerline of Covil and Montgomery Avenues and reconstruct the existing roadway symmetrically on each side. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection at the current location. The alignment would then cross over the CSX railroad, follow existing Covil Avenue and cross over Market Street along existing Montgomery Avenue. The alignment would cross over Princess Place Drive and the northern crossing of the CSX railroad, running parallel along the back side of the properties on the west side of Evans Street. The alignment would continue over Hurst Street and turn slightly to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.



Legend

- Alternative 1
- Alternative 2
- Alternative 3
- Alternative 4
- Alternative 5
- Alternative 6
- Alternative 7
- Alternative 8
- Railroad
- Stream
- Study Area
- Park
- Municipal Boundary
- County Boundary

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 2-4
Conceptual Alternative Alignments

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

2.4.2 Alternative 2

The alignment for Alternative 2 would be similar to Alternative 1 but would run parallel to the existing centerline of Covil and Montgomery Avenues on the west side and would reconstruct the existing roadway asymmetrically on the west side of the existing roadway. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection slightly west of the current location. The alignment would then cross over the CSX railroad, run parallel to existing Covil Avenue on the west side and cross over Market Street again paralleling the west side of existing Montgomery Avenue. The alignment would cross over Princess Place Drive and the northern crossing of the CSX railroad, running parallel along the back side of the properties on the west side of Evans Street, approximately 50 feet west of the alignment for Alternative 1. The alignment would continue over Hurst Street and turn slightly to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.

2.4.3 Alternative 3

The alignment for Alternative 3 would be similar to Alternatives 1 and 2 but would run parallel to the existing centerline of Covil and Montgomery Avenues on the east side and would reconstruct the existing roadway asymmetrically on the east side of the existing roadway. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection at the current location. The alignment would then cross over the CSX railroad, run parallel to existing Covil Avenue along the east side and cross over Market Street again paralleling the east side of existing Montgomery Avenue. The alignment would cross over Princess Place Drive and the northern crossing of the CSX railroad, running parallel along the back side of the properties on the west side of Evans Street, approximately 30 feet east of the alignment for Alternative 1. The alignment would continue over Hurst Street and turn slightly to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.

2.4.4 Alternative 4

The alignment for Alternative 4 would be different than the alignments for Alternatives 1, 2, and 3 with the alignment being located farther west, paralleling Mercer Avenue and North 31st Street. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection slightly west of the current location. The alignment would then cross over the CSX railroad, follow existing Mercer Avenue on the east side slightly east of the existing centerline, cross over Market Street, and run parallel to North 31st Street along the west side. The alignment would cross over Princess Place Drive and the northern crossing of the CSX railroad, running parallel to Evans Street and North 30th Street, midway between them. The alignment would continue over Hurst Street and turn to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.

2.4.5 Alternative 5

The alignment for Alternative 5 would be similar to the alignments for Alternatives 1, 2, and 3 as it would run along the existing Covil Avenue alignment. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection slightly west of the current location. The alignment would then cross over the CSX railroad, follow the west side of existing Covil Avenue before transitioning to the east side near the Broad Street intersection. It would then cross over Market Street and run parallel to Montgomery Avenue along the west side. The alignment would cross over Princess Place Drive and the northern crossing of the CSX railroad, running parallel along the back side of the properties on the west side of Evans Street. The alignment would continue over Hurst Street and turn slightly to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.

2.4.6 Alternative 6

The alignment for Alternative 6 would be different than the previous five alternatives with the alignment running parallel to Covil and Mercer Avenues, midway between each roadway. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection slightly west of the current location. The alignment would then cross over the CSX railroad, run parallel to the west side of existing Covil Avenue, cross over Market Street, and run parallel to Montgomery Avenue along the west side. The alignment would then cross over Princess Place Drive and the northern crossing of the CSX railroad, running parallel along the back side of the properties on the west side of Evans Street. The alignment would continue over Hurst Street and turn slightly to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.

2.4.7 Alternative 7

The alignment for Alternative 7 would be very similar to the alignment for Alternative 6 with the maximum distance between the alignments being approximately 35 feet. The Alternative 7 alignment would be slightly west of the Alternative 6 alignment south of Market Street and slightly east of Alternative 6 north of Market Street.

2.4.8 Alternative 8

The alignment for Alternative 8 would be similar to the alignment for Alternative 4 and would parallel the Mercer Avenue and North 31st Street roadways. The alignment would begin approximately 600 feet south of the existing Randall Parkway/Mercer Avenue intersection and would reconstruct the intersection slightly west of the current location. The alignment would then cross over the CSX railroad, paralleling existing Mercer Avenue approximately 100 feet east of the existing centerline, cross over Market Street, and run parallel along the back side of the properties on the west side of North 31st Street. The alignment would then cross over Princess Place Drive and the northern crossing of the CSX railroad, running along the back side of the Wilmington Housing Authority housing along North 30th Street. The alignment would continue over Hurst Street and turn to the northeast before ending at an interchange with Martin Luther King Jr. Parkway.

2.4.9 Conceptual Alternative Market Street Intersection Options

Conceptual alternatives for the Market Street intersection were developed for each of the conceptual alternative alignments. In general, three concepts were included, a TUDI, a Diverging Diamond Interchange (DDI), and a series of quadrant interchanges. The conceptual interchange alternative options are described in the following sections.

2.4.9.1 Tight Urban Diamond Interchange

Conventional diamond interchanges are the most common type of interchange in the United States. The TUDI is a variation of the conventional diamond interchange with more closely spaced ramp terminals than the conventional diamond interchange (Figure 2-5). Typically, a TUDI would have ramp terminals that are spaced 200 to 400 feet apart and are utilized in urban and suburban areas to minimize footprint. The short spacing between ramp terminals results in special operational needs. The traffic signals controlling the two ramp intersections on a TUDI must be coordinated to move traffic efficiently through the intersections and limit vehicle queuing between the ramps. A visualization of a typical TUDI is shown on Figure 2-5 where the proposed project would be the arterial roadway and Market Street would be the cross street.

Figure 2-5: Tight Urban Diamond Interchange

The TUDI alternatives would include the proposed project being grade separated over Market Street with ramps connecting to Market Street. The ramp terminals at Market Street would be approximately 400 feet apart and would include signalized intersections. To preserve the traffic operations of the interchange, a median island along Market Street would be included in the design. In addition, a

minimum of 300 feet of controlled access along Market Street outside the ramp terminals would be included in the design.

The conceptual design for each of the eight alignments, including the TUDI, are included in Appendix A.

2.4.9.2 Diverging Diamond Interchange (DDI)

The concept of the DDI is a recently developed variation of the traditional diamond interchange. The DDI concept deliberately routes the through-lanes along the intersecting street to cross to the opposite side of the roadway between the interchange ramp terminals (underneath the proposed overpass) (Figure 2-6). This concept allows left turns to be made without conflicting with the opposing through direction of travel. The through lanes are crossed for only a short section between diamond ramp intersections, then crossing back to be on the normal (right) side of the roadway outside the ramp terminals. A visualization of a typical DDI is shown on Figure 2-6 where the proposed project would be the arterial roadway and Market Street would be the cross street, as labeled.

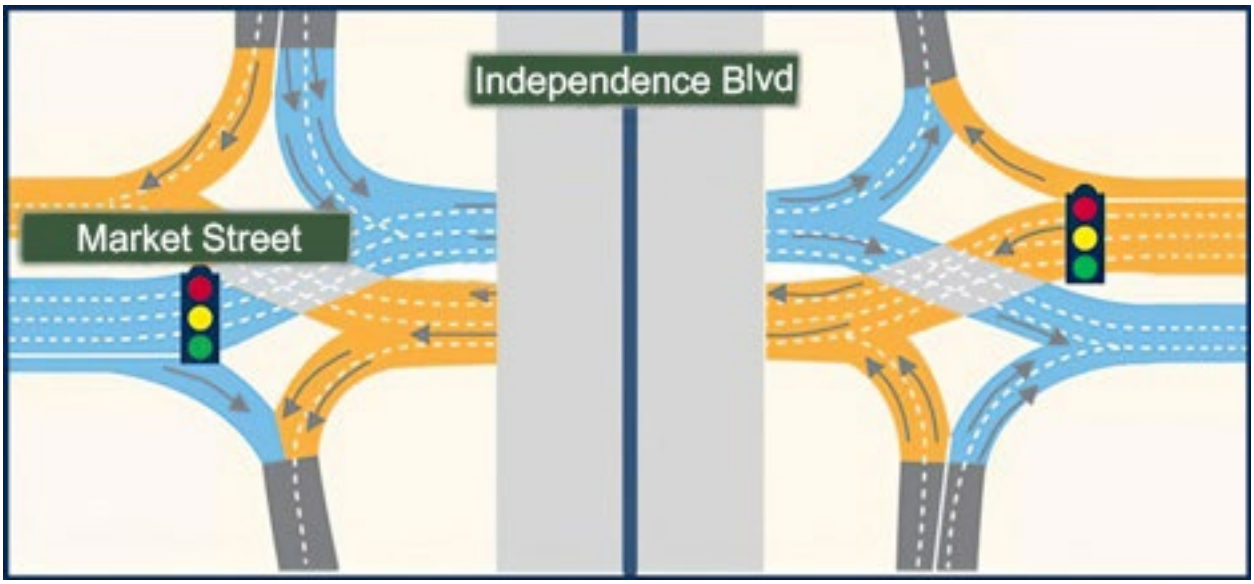


Figure 2-6: Diverging Diamond Interchange Configuration

The DDI alternatives would grade separate the proposed project over Market Street, with ramps connecting to Market Street in each of the four quadrants. The ramp terminals at Market Street would be approximately 400 feet apart and would include the crossover intersections and traffic signals. To preserve the traffic operations of the interchange, a median island along Market Street would be included in the design. In addition, a minimum of 300 feet of controlled access along Market Street outside the ramp terminals would be included in the design.

The conceptual design for each of the eight alignments, including the DDI, are included in Appendix A.

2.4.9.3 Quadrant Interchange

The quadrant interchange concept provides additional arc roadways between the arterial and the cross street that allow turning traffic to “cut the corner” between the roadways (Figure 2-7). The main

intersection of the roadways includes a grade separation. The quadrant interchange includes arc roadway connections in at least two of the quadrants, allowing for the main arterial roadway to operate without signalized intersections. The main arterial roadway can be configured to allow left turn movements from the main arterial roadway to the connector roadway via unsignalized directional crossovers commonly referred to as "left-overs."

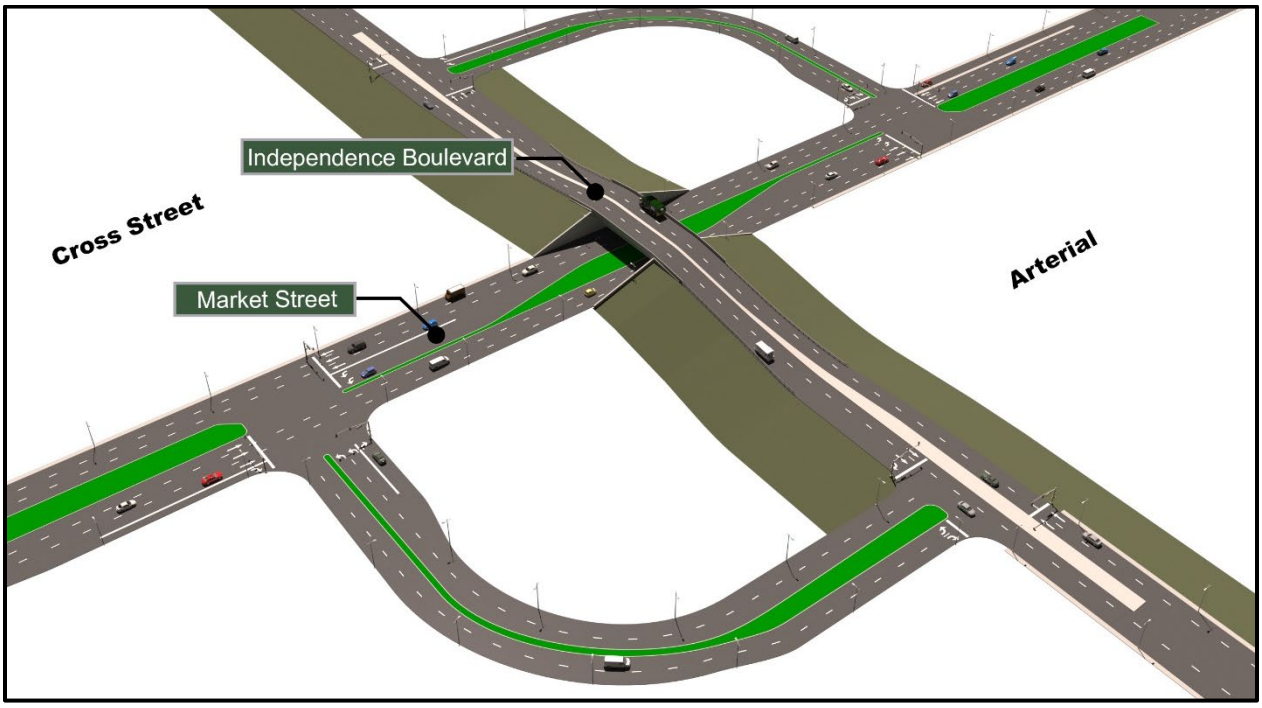


Figure 2-7: Quadrant Interchange

The quadrant interchange creates two additional intersections, approximately 250 to 500 feet from the grade-separated crossing to accommodate turning traffic. The street connections at the main arterial are typically designed with adequate acceleration and deceleration lengths to safely transition cars to and from high speeds along the main arterial. The length of the quadrant arc roadways is typically based on the greater of the distance required to connect the grade-separated roadways or to accommodate the traffic queued at the signalized intersection on the minor street. A visualization of a typical quadrant interchange is shown on Figure 2-8 where the proposed project would be the arterial roadway and Market Street would be the cross street.

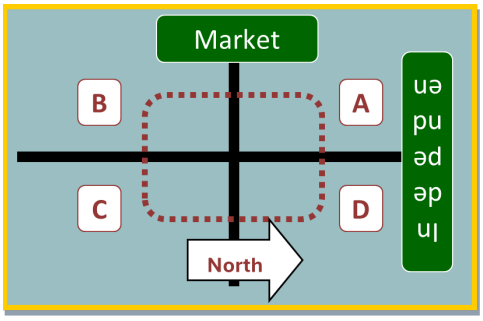


Figure 2-8. Typical Quadrant Interchange

The quadrant interchange alternatives would grade separate the proposed project over Market Street with roadways connecting to Market Street in two of the four quadrants. The new intersections at Market Street would be approximately 500 to 1,000 feet apart and would include traffic signals. To preserve the traffic operations of the interchange, a median island along Market Street would be included in the design.

Because the quadrant interchange design includes roadway connection ramps in two of the four quadrants, several combinations are possible that make up different alternative configurations. To distinguish each of the combinations, each of the quadrants was labeled alphabetically as shown in the graphic at right, with the northwest quadrant being "A" and continuing counterclockwise. In order to not have signals along the proposed project, one roadway connection must be on the east side of the proposed project and one roadway connection must be on the west side, resulting in the elimination of the AB and CD combinations. Therefore, four combinations are possible (AC, AD, BC and BD), with each combination being considered with and without directional left turns (left-overs) from the proposed project to the quadrant roadway.

The following eight options were developed for the quadrant interchange:

- Quadrant AC
- Quadrant AC with left-overs from the proposed project to the arc roadways
- Quadrant AD
- Quadrant AD with left-overs from proposed project to the arc roadways
- Quadrant BC
- Quadrant BC with left-overs from proposed project to the arc roadways
- Quadrant BD
- Quadrant BD with left-overs from proposed project to the arc roadways

The conceptual designs for each of the eight alignments including the quadrant interchanges are included in Appendix A.

2.4.10 Conceptual Martin Luther King Jr. Parkway Interchange Options

Conceptual alternatives for the interchange with Martin Luther King Jr. Parkway were developed to determine the optimal interchange alignment. Based on the three-leg configuration and projected turning volumes, the most viable interchange configuration would be a trumpet configuration. A trumpet interchange includes one loop and three ramps that connect the intersecting roadways. Four interchange options were developed that would include slightly different design speeds and ramp curvatures. A brief description of each of the alternative concepts is included in the following sections and the designs are included in Appendix A.

2.4.10.1 Option A

The conceptual interchange design for Option A would include a design speed of 30 miles per hour for the loop and 50 mph for the ramps. In addition, the design would include a slightly larger radius at the ramp connections to Martin Luther King Jr. Parkway to allow for an improved transition between the expressway and the ramps. The slightly larger radius is based on a recommendation in the NCDOT

Roadway Design Manual that states that the radius of curvature near the gore (the location where the ramp connects to the main roadway) not be less than 955 feet (NCDOT 2018b).

2.4.10.2 Option B

The conceptual interchange design for Option B is very similar to Option A and would also include a design speed of 30 mph for loops and 50 mph for ramps. However, Option B would not include the slightly larger radius connections as recommended in the NCDOT Roadway Design Manual, allowing for a minimum radius of 775 feet to be used.

2.4.10.3 Option C

The conceptual interchange design for Option C would have the same configuration as Options A and B but would include a lower design speed for the flyover ramp from westbound Martin Luther King Jr. Parkway to the southbound lanes of the proposed project. The design for Option C would include a 30 mph design speed for the loop and a 50 mile per hour design speed for all the ramps with the exception of the flyover ramp, which would have design speed of 40 miles per hour.

2.4.10.4 Option D

The conceptual interchange design for Option D would have the same configuration as the other three options but would have lower design speeds for the ramps. Option D would include a 30 mile per hour design speed for the loop and a 40 mile per hour design speed for the ramps and flyover.

2.5 Evaluation of Conceptual Alternative Alignments

The evaluation of the conceptual alternative alignments was based primarily on the alternatives' ability to provide adequate traffic operations and minimize negative effects on the human, natural, and cultural environments. The following sections include a summary of the detailed evaluation conducted for each alternative.

2.5.1 Traffic Operations Analysis Summary

The traffic operations for each of the conceptual alternative alignments were evaluated in the Conceptual Design Traffic Analysis Report (NCDOT 2011a). The traffic operations analysis was broken into two levels of analysis. The first level was a conventional capacity analysis that would determine the LOS for each of the Market Street intersection options. However, due to the differences in the operational characteristics of the configurations, a second level was developed that included a simulation of the entire network in the vicinity of Market Street, which would allow the options to be compared in a consistent manner.

2.5.1.1 LOS Analysis Results

The LOS analysis showed that 8 of the 10 interchange options would operate at LOS D or better in the 2035 design year. A summary of the overall LOS results is included in Table 2-7.

Table 2-7: Conceptual Design LOS Summary

Alternative	Intersection	Overall Intersection LOS a.m. (p.m.)	Average Delay (seconds) a.m. (p.m.)
Quadrant AC	Independence Boulevard Northbound Ramp at Market Street	C (D)	31 (36)
	Independence Boulevard Southbound Ramp at Market Street	C (C)	34 (27)
Quadrant AC with left-overs	Independence Boulevard Northbound Ramp at Market Street	C (C)	23 (24)
	Independence Boulevard Southbound Ramp at Market Street	D (C)	36 (25)
Quadrant AD	Independence Boulevard Northbound Ramp at Market Street	D (C)	39 (33)
	Independence Boulevard Southbound Ramp at Market Street	C (C)	33 (27)
Quadrant AD with left-overs	Independence Boulevard Northbound Ramp at Market Street	D (C)	36 (33)
	Independence Boulevard Southbound Ramp at Market Street	C (B)	26 (19)
Quadrant BC	Independence Boulevard Northbound Ramp at Market Street	C (C)	20 (23)
	Independence Boulevard Southbound Ramp at Market Street	D (D)	35 (39)
Quadrant BC with left-overs	Independence Boulevard Northbound Ramp at Market Street	B (B)	16 (17)
	Independence Boulevard Southbound Ramp at Market Street	E (E)	56 (75)
Quadrant BD	Independence Boulevard Northbound Ramp at Market Street	C (C)	30 (30)
	Independence Boulevard Southbound Ramp at Market Street	C (D)	31 (35)
Quadrant BD with left-overs	Independence Boulevard Northbound Ramp at Market Street	C (C)	30 (30)
	Independence Boulevard Southbound Ramp at Market Street	D (E)	48 (70)
TUDI	Independence Boulevard Northbound Ramp at Market Street	C (C)	20 (21)
	Independence Boulevard Southbound Ramp at Market Street	C (C)	27 (34)
DDI	Independence Boulevard Northbound Ramp at Market Street	N/A[a]	N/A[a]

Alternative	Intersection	Overall Intersection LOS a.m. (p.m.)	Average Delay (seconds) a.m. (p.m.)
	Independence Boulevard Southbound Ramp at Market Street	N/A[a]	N/A[a]

Source: Conceptual Design Traffic Analysis Report (NCDOT 2011a).
[a] Denotes configuration that cannot be analyzed with standard LOS procedures

2.5.1.2 Simulation Analysis Results

The 10 Market Street interchange alternatives were also run as simulations using SimTraffic software for the 2035 design year. The options were developed to include identical geographic extents and simulated for both the a.m. and p.m. peak hours. Each analysis was run five times with the results averaged to determine the average travel time for each option. The results of the analysis are given in hours and are a summation of the total travel time for every vehicle within the proposed network over a 1-hour period. Approximately 7,400 to 7,850 vehicles were accounted for in each network run, with the overall average travel time per vehicle varying between 2 minutes, 15 seconds to 8 minutes, 40 seconds depending on the alternative, peak hour, left-over configuration, and simulation seed number. A summary of the traffic simulation results is included in Table 2-8.

Table 2-8: Traffic Simulation Results

Alternative	a.m. Peak Total Travel Time (hours)	p.m. Peak Total Travel Time (hours)	a.m. Peak Travel Time per Vehicle (m:ss)	p.m. Peak Travel Time per Vehicle (m:ss)
Quadrant AC	563	375	4:21	3:07
Quadrant AC with left-overs	482	313	3:44	2:26
Quadrant AD	1,088	635	8:36	4:59
Quadrant AD with left-overs	850	759	6:39	5:58
Quadrant BC	287	420	2:15	3:15
Quadrant BC with left-overs	806	792	6:16	6:08
Quadrant BD	437	453	3:26	3:34
Quadrant BD with left-overs	1,003	1,031	7:51	8:06
TUDI	379	417	3:02	3:18
DDI	371	560	2:57	4:25

Source: Conceptual Design Traffic Analysis Report (NCDOT 2011a)

2.5.2 Summary of Conceptual Alternative Alignment Impacts

The conceptual alternative alignments were evaluated to determine how the proposed project would affect the human, natural, and cultural environment within the study area. The evaluation included both a quantitative and qualitative evaluation of the impacts.

2.5.2.1 Quantitative Evaluation of Alternatives

The following items were included in the quantitative evaluation:

- Relocations (business, residential, multi-family residential, churches, and accessory structures)
- Length
- Railroad crossings
- Potential hazardous materials sites
- Federally listed species
- Floodplain
- Wetlands
- Streams
- Nature preserves
- Significant Natural Heritage Areas
- Water supply critical areas
- Parks
- Schools
- Cemeteries
- Recorded historic sites
- High quality water resources

A summary of the impacts for each conceptual alternative alignment and Market Street intersection alternative is included in Table 2-9.

2.5.2.2 Qualitative Evaluation of Alternatives

In addition to the quantitative evaluation, each of the conceptual alternative alignments was evaluated for qualitative aspects that could be used in comparing the alternatives. Qualitative elements included the following:

- Effect of changes in access/closing of roadways or intersections
- Amount of property that would lose access to a public roadway
- Effect on the future development of the Wilmington Housing Authority property
- Changes to traffic patterns and need for detour routing due to changes in access
- Pattern of relocations to residential areas including minimizing the number of blocks affected

Both quantitative and qualitative effects were considered when determining which alternatives should be selected as DSAs.

Table 2-9: Conceptual Alternative Alignment Impact Summary

Impact	Business Relocations	Single Family Residential Relocations	Multi-Family Residential Relocations	Church Relocations	Total Relocations	Total After Potential Avoidance	Accessory Structure	Length (miles)	Railroad Crossings (number)	Potential Hazardous Materials Sites (number)	Known Federally Listed Species (number within 1,000 feet)	100-year Floodplain (acres)	Wetlands (acres)	Stream Impacts (number / linear feet)	Nature Preserves (number)	Significant Natural Heritage Areas (acres)	Water Supply Critical Areas (acres)	Parks (number / acres)	Schools (number)	Cemeteries (number)	Recorded Historic Sites (number / acres)	High Quality Resources (number crossings / acres)
Alternative 1																						
DDI	40	83	8	1	**132**	**120**	43	1.96	2	4	0	2.92	1.45	2 / 460	0	0	0	0 / 0	0	0	0 / 0	0 / 0
TUDI	31	83	8	1	**123**	**113**	44	1.96	2	4	0	2.92	1.45	2 / 460	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AC	29	71	8	1	**109**	**101**	43	1.96	2	4	0	2.92	1.45	2 / 460	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AD	29	87	8	1	**125**	**117**	45	1.96	2	4	0	2.92	1.45	2 / 460	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	29	73	8	1	**111**	**102**	44	1.96	2	3	0	2.92	1.45	2 / 460	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	29	89	8	1	**127**	**118**	46	1.96	2	3	0	2.92	1.45	2 / 460	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Alternative 2																						
DDI	39	85	6	1	**131**	**121**	47	1.95	2	4	0	2.89	1.15	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
TUDI	31	84	6	1	**122**	**114**	43	1.95	2	4	0	2.89	1.15	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AC	27	67	6	1	**101**	**101**	45	1.95	2	4	0	2.89	1.15	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AD	27	85	6	1	**119**	**119**	42	1.95	2	4	0	2.89	1.15	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	28	69	6	1	**104**	**103**	46	1.95	2	3	0	2.89	1.15	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	28	87	6	1	**122**	**121**	43	1.95	2	3	0	2.89	1.15	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Alternative 3																						
DDI	35	88	8	0	**131**	**121**	39	1.95	2	4	0	3.11	1.35	2 / 490	0	0	0	0 / 0	0	0	0 / 0	0 / 0
TUDI	29	84	8	0	**121**	**116**	36	1.95	2	3	0	3.11	1.35	2 / 490	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AC	28	77	8	0	**113**	**108**	33	1.95	2	4	0	3.11	1.35	2 / 490	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AD	28	93	8	0	**129**	**124**	34	1.95	2	4	0	3.11	1.35	2 / 490	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	26	78	8	0	**112**	**106**	32	1.95	2	3	0	3.11	1.35	2 / 490	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	26	94	8	0	**128**	**122**	33	1.95	2	3	0	3.11	1.35	2 / 490	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Alternative 4																						
DDI	26	110	0	1	**137**	**134**	60	1.97	2	5	0	2.81	1.2	2 / 620	0	0	0	1 / 0.1	0	0	0 / 0	0 / 0
TUDI	24	110	0	1	**135**	**133**	57	1.97	2	5	0	2.81	1.2	2 / 620	0	0	0	1 / 0.1	0	0	0 / 0	0 / 0
Quadrant AC	25	101	0	1	**127**	**126**	44	1.97	2	6	0	2.81	1.2	2 / 620	0	0	0	1 / 0.1	0	0	0 / 0	0 / 0
Quadrant AD	23	111	0	1	**135**	**134**	51	1.97	2	5	0	2.81	1.2	2 / 620	0	0	0	1 / 0.1	0	0	0 / 0	0 / 0

Impact	Business Relocations	Single Family Residential Relocations	Multi-Family Residential Relocations	Church Relocations	Total Relocations	Total After Potential Avoidance	Accessory Structure	Length (miles)	Railroad Crossings (number)	Potential Hazardous Materials Sites (number)	Known Federally Listed Species (number within 1,000 feet)	100-year Floodplain (acres)	Wetlands (acres)	Stream Impacts (number / linear feet)	Nature Preserves (number)	Significant Natural Heritage Areas (acres)	Water Supply Critical Areas (acres)	Parks (number / acres)	Schools (number)	Cemeteries (number)	Recorded Historic Sites (number / acres)	High Quality Resources (number crossings / acres)
Quadrant BC	24	98	0	1	**123**	**122**	47	1.97	2	4	0	2.81	1.2	2 / 620	0	0	0	1 / 0.1	0	0	0 / 0	0 / 0
Quadrant BD	22	108	0	1	**131**	**130**	54	1.97	2	3	0	2.81	1.2	2 / 620	0	0	0	1 / 0.1	0	0	0 / 0	0 / 0
Alternative 5																						
DDI	32	89	6	1	**128**	**120**	47	1.95	2	5	0	3.07	1.15	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
TUDI	28	88	6	1	**123**	**118**	37	1.95	2	4	0	3.07	1.15	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AC	27	72	6	1	**106**	**101**	37	1.95	2	5	0	3.07	1.15	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AD	27	87	6	1	**121**	**116**	38	1.95	2	5	0	3.07	1.15	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	25	72	6	1	**104**	**99**	35	1.95	2	4	0	3.07	1.15	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	25	87	6	1	**119**	**114**	36	1.95	2	4	0	3.07	1.15	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Alternative 6																						
DDI	38	92	6	1	**137**	**132**	49	1.95	2	5	0	3.08	0.9	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
TUDI	33	88	6	1	**128**	**125**	49	1.95	2	4	0	3.08	0.9	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AC	28	68	6	1	**103**	**102**	46	1.95	2	5	0	3.08	0.9	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AD	29	83	6	1	**119**	**118**	46	1.95	2	4	0	3.08	0.9	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	28	74	6	1	**109**	**108**	47	1.95	2	4	0	3.08	0.9	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	29	89	6	1	**125**	**124**	47	1.95	2	3	0	3.08	0.9	2 / 470	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Alternative 7																						
DDI	34	85	6	1	**126**	**116**	51	1.94	2	5	0	2.98	1.2	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
TUDI	30	80	6	1	**117**	**110**	51	1.94	2	5	0	2.98	1.2	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AC	25	63	6	1	**95**	**90**	46	1.94	2	5	0	2.98	1.2	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant AD	25	78	6	1	**110**	**105**	47	1.94	2	4	0	2.98	1.2	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	25	68	6	1	**100**	**95**	47	1.94	2	4	0	2.98	1.2	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	25	83	6	1	**115**	**110**	48	1.94	2	3	0	2.98	1.2	2 / 480	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Alternative 8																						
DDI	26	92	4	2	**124**	**112**	43	1.97	2	5	0	3.76	1.45	2 / 640	0	0	0	1 / 0.04	0	0	0 / 0	0 / 0
TUDI	26	89	4	2	**121**	**111**	39	1.97	2	5	0	3.76	1.45	2 / 640	0	0	0	1 / 0.03	0	0	0 / 0	0 / 0
Quadrant AC	21	77	4	2	**105**	**98**	39	1.97	2	6	0	3.76	1.45	2 / 640	0	0	0	0 / 0	0	0	0 / 0	0 / 0

Impact	Business Relocations	Single Family Residential Relocations	Multi-Family Residential Relocations	Church Relocations	Total Relocations	Total After Potential Avoidance	Accessory Structure	Length (miles)	Railroad Crossings (number)	Potential Hazardous Materials Sites (number)	Known Federally Listed Species (number within 1,000 feet)	100-year Floodplain (acres)	Wetlands (acres)	Stream Impacts (number / linear feet)	Nature Preserves (number)	Significant Natural Heritage Areas (acres)	Water Supply Critical Areas (acres)	Parks (number / acres)	Schools (number)	Cemeteries (number)	Recorded Historic Sites (number / acres)	High Quality Resources (number crossings / acres)
Quadrant AD	18	88	4	2	**112**	**107**	49	1.97	2	5	0	3.76	1.45	2 / 640	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BC	19	68	4	2	**93**	**89**	42	1.97	2	4	0	3.76	1.45	2 / 640	0	0	0	0 / 0	0	0	0 / 0	0 / 0
Quadrant BD	16	79	4	2	**101**	**98**	52	1.97	2	3	0	3.76	1.45	2 / 640	0	0	0	0 / 0	0	0	0 / 0	0 / 0

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2.5.3 Selection of Initial Detailed Study Alternatives

Initial DSAs were identified during a project meeting on December 12, 2011. Representatives from the following agencies were in attendance:

- WMPO
- FHWA
- NCDOT Division 3
- NCDOT Project Development and Environmental Analysis
- NCDOT Roadway Design
- NCDOT Mobility and Safety

The goal of the meeting was to evaluate the conceptual alternative alignments based on the data presented in the previous sections to determine which conceptual alternative alignments would be carried forward to preliminary design and included in the DEIS as DSAs.

2.5.3.1 Conceptual Alternative Alignments

Evaluation of the conceptual alternative alignments began by comparing the alignments that had similar attributes, including:

- Covil Avenue Corridors (Alternatives 1, 2, 3, and 5) – those that follow or closely parallel the existing Covil Avenue and Montgomery Avenue alignment, and would essentially replace the existing roadway with the proposed project
- Mercer Avenue Corridors (Alternatives 4 and 8) – those that follow or closely parallel the existing Mercer Avenue Corridor
- New Location Corridors (Alternative 6 and 7) – those that would be located between Covil Avenue and Mercer Avenue and would maintain substantial portions of the existing roadways

Each of the alternatives within the three corridors are very similar, and it was determined that the selection of the best option within each of the corridors would allow for a full range of options to be advanced as DSAs. The preliminary design for each of the DSAs would be accomplished in a manner that would minimize the impacts to the greatest extent possible and would utilize a best fit alignment within each of the three corridors.

Covil Avenue Corridors (Alternatives 1, 2, 3, and 5)

Based on the evaluation of quantitative and qualitative impacts it was determined that Alternative 2 was preferred over the remaining three alternatives due to the following reasons:

- Would be a better alignment for accommodating the traffic control of the Randall Parkway intersection improvement
- Would have less impact to the east side of Covil Avenue
- Would reduce multi-family residential relocations over the other alternatives
- Would abut the east side of the Wilmington Housing Authority parcel instead of splitting the parcel into two pieces, which would likely leave the parcel undevelopable

- Would have a more compact footprint between Market Street and Princess Place Drive and would affect fewer blocks of houses, leaving more complete blocks parallel to the corridor
- Would not cause any relocations north of Princess Place Drive
- Would not conflict with the powerline north of Princess Place Drive
- Would have comparable relocations to other alternatives
- Would have a short bridge over Princess Place Drive and CSX Railroad line

Mercer Avenue Corridors (Alternative 4 and 8)

Based on the evaluation of quantitative and qualitative impacts it was determined that Alternative 8 was preferred over Alternative 4 due to the following reasons:

- Would maintain more of the Mercer Avenue roadway and provide access to Randall Parkway
- Would abut the western edge of the Wilmington Housing Authority property instead of splitting the parcel into two pieces, which would likely leave the parcel undevelopable
- Would have a substantially lower number of relocations compared with Alternative 4
- Would be among those alternatives with the lowest overall relocations

New Location Corridors (Alternatives 6 and 7)

Based on the evaluation of quantitative and qualitative impacts it was determined that Alternative 7 was preferred over Alternative 6 due to the following reasons:

- Alignment would be slightly better/straighter
- Would result in fewer relocations
- Would allow for more of Covil Avenue to remain open due to the alignment being slightly to the west
- Potential for a shorter bridge over Princess Place Drive and CSX Railroad line
- Would have the lowest overall relocations of any alternative

Conceptual Alternative Market Street Intersection Options

The conceptual design alternatives at Market Street were evaluated to determine which of the concepts would provide the best traffic operations while minimizing the effects to the natural, human, and cultural environments.

TUDI

The TUDI was evaluated and the following items were identified:

- Would work well from a traffic operations standpoint
- Easily understood by public
- Would have fewer relocations than the DDI interchange, but would generally have higher relocations than the quadrant interchange options

It was determined that the TUDI should be carried forward to preliminary design as a DSA.

DDI

The DDI was evaluated and the following items were identified:

- Would work from a capacity standpoint, but there were concerns with the tight footprint and the potential for cars queuing within the interchange
- Would have a longer average travel time (34% longer than TUDI for p.m. peak, similar for a.m. peak)
- Would consistently cause higher relocations compared to the TUDI or quadrant interchange options
- Conceptually would require control of access farther along Market Street

It was determined that the DDI should not be carried forward as a DSA due to better available options.

Quadrant Interchange

The evaluation of the quadrant interchange determined that the traffic operation results for all the quadrant configurations with directional left turns (left-overs) on the proposed project would be relatively poor and would include queuing along the proposed project. It was determined that the directional left turn (left-over) options along the proposed project should not be carried forward and should be eliminated due to the negative effects on traffic operations.

Next, the quadrant options were evaluated one at a time to determine which of the four configurations would provide the greatest benefits with the fewest impacts. As discussed previously, in order to not have signals along the proposed project, one roadway connection must be on the east side of the roadway and one roadway connection must be on the west side, resulting in the elimination of the AB and CD combinations.

Quadrant D (with AD and BD combinations)

The Quadrant D (northeast quadrant) design was evaluated, and the following items were identified:

- Would not operate as well as the other quadrant designs from a traffic operations standpoint
- Would have a very heavy left turn movement from eastbound Market Street to northbound on the proposed project that would potentially require triple left turn lanes in the future
- Would have substantially higher relocations than other quadrant options
- Would not be consistent with the Market Street Corridor Study (City of Wilmington 2010)
- Would include a connection opposite the Darlington Avenue intersection that would create an 8-phase signal with very high volumes
- Quadrant AD travel times would be double the other options and would have some spillback along Market Street

Based on the negative effects it was determined that any configuration that included a quadrant connection in Quadrant B should be eliminated. Therefore, the Quadrant AD and BD combinations were eliminated.

Quadrant B (with BC combination) (BD combination eliminated above)

The Quadrant B (southwest quadrant) design was evaluated. Quadrant B would only include the Quadrant BC combination as the Quadrant BD option was eliminated above. The evaluation of the Quadrant B design identified the following items:

- Covil Avenue and New Location Corridor alignments would require the realignment of Darlington Avenue (in Quadrant C)
- Mercer Avenue Corridor alignments would require the closure of Wayne Street, resulting in a very long detour route
- A connection at the existing Mercer Avenue intersection would allow for a three-leg intersection at Market Street, which would improve the traffic operations substantially
- Would be consistent with Market Street Corridor Study

Based on the items identified it was determined that the Quadrant BC combination was a good alternative and recommended that it be carried forward to the preliminary design stage as a DSA.

Quadrant A (with AC combination, AD combination eliminated above)

The Quadrant A (northwest quadrant) design was evaluated. Quadrant A would only include the Quadrant AC combination as the Quadrant AD option was eliminated above. The evaluation of the Quadrant A design identified the following items:

- Maintaining access to 30th Street would be more difficult with this configuration, especially for the New Location and Mercer Avenue Corridor alignments.
- For Mercer Avenue Corridor alignments, 30th Street would need to be realigned to connect to 29th Street.

Based on the items identified it was determined that the Quadrant AC combination was a good alternative and recommended that it be carried forward to the preliminary design stage as a DSA.

2.5.3.2 Conceptual Martin Luther King Jr. Parkway Interchange Options

The project team discussed the interchange options at Martin Luther King Jr. Parkway, and NCDOT policy dictates that the driver expectation is for a high-speed connection, consistent with a 50-mph design. Based on this policy, the project team agreed that Option B with the 50-mph flyover design should be included in the preliminary design stage of the proposed project for all the alternatives. Minimization to a lesser design speed or bridging could be considered at a later date if environmental constraints are substantial.

2.5.4 Summary of Initial Detailed Study Alternatives

Based on the decisions included in the previous section, the following nine alternatives (three alignments with three Market Street interchange options for each alignment) were selected as DSAs for the proposed project and were carried forward to the preliminary design phase:

- Alternative 2 with TUDI at Market Street
- Alternative 2 with Quadrant AC at Market Street

- Alternative 2 with Quadrant BC at Market Street
- Alternative 7 with TUDI at Market Street
- Alternative 7 with Quadrant AC at Market Street
- Alternative 7 with Quadrant BC at Market Street
- Alternative 8 with TUDI at Market Street
- Alternative 8 with Quadrant AC at Market Street
- Alternative 8 with Quadrant BC at Market Street

Each alternative was designed to include the Option B interchange at Martin Luther King Jr. Parkway. Designs for each of the alternatives are included in Appendix B.

2.5.5 Additional Build Alternatives Considered

In efforts to minimize impacts to the adjacent community, two additional alternatives were considered, including a raised rail option (at the request of the Wilmington City Council) and a depressed facility option (identified by NCDOT and project engineers).

2.5.5.1 Raised Rail Option

The raised rail option would raise the existing CSX railroad to be bridged over the proposed project, allowing more portions of the proposed project to be constructed near the existing ground level. However, an interchange would still be required at Market Street due to traffic operations. The interchange would bridge the proposed project over Market Street. Raising the railroad and then extending Independence Boulevard would cause significantly more impacts to the railroad and community than would occur with any other alternative. Closing two railroad crossings at Forest Hills Drive and Princess Place Drive, and possibly closing four additional crossings at Mercer Avenue, Henry Street, Clay Street, and North 30th Street, would be disruptive to local traffic and reduce connectivity in residential areas to motorists as well as pedestrians and bicyclists. Elevating 2.8 miles of new railroad track would not only increase relocation impacts and construction cost but would also increase long-term operational and maintenance costs to CSX due to the significant increase in grade.

2.5.5.2 Depressed Facility Option

The depressed facility option would construct the proposed project underground, with the existing roadways being bridged over the proposed project. The depressed facility would include a "tight" cross section with a median barrier and retaining walls on the outside where needed to minimize right-of-way impacts and to minimize the depth and extent to which the proposed project would be below the groundwater table. Structures over the proposed project would include a center pier, which coincides with the median barrier and full height abutment walls on the outside, minimizing span lengths and structural depths of the bridges, to allow for a higher facility profile and less intrusion into the groundwater table. This alternative would include an at-grade intersection with Randall Parkway/Mercer Avenue, include a grade separation under the CSX railroad (which would need to be slightly raised), include a new grade separation south of Darlington Avenue over the proposed project, include an interchange at Market Street, and include grade separations under Princess Place Drive and the northern crossing of the CSX railroad. North of this point, the design would match all other

alternatives, which include a grade separation over Hurst Street and an interchange with Martin Luther King Jr. Parkway. The construction and maintenance of a depressed facility includes design, constructability, geotechnical, drainage, and maintenance complexities.

2.5.5.3 Summary of Additional Build Alternatives Considered

It was determined that these options are not feasible due to significantly higher costs as shown in Table 2-10. Additional information for the raised rail and depressed facility options can be found in Appendix C.

2.6 Phase III: Detailed Study Alternatives Evaluation

Based on the results of the Qualitative Screening of Alternative Concepts, both the No-Build and Build alternative concepts were carried forward to the Conceptual Design Alternative Evaluation. The No-Build Alternative will be given full consideration in this DEIS to provide a baseline for comparison with the build alternatives. The results of the Conceptual Design Alternative Evaluation identified nine alternatives (three alignments with three Market Street interchange options for each alignment), as well as a specified interchange configuration at Martin Luther King Jr. Parkway to be further developed as DSAs within the next phase. **During Phase III, the design year was updated to 2040 to better align with the projected timing of the proposed project.**

Table 2-10: Initial DSA Impacts and Cost Estimates

Impact Type	Alternative 2 TUDI	Alternative 2 AC	Alternative 2 BC	Alternative 7 TUDI	Alternative 7 AC	Alternative 7 BC	Alternative 8 TUDI	Alternative 8 AC	Alternative 8 BC	Depressed Facility (Jet Grouting Option)	Depressed Facility (Open Excavation Option)	Raised Railroad
Relocations												
Residential												
Owner	65	46	50	69	55	**59**	66	68	63	57	57	102[a]
Tenant	108	110	98	63	60	**49**	60	60	62	39	39	175[a]
Subtotal	**173**	**156**	**148**	**132**	**115**	**108**	**126**	**128**	**125**	**96**	**96**	**277[a]**
Business												
Owner	28	29	28	26	24	**24**	18	22	24	24	24	34[a]
Tenant	15	18	12	17	19	**16**	21	19	18	16	16	[a]
Non-Profit	1	2	1	3	4	**3**	5	5	5	3	3	[a]
Subtotal	**44**	**49**	**41**	**46**	**47**	**43**	**44**	**46**	**47**	**43**	**43**	**34[a]**
TOTAL RELOCATIONS	**217**	**205**	**189**	**178**	**162**	**151**	**170**	**174**	**172**	**139**	**139**	**311[a]**
Right-of-Way	$81,175,000	$82,825,000	$81,100,000	$74,325,000	$78,825,000	$71,725,000	$76,025,000	$79,825,000	$79,975,000	$75,425,000	$75,425,000	$148,610,000[a]
Utilities	$617,000	$362,000	$415,000	$633,000	$452,000	$452,000	$429,000	$452,000	$452,000	$452,000	$452,000	*[a]
Construction	$75,700,000	$74,500,000	$73,700,000	$76,600,000	$73,500,000	$72,800,000	$82,500,000	$80,800,000	$79,600,000	$172,400,000[b]	$138,900,000[b]	$121,700,000[c]
TOTAL COST	**$157,492,000**	**$157,687,000**	**$155,215,000**	**$151,558,000**	**$152,777,000**	**$144,977,000**	**$158,954,000**	**$161,077,000**	**$160,027,000**	**$248,277,000**	**$214,777,000**	**$270,310,000**

[a]Detailed relocation report was not prepared. Aerial photography used to identify business and residential relocations including 29 apartment buildings. Relocation and right-of-way estimated using GIS analysis of parcel data containing appraised building and land values.
[b]Construction costs include well points, sheet pile with tie-backs, construction dewatering, concrete retaining walls, etc. Also includes estimated pump operation and maintenance costs.
[c]Construction cost estimates based on functional design with cost per mile unit rates.

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2.6.1 Traffic Operations Analysis

The traffic forecast used for the traffic operations analyses of the no-build and build alternatives was obtained from the Traffic Forecast Technical Memorandum (NCDOT 2012b). The Traffic Operation Analysis Report (NCDOT 2013) summarizes the capacity analysis findings for the proposed project. The report includes an evaluation of the 2012 and 2040 No-Build Conditions and the 2040 Build Conditions for the nine alternatives. Table 2-11 provides a summary of the findings of the capacity analysis for the 2040 build alternatives.

Table 2-11: 2040 Build Alternatives Traffic Capacity Summary

Alternative	Number of Elements[a]	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
2012 Base Year Conditions	34	1	9	3	5	4	12
2040 No Build Conditions	28	0	1	2	2	5	18
2040 Build Segments Common to All Alternatives	5	0	0	2	3	0	0
2040 Build – Adjacent Segments	17	0	1	4	2	1	9
2040 Alternative 2 Quadrant AC	14	0	8	5	0	0	1
2040 Alternative 2 Quadrant BC	14	0	8	5	0	0	1
2040 Alternative 2 TUDI	11	0	2	7	0	0	2
2040 Alternative 7 Quadrant AC	14	0	8	5	0	0	1
2040 Alternative 7 Quadrant BC	14	0	8	5	0	0	1
2040 Alternative 7 TUDI	11	0	3	6	0	0	2
2040 Alternative 8 Quadrant AC	11	0	4	7	0	0	0
2040 Alternative 8 Quadrant BC	11	0	6	5	0	0	0
2040 Alternative 8 TUDI	13	0	5	7	0	0	1

[a] Elements include basic freeway segments, ramp junctions, weaving segments, multilane segments, signalized intersections, and unsignalized intersections as reported in Tables 15a-15e of the Traffic Operation Analysis Report (NCDOT 2013).

2.6.2 Alternatives Eliminated from Further Consideration

2.6.2.1 Quadrants AC and BC at Market Street Interchange Configuration

The results of the analyses show that alternatives with Quadrants AC and BC at the Market Street interchange configuration provide minimal traffic improvement compared to the other Market Street interchange configurations. Due to the lack of traffic improvement and the number of relocations

associated with these configurations, they were eliminated from further study. These configurations include the following:

- Alternative 2 with Quadrant AC at Market Street
- Alternative 2 with Quadrant BC at Market Street
- Alternative 7 with Quadrant AC at Market Street
- Alternative 7 with Quadrant BC at Market Street
- Alternative 8 with Quadrant AC at Market Street
- Alternative 8 with Quadrant BC at Market Street

2.6.2.2 Alternative 8

Through coordination between NCDOT and the City of Wilmington in the spring of 2017, it was determined Alternative 8 would require the acquisition of the newly developed City of Wilmington Police Firing Range Facility. The facility, located east of 30th Street and south of Hurst Street, was completed in 2019. Therefore, Alternative 8 was eliminated from further study.

2.7 Design Revisions on Remaining Detailed Study Alternatives

With the elimination of Alternative 8 and the quadrant interchanges, the remaining alternatives included Alternative 2 with a TUDI at Market Street and Alternative 7 with a TUDI at Market Street. The alignments for each remained consistent as those described in Section 2.4; however, several design changes were made to further avoid and minimize impacts, as well as to increase connectivity. These design revisions are described in the following sections.

A project flyover video is available on the project's website that details what the project would look like once constructed. The video can be viewed at https://www.ncdot.gov/projects/independence-boulevard/Pages/photos-videos.aspx.

2.7.1 Darlington Avenue Grade Separation

After additional coordination between NCDOT and the City of Wilmington in the fall of 2018, it was determined additional concepts should be prepared at Darlington Avenue and Hurst Street to investigate the feasibility of providing more access and mobility beneath the proposed project for the remaining DSAs. At that time, the preliminary designs for the nine DSAs included an elevated road on fill for the length of the roadway, which did not allow for connectivity beneath Independence Boulevard between North 30th Street and Maides Avenue.

The designs at the time included Darlington Avenue as a right-in/right-out access and Hurst Street as grade-separated with the proposed project. All other areas of design were consistent with the other alternative features, with access as provided below:

- Grade separations over CSX Rail (both crossings)
- At-grade intersection at Randall Parkway/Mercer Avenue and Independence Boulevard
- Grade separation and new interchange with Market Street
- Grade separation (no access) over Princess Place Drive

- New interchange with Martin Luther King Jr. Parkway

To provide more east-west connectivity in this area, a grade separation at both Darlington Avenue and Hurst Street was evaluated consistent with the proposed design criteria as described in Section 2.3.3. This option proposed a grade separation at Independence Boulevard and Darlington Avenue, which would allow through connectivity beneath Independence Boulevard to Mercer Avenue. This allows for an additional ingress/egress point for residents along Darlington Avenue and the portion of Covil Avenue that would remain open that are bound by the CSX railroad. Without connection to Mercer Avenue, the only egress point would be Market Street.

2.7.2 Bridging from Market Street to Hurst Street

As stated in Section 2.7.1, additional concepts were developed for the areas near Darlington Avenue and Hurst Street. Original designs did not provide for connectivity beneath the proposed project between North 30th Street and Maides Avenue. It was determined that due to the number of proposed bridges between the interchange at Market Street and Hurst Street that the entire length of the roadway from Market Street to just past Hurst Street would be elevated.

2.7.3 Narrowing of Typical Section and Right-of-Way

At this stage in project design, the roadway design criteria called for a median-divided freeway with a design speed of 55 mph. The median width, consistent with NCDOT standards for that type of facility, was proposed to be 46 feet wide.

Based on efforts to reduce impacts associated with the proposed project, NCDOT investigated the potential to reduce both the roadway design type (from freeway to boulevard) and the proposed speed limit. This reduction would make the proposed roadway more consistent with existing Independence Boulevard and US 74.

The design typical section was also modified to allow for a narrow raised median section that could transition onto the median barrier-separated single structure bridges proposed for the roadway over the railroad, Darlington Avenue, and the long bridge spanning Market Street, Princess Place Drive, the second railroad crossing, and Hurst Street.

2.7.4 Single Point Urban Interchange

In addition to the TUDI configuration, it was determined an SPUI should also be evaluated for the Market Street interchange to further reduce impacts to the surrounding communities. An SPUI is used to improve traffic capacity and operations while requiring less right-of-way than the diamond interchange (FHWA 2010). The configuration of a typical SPUI is shown on Figure 2-9. The turning movements of the major road ramps and all the movements of the minor road are executed in one central area that is either on the overpass or underpass. Since an SPUI has one signalized intersection, it allows for a simpler phasing sequence for signal control.

Figure 2-9: Typical SPUI Configuration

The SPUI alternatives would include the proposed project being grade separated over Market Street with ramps connecting to Market Street. The ramp terminals at Market Street would be approximately 110 feet apart and would include signalized intersections. To preserve the traffic operations of the interchange, a median island along Market Street would be included in the design. In addition, controlled access along Market Street outside the ramp terminals would be required. The additional controlled access would vary from 20 feet at the narrowest point to 80 feet at the widest.

2.7.5 Revised Design Criteria

Roadway design criteria for the remaining DSAs were updated in 2020 and are listed in Table 2-12. The criteria were developed based on the following design standards and considered the proposed project's functional classification and design speed:

- AASHTO – A Policy on Geometric Design of Highways and Streets, 2018 Edition
- NCDOT – Roadway Design Manual 2002, as amended

Table 2-12: Roadway Design Criteria

Design Element	Roadway	Design Criteria
Functional Classification	Independence Boulevard Randall Parkway Market Street Princess Place Hurst Avenue Martin Luther King Jr. Parkway	Urban Principal Arterial Urban Minor Arterial Urban Principal Arterial Major Collector Local Street Freeway
Design Speed	Independence Boulevard Ramps/Flyovers Loops Randall Parkway Market Street Martin Luther King Jr. Parkway Minor Cross Streets	55 mph 50 mph 30 mph 40 mph 45 mph 60 mph In accordance with functional classification
Right-of-Way Width	All Construction	Variable to maintain construction and maintenance
Lane Width	Independence Boulevard Ramp – single lane Loop – single lane Cross Street	12 ft 16 ft 20 ft 12 ft (desirable)
Shoulder Width	Independence Boulevard Ramp Loop	12 ft outside (10 paved)/6 ft inside (4 paved) 14 ft outside (10 paved)/12 ft inside (4 paved) 12 ft outside (4 paved)
Median Width	Independence Boulevard Randall Parkway Market Street Martin Luther King Jr. Parkway	23 ft varies 23 ft 30 ft (existing)
Vertical Grades	—	In accordance with AASHTO design standards based on level terrain in urban area
Superelevation Rate[a]	Roadways Bridges	e_{max} = 8 percent e_{max} = 6 percent
Vertical Clearance	—	Railroad – 23 ft Local Roads – 15 ft

[a] Superelevation rate (emax) is the maximum slope from one side of a highway to the other on a curve.

2.8 Traffic Operations Analysis

An updated traffic forecast used for the traffic operations analyses of the no-build and build conditions was obtained from the Traffic Forecast Technical Memorandum (NCDOT 2017b). The Traffic Capacity Analysis (NCDOT 2018a) summarizes the capacity analysis findings for the proposed project. The report includes an evaluation of the 2017 and 2040 no-build conditions and the 2040 build conditions for the four alternatives listed below.

Remaining DSAs:

- Alternative 2 with TUDI at Market Street
- Alternative 2 with SPUI at Market Street
- Alternative 7 with TUDI at Market Street
- Alternative 7 with SPUI at Market Street

A summary of the LOS results for the basic freeway segments, freeway merges and diverges, isolated ramp roadways, freeway weaving segments, and unsignalized and signalized intersections for all 2040 build alternatives are included in Table 2-13 through Table 2-21, and the LOS results are shown on Figure 2-10 through Figure 2-17.

2.8.1 Alternative 2 with TUDI at Market Street

All intersections analyzed within the study area would perform at LOS D or better, and/or with a v/c ratio of 0.85 or better, for both peak hours. Recommended storage lengths are additional storage that are required beyond the proposed design storage. In general, the provided storage lengths in the proposed design for the intersections within the study area would adequately handle queues.

2.8.2 Alternative 2 with SPUI at Market Street

All intersections analyzed within the study area would perform at LOS D or better, and/or with a v/c ratio of 0.85 or better, for both peak hours. Recommended storage lengths are additional storage that are required beyond the proposed design storage. In general, the provided storage lengths in the proposed design for the intersections within the study area would adequately handle queues.

2.8.3 Alternative 7 with TUDI at Market Street

All intersections analyzed within the study area would perform at LOS D or better, and/or with a v/c ratio of 0.85 or better, for both peak hours. Recommended storage lengths are additional storage that are required beyond the proposed design storage. In general, the provided storage lengths in the proposed design for the intersections within the study area would adequately handle queues.

2.8.4 Alternative 7 with SPUI at Market Street

All intersections analyzed within the study area would perform at LOS D or better, and/or with a v/c ratio of 0.85 or better, for both peak hours. Recommended storage lengths are additional storage that are required beyond the proposed design storage. In general, the provided storage lengths in the proposed design for the intersections within the study area would adequately handle queues.

Table 2-13: 2040 Common to Build Alternatives – Highway Capacity Software LOS

ID [a]	Segment	a.m. Peak Level of Service or v/c Ratio [b]	p.m. Peak Level of Service or v/c Ratio [b]
	Basic Freeway Segments		
101	Independence Boulevard Northbound - within US 17 Business Intersection	B	C
102	Independence Boulevard Southbound - within US 17 Business Intersection	C	B
103	Independence Boulevard Northbound - from US 17 Business to US 74	C	D
104	US 74 WB from Independence Boulevard to 23rd Street	C	B
105	US 74 EB within Independence Boulevard Intersection	A	B
106	US 74 WB within Independence Boulevard Intersection	B	A
	Ramps and Ramp Junctions		
201	Independence Boulevard Northbound - to US 17 Business (Isolated Diverge – v/c ratio reported)	0.43	0.50
202	Independence Boulevard Southbound - from US 17 Business (Isolated Diverge – v/c ratio reported)	0.46	0.41
203	Independence Boulevard Northbound - From US 17 Business	B	C
204	Independence Boulevard Northbound - to US 74 WB (Isolated Diverge – v/c ratio reported)	0.62	0.55
205	Independence Boulevard Southbound - from US 74 EB (Isolated Diverge – v/c ratio reported)	0.24	0.27
206	Independence Boulevard Northbound - to US 74 EB (Isolated Diverge – v/c ratio reported)	0.29	0.42
207	US 74 WB - from Independence Boulevard Northbound	B	B
	Weaving Segments		
301	Independence Boulevard Southbound from US 74 to US 17 Business	C	C
302	US 74 EB from North 23rd Street to Independence Boulevard	B	C
303	US 74 EB from Independence Boulevard to Kerr Avenue	B	C
304	US 74 WB from Kerr Avenue to Independence Boulevard	C	B
	Multilane Segments		
401	Independence Boulevard - South of US 17 Business Northbound	C	B
401	Independence Boulevard - South of US 17 Business Southbound	B	C

[a] Refer to Figure 2-10 and Figure 2-11.

[b] The volume-to-capacity (v/c) ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available and vehicles are not expected to experience significant queues and delays for these specific movements.

Table 2-14: 2040 Common to Build Alternatives – At-grade Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
23	Independence Boulevard and Mercer Avenue /Randall Parkway	D	D
	Eastbound Through/Left	F	F
	Eastbound Right	D	D
	Westbound Left	E	E
	Westbound Through/Left	E	F
	Westbound Right	D	E
	Northbound Left	F	E
	Northbound Through	C	C
	Northbound Right	A	A
	Southbound Left	E	F
	Southbound Through/Right	C	C

[a] Refer to Figure 2-12.

Table 2-15: 2040 Common to Build Alternatives – Cul-de-sac on Mercer Avenue Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
23	Independence Boulevard and Mercer Avenue/Randall Parkway	C	C
	Westbound Left	F	F
	Westbound Right	D	E
	Northbound Through	C	C
	Northbound Right	A	A
	Southbound Left	F	F
	Southbound Through	B	A

[a] Refer to Figure 2-12.

Table 2-16: 2040 Common to Build Alternatives – Superstreet Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
23	Independence Boulevard and Mercer Avenue /Randall Parkway	B	B
	Eastbound Right	B	C
	Westbound Right	C	D
	Northbound Left	D	C
	Northbound Through	B	A
	Northbound Right	A	A
	Southbound Left	C	D
	Southbound Through	A	A

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
	Southbound Right	A	A
231	Independence Boulevard U-Turn 800 feet North of Randall Parkway	B	A
	Northbound U-Turn	D	C
	Northbound Through	A	A
	Southbound Through	B	B
232	Independence Boulevard U-Turn 800 feet South of Randall Parkway	A	A
	Northbound Through	A	B
	Southbound U-Turn	D	D
	Southbound Through	A	A

[a] Refer to Figure 2-12.

Table 2-17: 2040 Build At-grade Alternative Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
14	Independence Boulevard at US 17 Business (Market Street)	F	F
	Eastbound Left	F	F
	Eastbound Through	F	F
	Eastbound Right	E	D
	Westbound Left	F	F
	Westbound Through	F	E
	Westbound Right	D	D
	Northbound Left	F	F
	Northbound Through	D	F
	Northbound Right	B	C
	Southbound Left	F	F
	Southbound Through	F	F
	Southbound Right	C	C

[a] Refer to Figure 2-13.

Table 2-18: 2040 Alternative 2 SPUI Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
11	Wayne Drive/30th Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	D
	Eastbound Through/Right	C	C
	Westbound Left	E [b]	E [b]

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
	Westbound Through	B	C
	Westbound Right	A	B
	Northbound Left	E [b]	E [b]
	Northbound Through/Right	D	D
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]
14	Independence Boulevard On-Ramps at Independence Boulevard Off-Ramps	D	C
	Eastbound Left	D	E [b]
	Eastbound Through	D	C
	Eastbound Right	A	B
	Westbound Left	E [b]	D
	Westbound Through	D	C
	Westbound Right	C	C
	Northbound Left	C	D
	Northbound Right	C	D
	Southbound Left	C	D
	Southbound Right	B	A
17	Darlington Avenue/Henry Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	D
	Eastbound Through	C	C
	Eastbound Right	A	A
	Westbound Left	E [b]	E [b]
	Westbound Through/Right	C	C
	Northbound Left	D	E [a]
	Northbound Through/Right	D	D
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]

[a] Refer to Figure 2-14.

[b] The v/c ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available and vehicles are not expected to experience significant queues and delays for these specific movements.

Table 2-19: 2040 Alternative 2 TUDI Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
11	Wayne Drive/30th Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	D
	Eastbound Through/Right	C	C
	Westbound Left	D	E [b]
	Westbound Through	A	B
	Westbound Right	A	B
	Northbound Left	E [b]	E [b]
	Northbound Through/Right	D	D
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]
17	Darlington Avenue/Henry Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	E [b]
	Eastbound Through	C	C
	Eastbound Right	A	A
	Westbound Left	E [b]	E [b]
	Westbound Through/Right	C	B
	Northbound Left	D	E [b]
	Northbound Through/Right	D	E [b]
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]
141	Southbound Independence Boulevard at US 17 (Market Street)	C	C
	Eastbound Through	B	B
	Eastbound Right	B	C
	Westbound Left	D	D
	Westbound Through	A	A
	Southbound Left	D	D
	Southbound Right	D	D
142	Northbound Independence Boulevard at US 17 Business (Market Street)	B	C
	Eastbound Left	E [b]	E [b]
	Eastbound Through	A	B
	Westbound Through	A	B
	Westbound Right	B	B
	Northbound Left	D	D
	Northbound Right	D	D

[a] Refer to Figure 2-15.

[b] The v/c ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available and vehicles are not expected to experience significant queues and delays for these specific movements.

Table 2-20: 2040 Alternative 7 SPUI Intersection LOS

ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
11	Wayne Drive/30th Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	D
	Eastbound Through/Right	C	C
	Westbound Left	E [b]	E [b]
	Westbound Through	B	C
	Westbound Right	A	B
	Northbound Left/	E [b]	E [b]
	Northbound Through/Right	D	D
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]
14	Independence Boulevard On-Ramps at Independence Boulevard Off-Ramps	D	D
	Eastbound Left	D	C
	Eastbound Through	D	C
	Eastbound Right	A	A
	Westbound Left	E [b]	D
	Westbound Through	D	D
	Westbound Right	C	D
	Northbound Left	C	D
	Northbound Right	C	D
	Southbound Left	C	D
	Southbound Right	B	A
17	Darlington Avenue/Henry Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	E [b]
	Eastbound Through	C	C
	Eastbound Right	A	A
	Westbound Left	E	E [b]
	Westbound Through/Right	C	B
	Northbound Left	D	E[1]
	Northbound Through/Right	D	D
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]

[a] Refer to Figure 2-16.

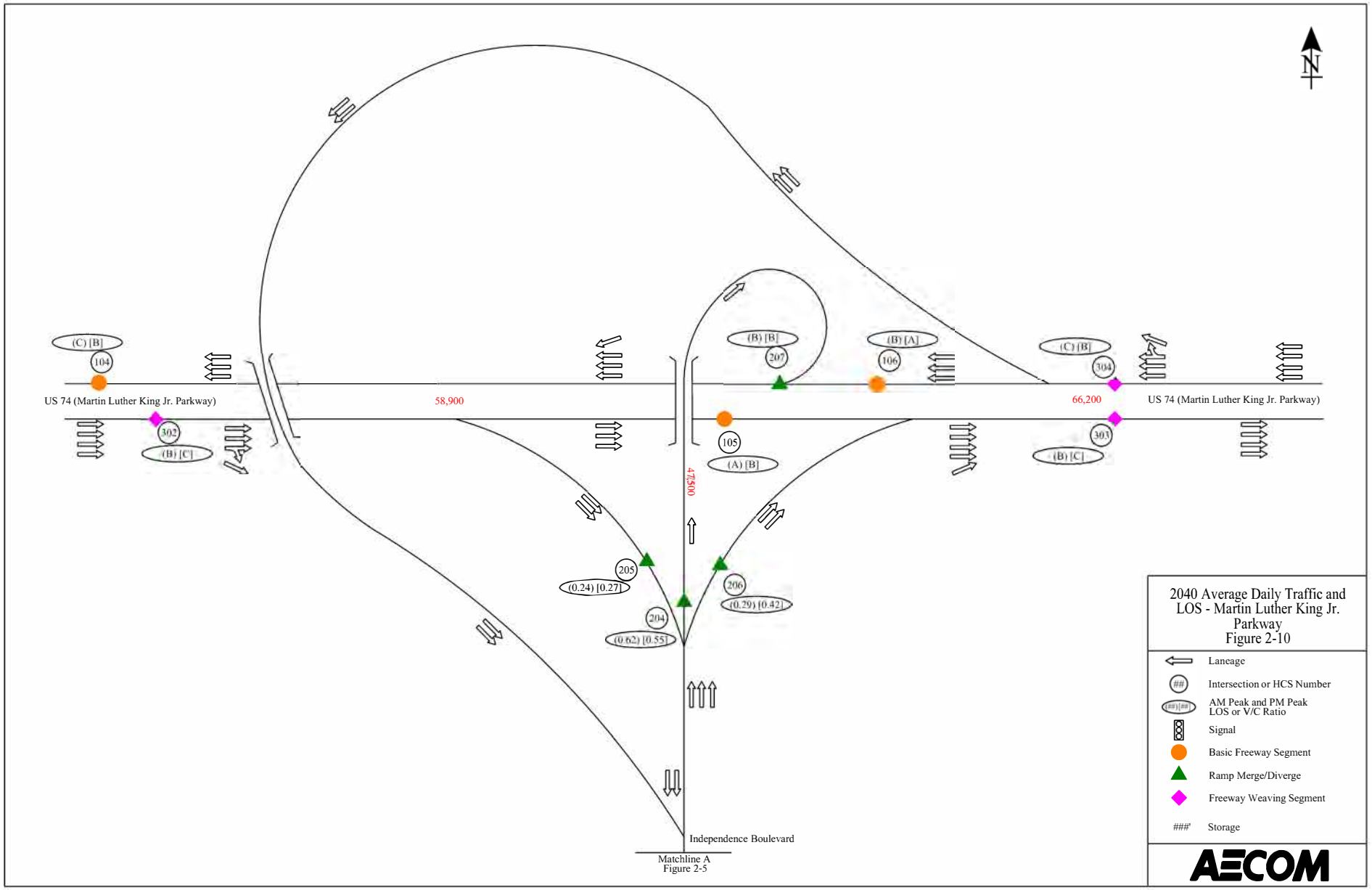
[b] The v/c ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available and vehicles are not expected to experience significant queues and delays for these specific movements.

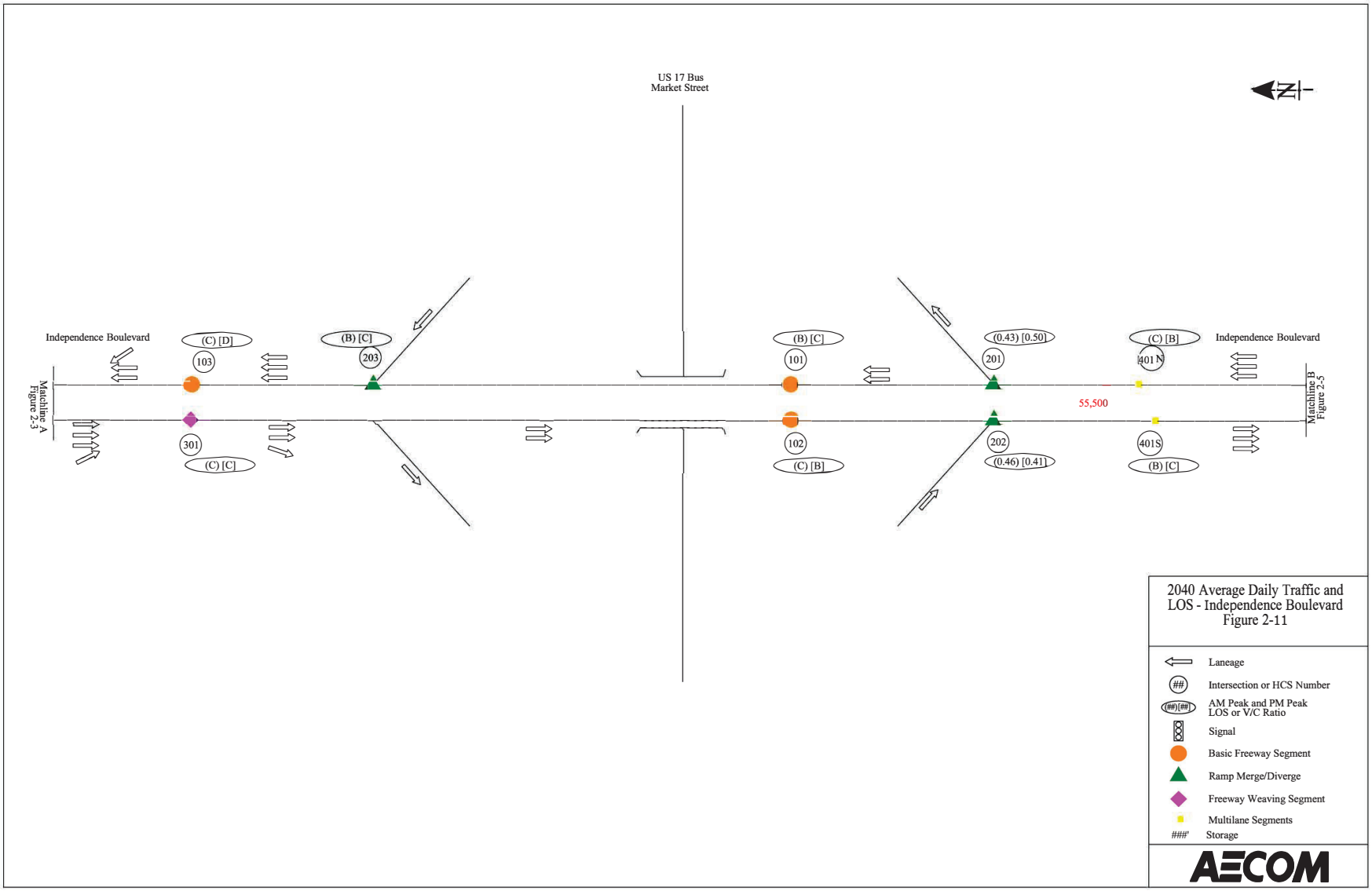
Table 2-21: 2040 Alternative 7 TUDI Intersection LOS

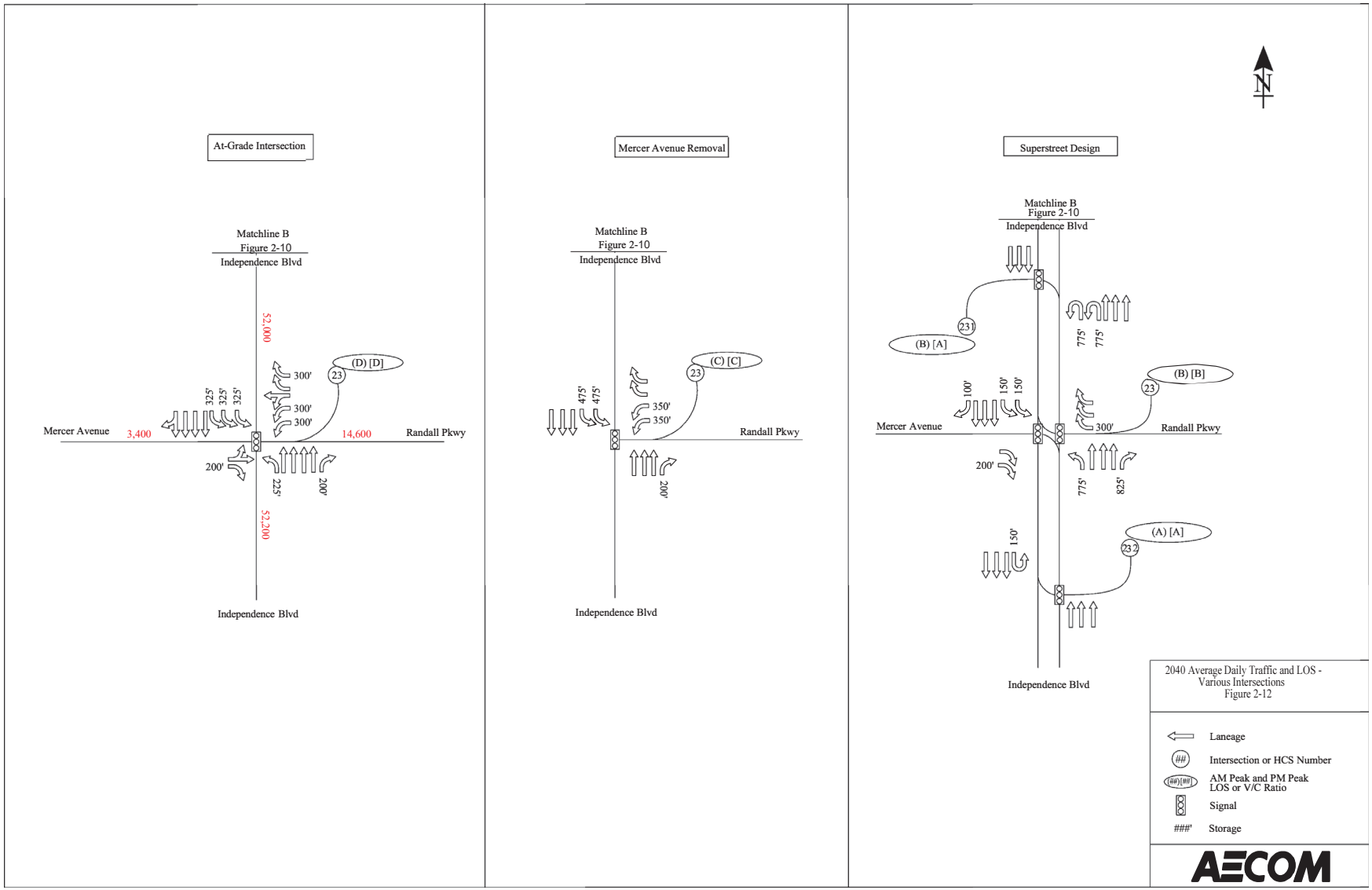
ID [a]	Intersection	a.m. Peak LOS	p.m. Peak LOS
11	Wayne Drive/30th Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	D
	Eastbound Through/Right	C	C
	Westbound Left	D	E [b]
	Westbound Through	A	B
	Westbound Right	A	B
	Northbound Left	E [b]	E [b]
	Northbound Through/Right	D	D
	Southbound Left	E	E [b]
	Southbound Through/Right	E [b]	E [b]
17	Darlington Avenue/Henry Street at US 17 Business (Market Street)	C	C
	Eastbound Left	E [b]	E [b]
	Eastbound Through	C	C
	Eastbound Right	A	A
	Westbound Left	E [b]	E [b]
	Westbound Through/Right	C	B
	Northbound Left	D	E [b]
	Northbound Through/Right	D	D
	Southbound Left	E [b]	E [b]
	Southbound Through/Right	E [b]	E [b]
141	Southbound Independence Boulevard at US 17 (Market Street)	C	C
	Eastbound Through	B	B
	Eastbound Right	B	C
	Westbound Left	D	D
	Westbound Through	A	A
	Southbound Left	D	D
	Southbound Right	D	D
142	Northbound Independence Boulevard at US 17 (Market Street)	B	C
	Eastbound Left	E [b]	E [b]
	Eastbound Through	A	A
	Westbound Through	A	B
	Westbound Right	B	B
	Northbound Left	D	D
	Northbound Right	D	D

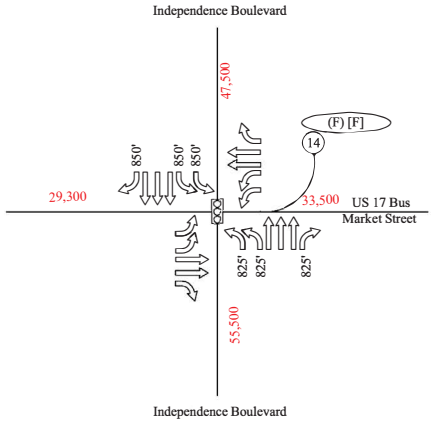
[a] Refer to Figure 2-17.

[b] The v/c ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available and vehicles are not expected to experience significant queues and delays for these specific movements.


N
(C) [B]
104
US 74 (Martin Luther King Jr. Parkway)
302
(B) [C]
58,900
(B) [B]
207
(B) [A]
106
(C) [B]
304
66,200
US 74 (Martin Luther King Jr. Parkway)
303
(B) [C]
105
(A) [B]
47,500
205
(0.24) [0.27]
206
(0.29) [0.42]
204
(0.62) [0.55]
Independence Boulevard
Matchline A
Figure 2-5
2040 Average Daily Traffic and LOS - Martin Luther King Jr. Parkway
Figure 2-10
Laneage
Intersection or HCS Number
AM Peak and PM Peak LOS or V/C Ratio
Signal
Basic Freeway Segment
Ramp Merge/Diverge
Freeway Weaving Segment
Storage
AECOM


US 17 Bus
Market Street
N
Independence Boulevard
(C) [D]
103
(B) [C]
203
(B) [C]
101
(0.43) [0.50]
201
(C) [B]
401N
Independence Boulevard
Matchline A
Figure 2-3
55,500
Matchline B
Figure 2-5
301
(C) [C]
102
(C) [B]
202
(0.46) [0.41]
401S
(B) [C]
2040 Average Daily Traffic and
LOS - Independence Boulevard
Figure 2-11
Laneage
Intersection or HCS Number
AM Peak and PM Peak
LOS or V/C Ratio
Signal
Basic Freeway Segment
Ramp Merge/Diverge
Freeway Weaving Segment
Multilane Segments
Storage
AECOM


At-Grade Intersection
Matchline B
Figure 2-10
Independence Blvd
52,000
(D) [D]
23
300'
300'
300'
325'
325'
325'
Mercer Avenue
3,400
14,600
Randall Pkwy
200'
225'
200'
52,200
Independence Blvd
Mercer Avenue Removal
Matchline B
Figure 2-10
Independence Blvd
(C) [C]
23
475'
475'
350'
350'
Randall Pkwy
200'
Independence Blvd
Superstreet Design
Matchline B
Figure 2-10
Independence Blvd
23
(B) [A]
775'
775'
(B) [B]
23
100'
150'
150'
Mercer Avenue
300'
Randall Pkwy
200'
775'
825'
150'
(A) [A]
23
Independence Blvd
N
2040 Average Daily Traffic and LOS -
Various Intersections
Figure 2-12
Laneage
Intersection or HCS Number
(##)[##] AM Peak and PM Peak
LOS or V/C Ratio
Signal
###' Storage
AECOM



2040 Average Daily
Traffic and LOS - Independence Boulevard
and Market Street Intersection
Figure 2-13

Laneage

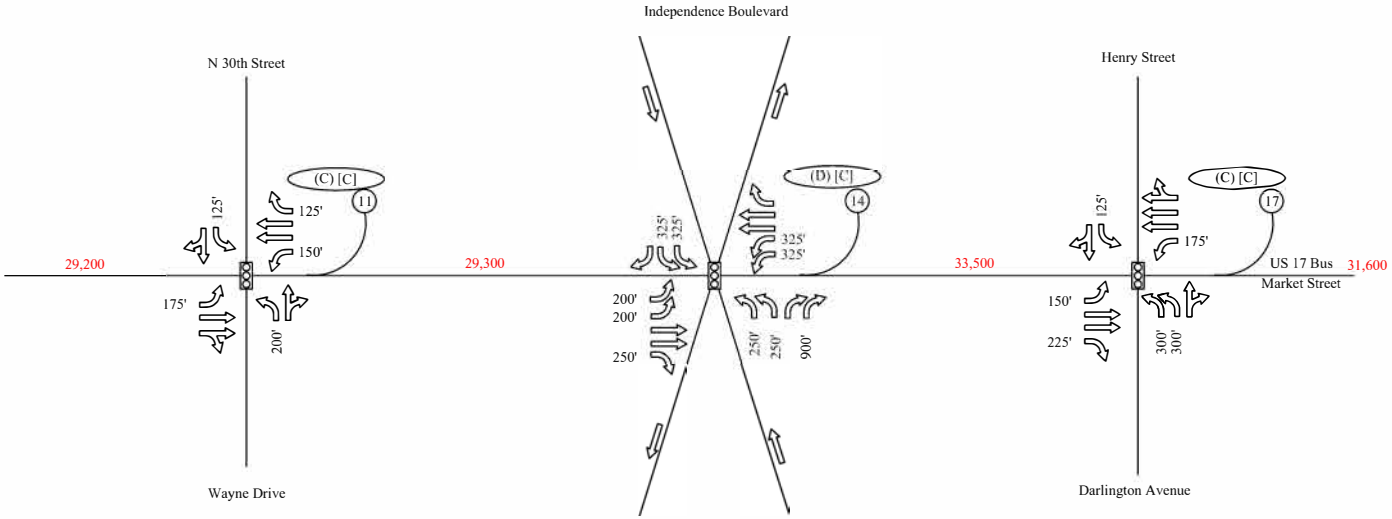
(##) Intersection or HCS Number

(##)[##] AM Peak and PM Peak LOS or V/C Ratio

Signal

###' Storage

AECOM



2040 Alternative 2 SPUI
Average Daily Traffic and
LOS
Figure 2-14

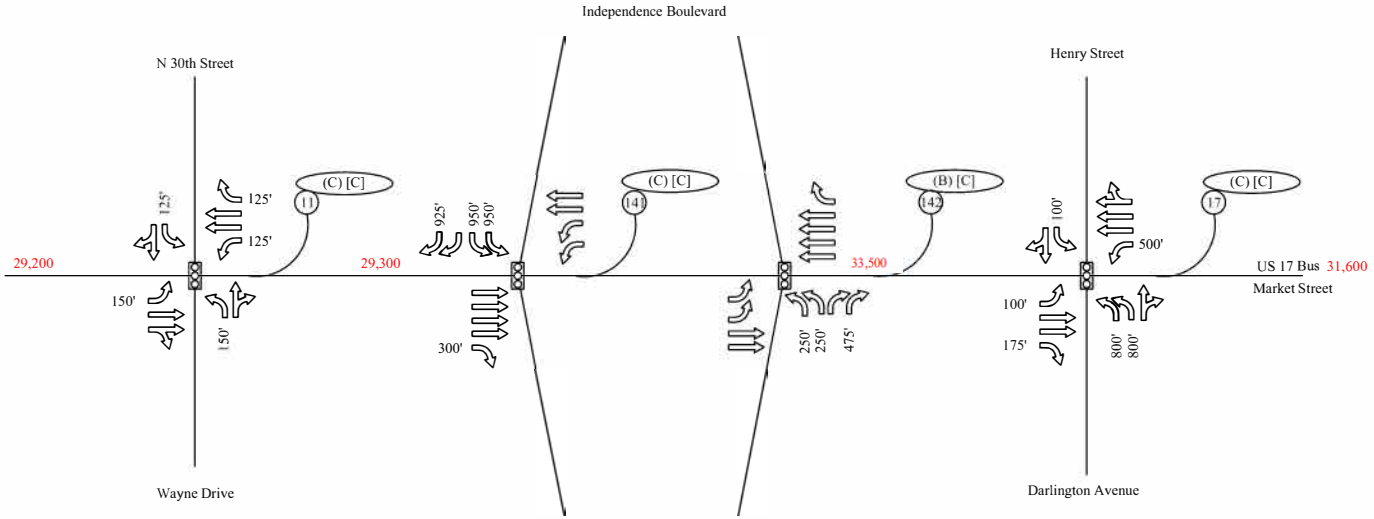
Intersection or HCS Number

(##)(##) AM Peak and PM Peak LOS or V/C Ratio

Signal

###' Storage

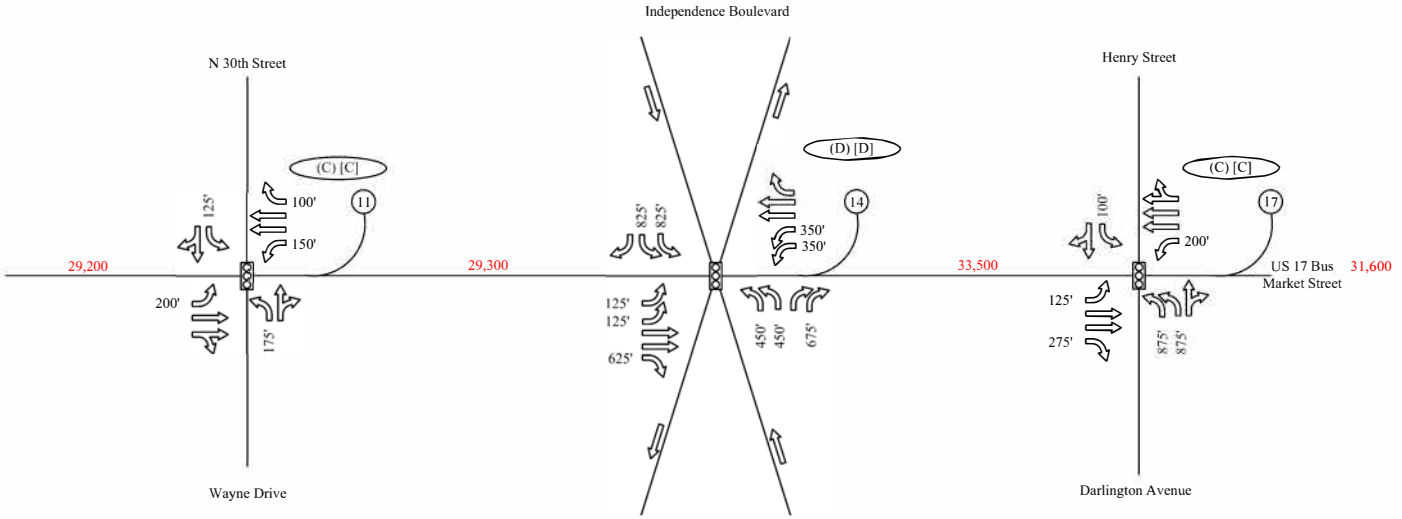
AECOM



2040 Alternative 2 TUDI
Average Daily Traffic
and LOS
Figure 2-15

##	Intersection or HCS Number
(##)[##]	AM Peak and PM Peak LOS or V/C Ratio
	Signal
###'	Storage

AECOM



2040 Alternative 7 SPUI
Average Daily Traffic
and LOS
Figure 2-16

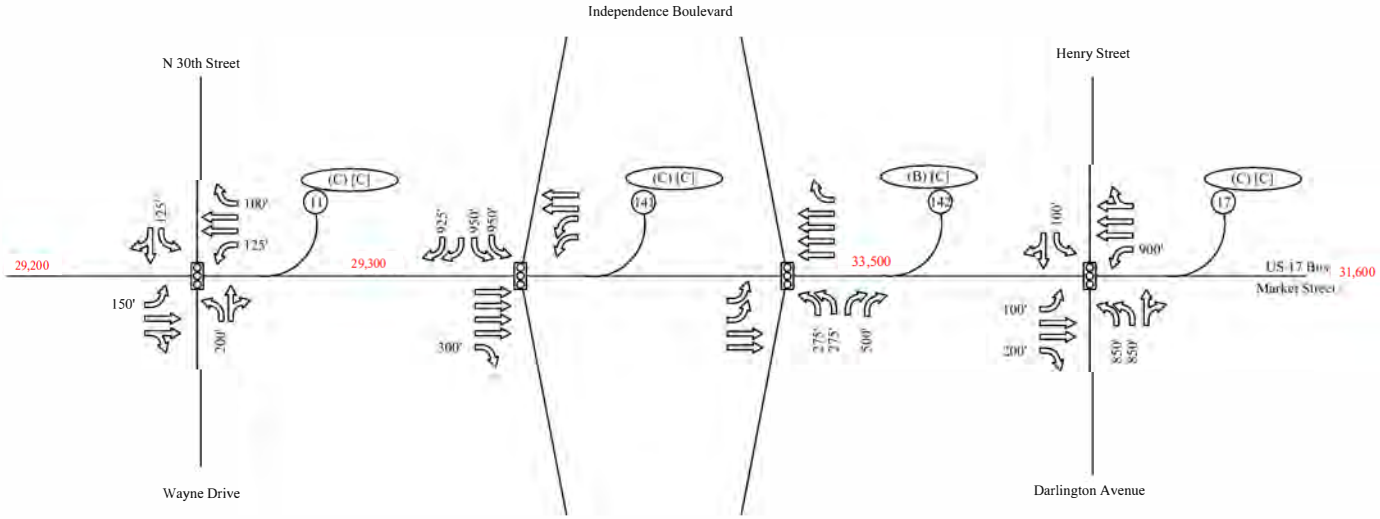
(##) Intersection or HCS Number

(##)/(##) AM Peak and PM Peak LOS or V/C Ratio

Signal

###' Storage

AECOM



2040 Alternative 7 TUDI
Average Daily Traffic
and LOS
Figure 2-17

##	Intersection or HCS Number
(##)[##]	AM Peak and PM Peak LOS or V/C Ratio
	Signal
###'	Storage

AECOM

2.9 Current Detailed Study Alternatives

In 2018, NCDOT developed preliminary impact calculations for Alternatives 2 and 7 and the TUDI and SPUI Options. These are shown in Table 2-22. The interchange at Martin Luther King Jr. Parkway was excluded from analysis as the impacts at this location would be the same across all alternatives.

Based upon these impacts, NCDOT eliminated Alternative 2 from further consideration.

The current DSAs being evaluated within this DEIS are Alternative 7 with a SPUI at Market Street (SPUI Option) and Alternative 7 with a TUDI at Market Street (TUDI Option).

Table 2-22: Preliminary Impact Calculations for Alternatives 2 and 7

Feature	Alternative 2 TUDI	Alternative 2 SPUI	Alternative 7 TUDI	Alternative 7 SPUI
Length (miles)	1.7	1.7	1.7	1.7
Delineated wetland impacts (acres)	1.32	1.32	1.24	1.24
Delineated stream impacts (linear feet)	392.24	392.24	370.01	370.01
Delineated pond impacts (acres)	0	0	0	0
Relocations				
Residential	90	77	74	66
Business	35	32	34	30
Non-profit	1	1	1	1
Federal/State Threatened Endangered Species Habitat Present	Yes	Yes	Yes	Yes
Natural Heritage Program SNHA, Managed Areas and Wetland Mitigations Sites (acres)	0	0	0	0
Prime Farmlands/Farmlands of Statewide Importance (acres)	0	0	0	0
Forest (acres)	75.06	74.77	74.90	74.29
100-year Floodplain and Floodway Impacts (acres)	2.07	2.07	1.70	1.70
Historic Properties (number)	0	0	0	0
Recorded Archaeological Sites (number)	0	0	0	0
Wildlife Refuge/Gamelands (acres)	0	0	0	0
Recreational Areas/Parks (number)	1	1	1	1

Feature	Alternative 2 TUDI	Alternative 2 SPUI	Alternative 7 TUDI	Alternative 7 SPUI
High Quality Waters (Outstanding Water Resource, Water Supply Protected or Critical Areas) (acres)	0	0	0	0
Public Water Supply Wells (100-foot Buffer) (number)	0	0	0	0
Cemeteries (number)	0	0	0	0
Churches (number)	2	2	2	2
Potential Underground Storage Tank/ Hazmat Sites (number)	2	2	2	2
Total Cost	**$257,331,600.00**	**$247,147,300.00**	**$193,361,100.00**	**$192,236,800.00**

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3 Environmental Resources and Impacts

This chapter describes the existing human, physical, cultural, and natural environments of the study area that could be affected by the proposed project. The inventory and evaluation of the existing environment presented in this chapter provides the necessary baseline from which to assess and document the potential impacts of the DSAs. The potential environmental consequences of the proposed project are discussed at the end of each subsection.

3.1 Human Environment

On January 20, 2025, President Trump signed Executive Order (EO) 14148 – *Initial Rescissions of Harmful Executive Orders and Actions* and EO 14154 – *Unleashing American Energy*. The EOs revoked EO 13990 – *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis* (January 20, 2021) and EO 14008 – *Tackling the Climate Crisis at Home and Abroad* (January 27, 2021). Subsequently on January 29, 2025, Secretary Duffy signed a Memorandum for Secretarial Offices and Heads of Operating Administrations – *Implementation of Executive Orders Addressing Energy, Climate Change, Diversity, and Gender*. On February 25, 2025, the Council on Environmental Quality (CEQ) published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, FHWA will not include greenhouse gas emissions and climate change analyses in the federal environmental review process. Any purported greenhouse gas emissions and climate change impacts will not be considered in the federal decision. Accordingly, no greenhouse gas emissions or climate change analyses are included in this DEIS.

The January 20, 2025 EOs also revoked EO 14096 – *Revitalizing Our Nation's Commitment to Environmental Justice for All* (April 21, 2023). Subsequently on January 21, 2025, President Trump signed EO 14173 – *Ending Illegal Discrimination and Restoring Merit-Based Opportunity*. This EO revoked EO 12898 – *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994). On February 25, 2025, the CEQ published an Interim Final Rule removing the CEQ's NEPA implementing regulations, effective April 11, 2025 (90 Fed. Reg. 10610). As a result of these actions, all federal environmental justice requirements are revoked and no longer apply to the federal environmental review process. FHWA, Federal Transit Administration, and Federal Railroad Administration's Joint NEPA regulations (23 Code of Federal Regulations [CFR] part 771) and the agencies Interim Final Guidance on *Section 139 Environmental Review Process: Efficient Environmental Reviews for Project Decision-making and One Federal Decision* (December 17, 2024) do not require an environmental justice analysis. Accordingly, no analysis of environmental justice is included in this DEIS. Any purported environmental justice impacts will not be considered in the federal decision. Social,

economic, and community impacts will continue to be disclosed where applicable in accordance with 23 CFR 771.

Characteristics of the human environment within the study area were examined and reported in the U-4434 Community Impact Assessment (NCDOT 2019f), the U-4434 Community Impact Assessment Update Memo (NCDOT 2022a), and the U-4434 Land Use Scenario Assessment (LUSA) (NCDOT 2019g). Impacts to resources are calculated based using right-of-way impacts (project footprint) or slope stake limits plus a 25-foot buffer.

FHWA and NCDOT recognize that cumulative effects were defined in the CEQ regulations. However, the CEQ regulations are being rescinded. Thus, these reports should be viewed in the context of the definition of effects provided in the February 19, 2025 *Memorandum for Heads of Federal Departments and Agencies* with the subject: *Implementation of the National Environmental Policy Act.* The subject memorandum defines effects as reasonably and foreseeable effects of the proposed action consistent with Section 102 of NEPA, which does not employ the term "cumulative effects, " NEPA instead requires consideration of "reasonably foreseeable" effects, regardless of whether or not those effects might be characterized as "cumulative." Title VI of the Civil Rights Act of 1964 states that "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." As part of this project, a demographic assessment has been performed to identify populations that are protected under Title VI.

The evaluation of impacts within this section adhere to DOT Order 2100.7 (DOT 2025).

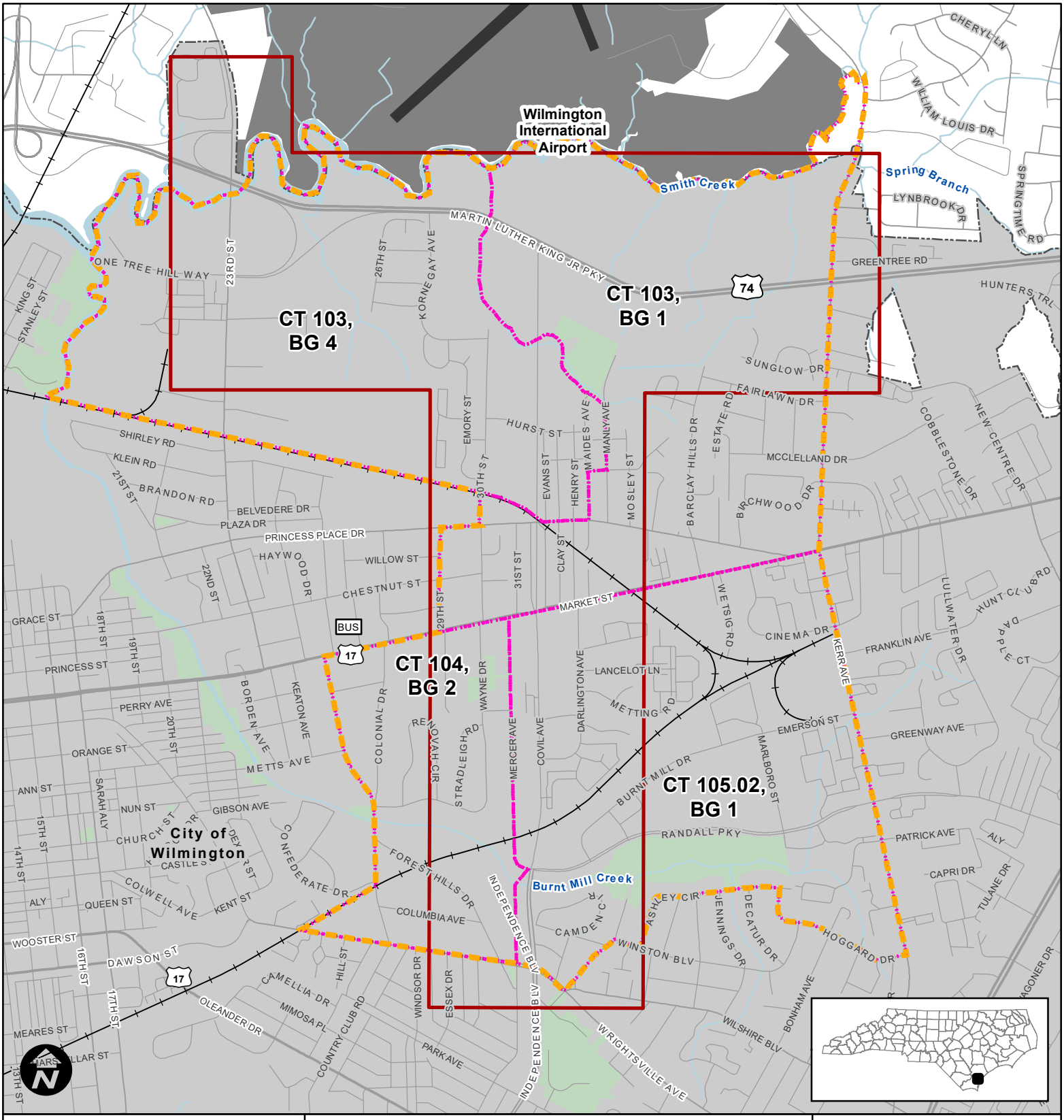
3.1.1 Population Characteristics

Community-based demographic data were gathered from the 2020 US Census (US Census Bureau 2022) and the 2015-2019 ACS 5-year estimates (US Census Bureau 2020). The demographic study area is based on the 2011 Community Characteristics Report - Environmental Justice Addendum (NCDOT 2014a) and includes all Census Block Groups within the study area (Figure 3-1). Note that the 2011 Community Characteristics Report – Environmental Justice Addendum was prepared and finalized under a prior regulatory regime and does not reflect recent changes in regulatory or Executive Order requirements. Block groups that were partially located within the study area were only included if they contained residential land uses within the portion that fell inside the study area and/or if it was determined that the population would likely be subjected to direct impacts.

3.1.1.1 Population Growth

The City of Wilmington is the most populated municipality in New Hanover County and North Carolina's largest coastal city. Within the demographic study area, ACS data show a notable population increase of 48.6 percent between 2005 and 2019, an annualized increase of 4.0 percent during that time. By comparison, New Hanover County and the City of Wilmington both grew by an annualized rate of 1.9 percent during the same time period. Two Block Groups, Census Tract 103, Block Group 4 and Census Tract 105.02, Block Group 1, grew especially fast with annualized growth rates of 5.1 and 6.1 percent, respectively, between 2009 and 2019. Both of these Block Groups are located east of the project.

Census Tract 103, Block Group 4 contains several moderately priced single-family neighborhoods that may be absorbing some of Wilmington's population growth, including families moving to the City. Census Tract 105.02, Block Group 1 contains many new apartment complexes that have been completed over the past 15 years that likely account for its growth.



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Railroad
- Stream
- Study Area
- Demographic Study Area
- Census Tract (CT), Block Group (BG)
- Park
- Municipal Boundary
- County Boundary

Figure 3-1
Demographic Study Area

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

3.1.1.2 Race/Ethnic Composition

The race/ethnic composition of the demographic study area and New Hanover County are compared in Table 3-1.

Table 3-1: Population by Race/Ethnicity

Race	Population in Demographic Study Area	Percentage in Demographic Study Area	Population in New Hanover County	Percentage in New Hanover County
White	5,508	51.7%	184,851	81.1%
Black or African American	4,828	45.3%	31,337	13.7%
American Indian and Alaska Native Alone	0	0.0%	577	0.3%
Asian	46	0.4%	3,012	1.3%
Native Hawaiian/Pacific Islander	15	0.1%	199	0.1%
Other Race	25	0.2%	2,870	1.3%
Two or More Races	226	2.3%	5,092	2.2%
Total	10,648	100%	227,938	100%
Total Hispanic	364	3.4%	12,657	5.6%

Source: US Census Bureau, American Community Survey 5-year Estimates (2015-2019), Table B03002, "Hispanic or Latino Origin by Race."

3.1.1.3 Limited English Proficiency

For many individuals living in the United States, English is not their primary language. Individuals with a limited ability to read, write, speak, or understand English are considered to be limited English proficient (LEP).

Census data do not indicate LEP populations meeting the United States Department of Justice LEP Safe Harbor threshold, but do indicate an Asian/Pacific language-speaking population exceeding 50 persons within the demographic study area that may require language assistance. This population is in the southeastern portion of the study area. Field visits were unable to determine the exact location of this population. The Safe Harbor threshold for LEP is 5 percent or 1,000 people, whichever is less, of the population that is eligible to receive written translation services for the project.

3.1.2 Economic Characteristics

3.1.2.1 Business and Employment

According to the Cape Fear Moving Forward 2045 MTP (WMPO 2020), the number of jobs in the Wilmington Urban Area is expected to increase 51 percent between 2020 and 2045, an average annualized growth rate of 4.7 percent. According to the North Carolina Department of Commerce, the top five non-governmental employers are the New Hanover Regional Medical Center/Cape Fear Hospital, Thermo Fisher Scientific, Wal-Mart Stores, Mastec, and Celico Partnership (NC Department of Commerce 2022).

The unemployment rate of the Wilmington Metropolitan Statistical Area was 3.1 percent in March 2022 and 4.1 percent in March 2021, according to the US Bureau of Labor Statistics (2022). New Hanover County's unemployment rate matched the Metropolitan Statistical Area in March 2022 at 3.1 percent and was higher in March 2021 at 5.4 percent. ACS data measure employment based upon whether a person is 16 years and older and had not worked in the past 12 months. Based on this, in 2019 the unemployment rate for the demographic study area was 6.5 percent, while percentages for New Hanover County for the same period were 5.0 percent. This shows that the demographic study area has a higher unemployment rate than New Hanover County.

The Burnt Mill Business Park is located in the southern portion of the study area at the intersection of Covil Avenue and Randall Parkway. The business park currently holds 16 office buildings with an additional 15,500 square foot office building planned (Nunn 2021). Market Street is a major retail and business corridor. Within the study area, Market Street has hotels, restaurants, home improvement businesses, and car dealerships. Several businesses along Princess Place Drive are also within the project footprint. These businesses include a daycare, a sound studio, and an auto repair garage.

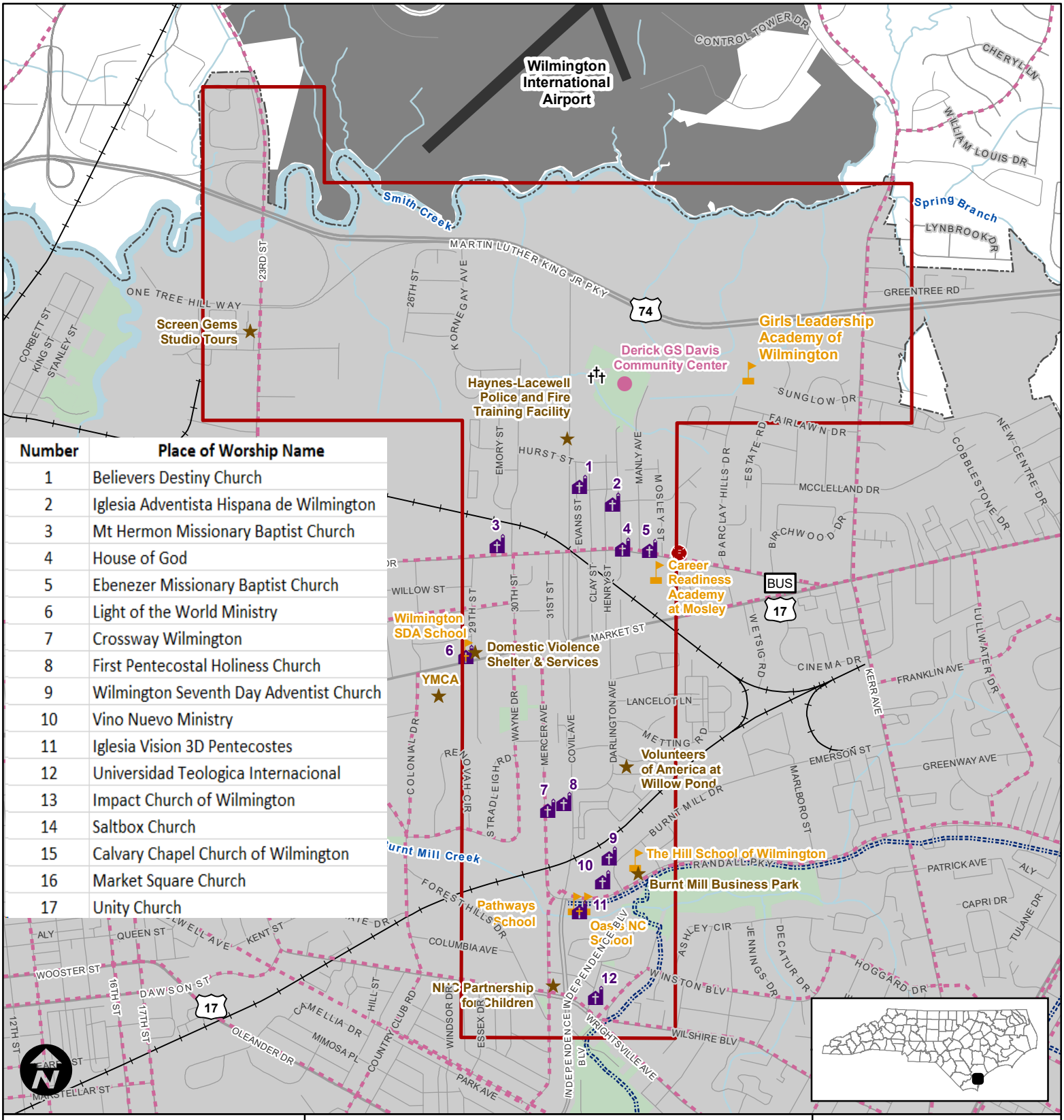
3.1.3 Community Facilities and Services

Community facilities and services within the study area are shown on Figure 3-2.

3.1.3.1 Affected Environment

Community Centers

As shown on Figure 3-2, only one community center is located within the study area. The Derick G.S. Davis Community Center is located in Maides Park at 1101 Manly Avenue. The community center has two multi-purpose rooms, an arts and crafts room, a full service kitchen, and a computer room. Maides Park is also where the only cemetery within the study area is located. The Maides Park Cemetery contains the graves of James and Matilda Maides (after whom the park is named), as well as an undetermined number of other graves. The Haynes-Lacewell Police and Fire Training Facility was constructed in 2019 on Hurst Street, just to the west of the proposed project footprint.



Number	Place of Worship Name
1	Believers Destiny Church
2	Iglesia Adventista Hispana de Wilmington
3	Mt Hermon Missionary Baptist Church
4	House of God
5	Ebenezer Missionary Baptist Church
6	Light of the World Ministry
7	Crossway Wilmington
8	First Pentecostal Holiness Church
9	Wilmington Seventh Day Adventist Church
10	Vino Nuevo Ministry
11	Iglesia Vision 3D Pentecostes
12	Universidad Teologica Internacional
13	Impact Church of Wilmington
14	Saltbox Church
15	Calvary Chapel Church of Wilmington
16	Market Square Church
17	Unity Church

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Cemetery
- Place of Worship
- School
- Fire Station
- Community Center
- Other Notable Feature
- Bike Route
- Cross-City Trail
- Railroad
- Stream
- Study Area
- Park
- Municipal Boundary
- County Boundary

Figure 3-2
Community Facilities

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

Parks and Recreational Facilities

There are no state or national parks or forests within the study area. There are six local parks within the study area (Figure 3-2). Maides Park, located north of Princess Place Drive along Manly Avenue, is a neighborhood park owned and operated by the City of Wilmington. The park went through extensive renovations and had a grand re-opening in May 2009. Park amenities include picnic shelters, grills, basketball courts and athletic fields with lights, walking trails, and a community center that includes a full-service kitchen, multi-purpose rooms, space for arts and crafts, and a computer lab. Other notable features within Maides Park include the Maides Park Cemetery and a stream.

In addition to Maides Park, the City of Wilmington operates Beaumont Park, located between Wayne Drive and Mercer Avenue just south of Market Street. Beaumont Park is a neighborhood park, approximately 3 acres in size and contains a playground, picnic areas, and basketball courts.

McCrary Park is located at the intersection of Randall Parkway and Marlboro Street, northeast of Colonial Village. Park amenities include shelters, picnic tables, a canoe/kayak launch, and fishing. A segment of the Cross-City Trail is located north of the park along Randall Parkway.

Mother's Park, a neighborhood park, is in the Colonial Park neighborhood. It includes playground equipment, tables, and benches.

Triangle Park and Empie Park are in the southern portion of the study area. Triangle Park is a triangular 0.5-acre parcel bounded by Wrightsville Avenue to the north and Forest Hills Drive to the south and east. There are no facilities within the park. The Cross-City Trail traverses the park. Empie Park is owned and operated by the City of Wilmington. It includes playgrounds, tennis courts, open space, picnic shelters, a concession stand, basketball courts, athletic fields, lighted facilities, and a dog park.

These parks are publicly owned resources, owned by the City of Wilmington, and are potential Section 4(f) resources (discussed further in Chapter 4). Maides Park would be accessible by the proposed project via the multi-use path. None of the other parks have access to, or from, the proposed project.

Cemeteries and Churches

Several churches are located within the study area, including two within the proposed project footprint. One of the churches would be relocated with either alternative option, the Iglesia Vision 3D Trinidad Divina Pentecostes and their theological education center, Universidad Teologica Internacional. The Iglesia Vision 3D Trinidad Divina Pentecostes and Universidad Teologica Internacional consist of two buildings on a single parcel that are owned and operated by the Iglesia Vision 3D Trinidad Divina Pentecostes parish. The second church, Vino Nuevo Ministry, would be relocated with the TUDI Option only. The Iglesia Vision 3D Trinidad Divina Pentecostes is located at 359 Mercer Avenue and operates the Universidad Teologica Internacional located at 340 Covil Avenue . The two buildings share a parcel and a driveway that extends from Mercer Avenue to Covil Avenue. The second church within the proposed project footprint is Vino Nuevo Ministry located at 3021 Market Street. The relocation report is located in Appendix D.

A memo detailing outreach efforts to the two churches is located in Appendix E.

Other churches within the study area include the following:

- Mount Hermon Missionary Baptist Church (504 Evans Street)
- House of God Church (443 Maides Avenue)
- Ebenezer Missionary Baptist Church (2929 Princess Place Drive)
- Light of the World Ministry (3601 Princess Place Drive)
- Crossway Wilmington (3701 Princess Place Drive)
- Wilmington Seventh Day Adventist Church (2833 Market Street)
- Saltbox Church (3233 Burnt Mill Drive #1)
- Unity Church (717 Orchard Avenue)
- Market Square Church (3110 Randall Parkway)
- Impact Church of Wilmington (3131 Randall Parkway)
- Calvary Chapel of Wilmington (3201 Randall Parkway)
- First Pentecostal Holiness Church (2901 Chestnut St)
- Iglesia Adventista Hispana de Wilmington (1134 North Kerr Avenue)
- Believers Destiny Church (1217 North Kerr Avenue)
- Vino Nuevo Ministry (3021 Market Street)

A small family cemetery (Maides Park Cemetery) is located in Maides Park; however, it is outside of the proposed project footprint.

Schools

There are several schools within the study area; two are located within the proposed project footprint. Oasis NC (3114 Randall Parkway) is a 501(c)3 non-profit organization providing academic and social instructional services that benefit individuals with autism, attention deficit/hyperactivity disorder, anxiety, and other learning differences. Pathways Middle and High School (3110 Randall Parkway) is a private Christian school associated with the Market Square Church.

The schools present within the study area are shown on Figure 3-2 and include:

- Wilmington Adventist School (2833 Market Street) is a private Christian school that serves kindergarten through 8th grade.
- Career Readiness Academy (CRA) at Mosley (3702 Princess Place Drive) – The CRA at Mosley is part of the New Hanover County School System, and has grades 9 through 12. The school's curriculum is designed to increase student achievement and graduation rates, provide relevant job skills and credentials to students, and increase sustainable partnerships with the local business community.
- The Hill School of Wilmington (3333 Jaeckle Drive, Suite 140) – The Hill School is located in the Burnt Mill Office Park in the southern portion of the study area and has grades 1 through 8. The Hill School offers half-day academic programs for students with learning disabilities and attention deficit/hyperactivity disorder.
- The Girls Leadership Academy of Wilmington campus (4100 Sunglow Drive) is an all-girls public charter school currently serving grades 6 through 9. The school focuses on rigorous

college preparatory education and the personal life skills necessary for a successful college experience leading to graduation.

Local school transportaton officials noted there are three schools within 0.4 mile of the project and indicated 169 buses traverse the study area on a daily basis. Students attending nearby schools travel to school by bus or car.

Police, Fire, and Emergency Services

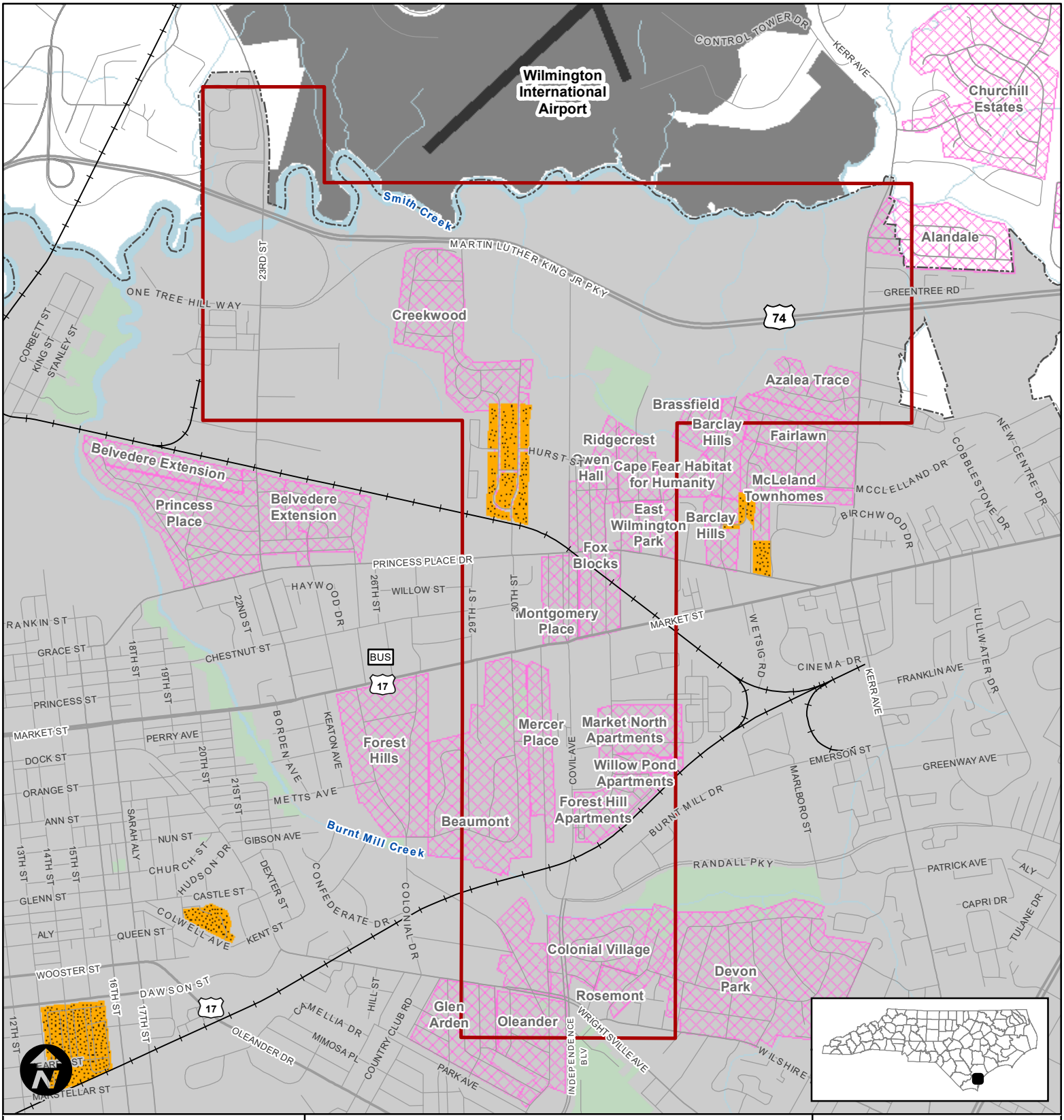
Police service in the study area is provided by the Wilmington Police Department and the New Hanover County Sheriff's Department. The Wilmington Police Department's headquarter is at 615 Bess Street, west of the study area in downtown Wilmington. The New Hanover County Sheriff's office is downtown at 316 Princess Street.

Fire services are provided by the Wilmington Fire Department, and within the study area, they are specifically provided by Fire Station 3 located at 114 Cinema Drive.

Overall emergency medical services (EMS) services are provided by New Hanover County EMS Emergency Management and 911 Communications, which is located at 230 Government Center Drive. The EMS Manager noted that the Market Street corridor is a major artery for EMS response vehicles.

Neighborhoods and Community Cohesion

There are several well-established neighborhoods throughout the study area. The neighborhoods span various socioeconomic strata and include developments along Princess Place Drive as well as the neighborhoods of East Wilmington, Creekwood, and Forest Hills (Figure 3-3). There are a number of indicators of community cohesion in the study area. During site visits in 2019, 2021, 2022, and 2023, visible community interactions and pedestrian activity were observed, particularly in the neighborhoods to the north of Market Street along Montgomery Avenue. City of Wilmington city planners indicated neighborhoods within the study area have a high occupancy rate partially due to a mix of price points, varied densities, and proximity to goods and services. In addition, while many of the businesses on Market Street draw customers from outside the study area, some businesses, such as the CVS, likely serve the local neighborhoods. The presence of community cohesion can also be derived from the number of churches in the study area, particularly the number of churches in the vicinity of the proposed project on Princess Place Drive. It's reasonable to assume that these churches draw many of their parishoners from neighborhoods surrounding the proposed project.



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Railroad
- Stream
- Study Area
- Neighborhoods
- Wilmington Housing Authority Property
- Park
- Municipal Boundary
- County Boundary
- Municipal Boundary

Figure 3-3
Neighborhoods and Housing

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

3.1.3.2 Impacts

Community Centers

The proposed project would have no impact to community centers. The Derick G.S. Davis Community Center within Maides Park is outside of the proposed project footprint and would not be directly impacted by the proposed project, nor are any of the facilities expected to have their access altered.

Parks and Recreational Facilities

The proposed project is not anticipated to impact the use of any of the parks in the study area. The proposed greenway along the east side of the roadway connects the Cross-City Trail at Randall Parkway to Maides Park. In order to make the connection, minor impacts are anticipated; however, the impacts anticipated include minor ground disturbance and would not impact the use of the park. Additional details regarding the Section 4(f) eligibility are discussed in Chapter 4.

Cemeteries and Churches

Two churches within the proposed project footprint could be impacted as a result of the proposed project. One of the churches would be relocated with either alternative option, the Iglesia Vision 3D Trinidad Divina Pentecostes and their theological education center, Universidad Teologica Internacional. The Iglesia Vision 3D Trinidad Divina Pentecostes and Universidad Teologica Internacional consist of two buildings on a single parcel that are owned and operated by the Iglesia Vision 3D Trinidad Divina Pentecostes parish. The second church, Vino Nuevo Ministry, would be relocated with the TUDI Option only. The Iglesia Vision Trinidad Divina Pentecostes and Vino Nuevo Ministry are churches that serve the local community. For Iglesia Vision Trinidad Divina Pentecostes and Vino Nuevo Ministry, if the congregants live near the church and walk or bicycle to church then the church not being relocated near its current location would be an adverse affect on the local community. Both churches may have difficulty in finding nearby land to relocate as available land is scarce within the immediate area around the churches.

Direct impacts to the remaining churches within the study area are not anticipated.

Schools

The two schools located within the proposed project footprint would incur minor impacts to driveway access, but are not anticipated to be relocated. These two schools are located at the beginning of the project at the existing intersection of Independence Boulevard and Randall Parkway. Increases in noise are possible, but could be mitigated through the construction of noise walls. The other schools present in the study area would not be impacted by the proposed project.

Police, Fire, and Emergency Services

Construction of the Haynes-Lacewell Police and Fire Training Facility was completed in 2019 immediately adjacent to the proposed project footprint; however, it would not be directly impacted and would not have its access altered upon completion of the proposed project.

The proposed project would likely have an overall positive effect on police, fire, and other safety operations in the study area due to increased north-south mobility between Shipyard Boulevard and Martin Luther King Jr. Parkway. The Traffic Forecast Technical Memorandum found that the proposed project would provide relief to 23rd Street and Market Street, which are currently the chosen path for north-south traffic between Martin Luther King Jr. Parkway and Kerr Avenue (NCDOT 2017b).

The New Hanover County Emergency Management and 911 Communications Manager noted that the proposed project would have a high impact to response times if major intersections in the corridor are closed or narrowed to one lane during construction. The corridor is a response artery for EMS response vehicles. Coordination with the City of Wilmington police and fire departments would continue during construction to ensure minimal disruption of emergency services.

Neighborhoods and Community Cohesion

The construction of a thoroughfare on a new location through a residential area that is well-established is likely to impact community cohesion and stability. According to the relocation reports developed in March 2022 (Appendix D), the project would result in 59 residential relocations if the SPUI interchange is selected, and 71 residential relocations if the TUDI interchange is selected (NCDOT 2022b). Under both DSAs, many of the relocations would be in the section that would traverse from Randall Parkway to the CSX railroad that is just north of Princess Place Drive. While the property owners that would have direct impacts from partial or complete acquisitions are protected under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, there would be community cohesion impacts to the residents in the vicinity of the proposed project that remain.

Notably adverse community impacts are anticipated with the proposed project, and these effects appear to affect Title VI populations more than the general population.

Modifications have been incorporated into the project design to alleviate and/or minimize impacts to community cohesion. Preliminary designs for the DSAs did not allow for connectivity beneath Independence Boulevard between North 30th Street and Maides Avenue. To provide more east-west connectivity, a grade separation at both Darlington Avenue and Hurst Street was included in revised designs. The typical section of the roadway, design type, and proposed speed limit for the proposed project were also reduced to minimize impacts.

Several design variations were investigated in an effort to retain the proposed project as an at-grade facility (Section 2.5.5). A request to allow at-grade crossings for the proposed project was made to CSX Transportation during a meeting held on July 12, 2017. In a response dated July 25, 2017, CSX Transportation states, “From an operational and safety standpoint, any at-grade option for the Independence Boulevard extension project is unacceptable.” All agency correspondence and meeting minutes are located in Appendix F.

The proposed project would be elevated on a berm from approximately the intersection of Randall Parkway north to Market Street. While a new connection would be provided to cross via an extension of Darlington Avenue beneath the berm (Figure 3-4), this berm would change the physical makeup of the community and serve as a barrier, particularly if the proposed project includes noise walls along the

roadway. The inclusion of noise walls has not been determined yet and would not be determined until after a final design noise analysis is conducted. Community cohesion impacts are likely to be most acute to the residents who remain on the east side of Covil Avenue and the west side of Mercer Avenue to the south of Market Street, and to the residents whose property would not be purchased along 31st and Evans Streets north of Market Street. However, given that the surrounding area is flat, the introduction of an elevated roadway through established neighborhoods is likely to cause impacts to community cohesion. An elevated roadway providing no access while reducing connectivity would likely reduce housing values within its vicinity.

Figure 3-4: View from Darlington Avenue looking west towards Covil Avenue today (left), and with a rendering of the proposed project (right)

Table 3-2 provides a summary of impacts to community facilities and services.

Table 3-2: Community Facilities and Services Impacts

Community Facilities and Services	Alternative 7 with SPUI Option	Alternative 7 with TUDI Option	Type of Impact
Parks	1	1	Connection of multi-use path to Maides Park, no loss of park use
Places of Worship	1	2	Relocation
Cemeteries	0	0	N/A
Schools	2	2	Driveway access issues, schools to remain in place and in use
Daycares	1	1	Relocation
Libraries	0	0	N/A
Community Centers	0	0	N/A
Greenways	1	1	Extension of Cross-City trail
Fire Stations	0	0	N/A
Hospitals	0	0	N/A

Note: Impacts calculated preliminary design slope stake limits plus a 25-foot buffer.

3.1.3.3 Conclusion and Proposed Community Cohesion Mitigation Measures

Finding comparable housing that is nearby would be challenging in Wilmington, where rents are rising and there is a shortage of housing. Many residents may be forced to move away from the area to find comparable housing. Since 2019, rents and housing prices have been rising at an even faster pace, while incomes have not kept pace with the housing market or current inflation. These current factors are likely to magnify the shortage of housing for the foreseeable future, thus making it even more difficult for relocated residents to relocate into comparable housing within the community.

NCDOT's standard right-of-way process would be used to assist residents and businesses relocated by the proposed project. This would include a real estate appraisal and an offer at current market value of the property at its highest and best use when appraised. NCDOT must:

- Treat all owners and tenants equally
- Fully explain the owner's rights
- Pay just compensation in exchange for property rights
- Furnish relocation advisory assistance

If a residence or business is to be acquired as part of the proposed project, additional assistance in the form of advice and compensation is available. NCDOT would provide assistance on locations of comparable housing and/or commercial establishments, moving procedures, and moving aid. Moving expenses may be paid as part of the process. Additional monetary compensation is available to help homeowners cope with mortgage increases, increased value of comparable homes, and other such expenses. NCDOT cannot require a resident to move unless at least one comparable dwelling is made available to the resident and the resident has been given at least a 90-day notice in writing. A program is also available to assist business owners.

Any tenant who is relocated because of a state transportation project will be offered relocation assistance services to help them find a suitable replacement property, with tenant's eligibility and amount of payment being governed on length of time of occupancy and availability and price of replacement housing in the area. A negotiating/relocation agent will contact any relocatee to explain relocation services and payments, and it is important for all relocatees to know that they are not eligible for relocation assistance benefits until a written offer is made to purchase the real estate presently occupied by an owner or tenant, or until a letter of eligibility is received. Relocatees should not move until they have received written authorization to do so as moving prior to receipt of a written authorization to move could make a potential relocatee ineligible for services. People seeking relocation assistance will be required to certify that they are lawfully present in the United States, and no relocatee will be asked to vacate the property until at least 90 days after they have been given notice of the date by which they should vacate the property. Relocatees are eligible for certain options to cover moving expenses, assistance finding comparable decent, safe, and sanitary housing, as well as possible rent supplements, depending on the amount of rent they currently pay and the rental market in the area. Per federal regulation, as 90-day tenant relocatee (a tenant who has occupied the rental for at least 90 days) may use the full amount of rent supplement offered through the relocation program towards the down payment and incidental expenses for the purchase of a replacement dwelling. Incidental expenses

include the reasonable costs normally paid by the buyer in a housing transaction. These expenses may include a home inspection, title search, recording fees, and other closing costs. Costs may not include prepaid expenses such as real estate taxes and property insurance. Benefits depend on the length of time a tenant has occupied the present rental and are generally unique to each relocatee's situation.

The standard right-of-way process represents the minimum that is provided to relocatees. However, NCDOT is committed to ensuring that adequate compensation and aid are made available for the community and would be working closely with residents and businesses to develop mitigation measures.

NCDOT is committed to the exploration of enhanced relocation efforts. These will be further evaluated as the project progresses. NCDOT will actively explore partnerships to develop affordable housing options within Wilmington for those displaced and who express a desire to remain in the community. Further, NCDOT is committed to exploring enhanced relocation options and efforts and aims to incorporate context-sensitive design and solutions derived from ongoing community engagement efforts into the project design. More specific context-sensitive design and solutions, as identified through future outreach efforts, will be included as greensheet commitments in the Final Environmental Impact Statement (FEIS) and/or the Record of Decision (ROD) for the proposed project. During the development of mitigation measures for the proposed project, NCDOT will also address, after considering input from those effected, the impact the proposed project may have on housing values for those remaining in the community. Additionally, NCDOT will collaborate with local agencies and the City of Wilmington to establish a community working group. This group will play a pivotal role in the development of mitigation measures, including the creation of a neighborhood plan. The working group will consist of members of the community affected by the project in the study area, the City of Wilmington, NCDOT Division 3, NCDOT PicsVIS, the consultant, and FHWA. Recommendations for mitigation measures will be considered during the development of the neighborhood plan. Once the plan is approved by the City of Wilmington, mitigation measures will be implemented by either the City of Wilmington or NCDOT. The neighborhood plan will be completed prior to the finalization of the FEIS.

Noise impacts to the remaining community have been assessed as part of the proposed project and are further discussed in Section 3.3.1.

The proposed project will allow for continued access to jobs and community services. The proposed project would not disrupt bus or transit services and would accommodate pedestrian movements along and across the project as noted through the connection of roadways beneath Independence Boulevard and the addition of sidewalks and a multi-use path.

NCDOT will adhere to its Disadvantaged Business Enterprise (DBE) Program for the construction of the proposed project. The DBE program ensures that disadvantaged businesses have the opportunity to do business with NCDOT. A disadvantaged business is a business that is owned, operated, and controlled by women or minorities and falls below a designated income and net worth threshold. Additionally, the proposed project will also offer the following NCDOT Office of Civil Rights' programs:

- Business Opportunity and Workforce Development – provides supportive services to DBE firms through training, education, one-on-one technical assistance, and other services.
- Minority & Women Business Enterprise Programs – ensures firms that meet eligibility requirements are afforded the maximum opportunity to participate in the performance of contracts financed with state funds.
- On-The-Job Training Program – assists disadvantaged workers in entering the highway construction industry.
- Education Initiatives – programs that are provided in both rural and urban communities that provide learning opportunities in the field of engineering. They provide mentorship throughout elementary, middle, and high school as well as multi-disciplinary internship and training opportunities for college and post graduate students.

Potential mitigation measures, responsible parties, and timing are listed in Table 3-3. Safe Transportation for Every Pedestrian (STEP) measures (https://highways.dot.gov/safety/pedestrian-bicyclist/step) are being assessed for potential inclusion as part of the proposed project as possible mitigation measures. Visuals of potential mitigation measures will be provided at public hearings and small group meetings where public input can be obtained. Preliminary conversations will be scheduled with the City of Wilmington to discuss their commitment to a community plan. Executive leadership at NCDOT has committed to providing resources and funding within their purview. Opportunities for DBE and the On-The-Job Training Program will be included in newsletters and at the public hearing.

NCDOT will continue to acquire input from the public regarding potential mitigaton measures that will be incorporated into the FEIS, ROD, final design outreach workshops, and public meetings conducted throughout the project development process.

A project flyover video is available on the project's website that details what the project would look like once constructed. The video can be viewed at https://www.ncdot.gov/projects/independence-boulevard/Pages/photos-videos.aspx.

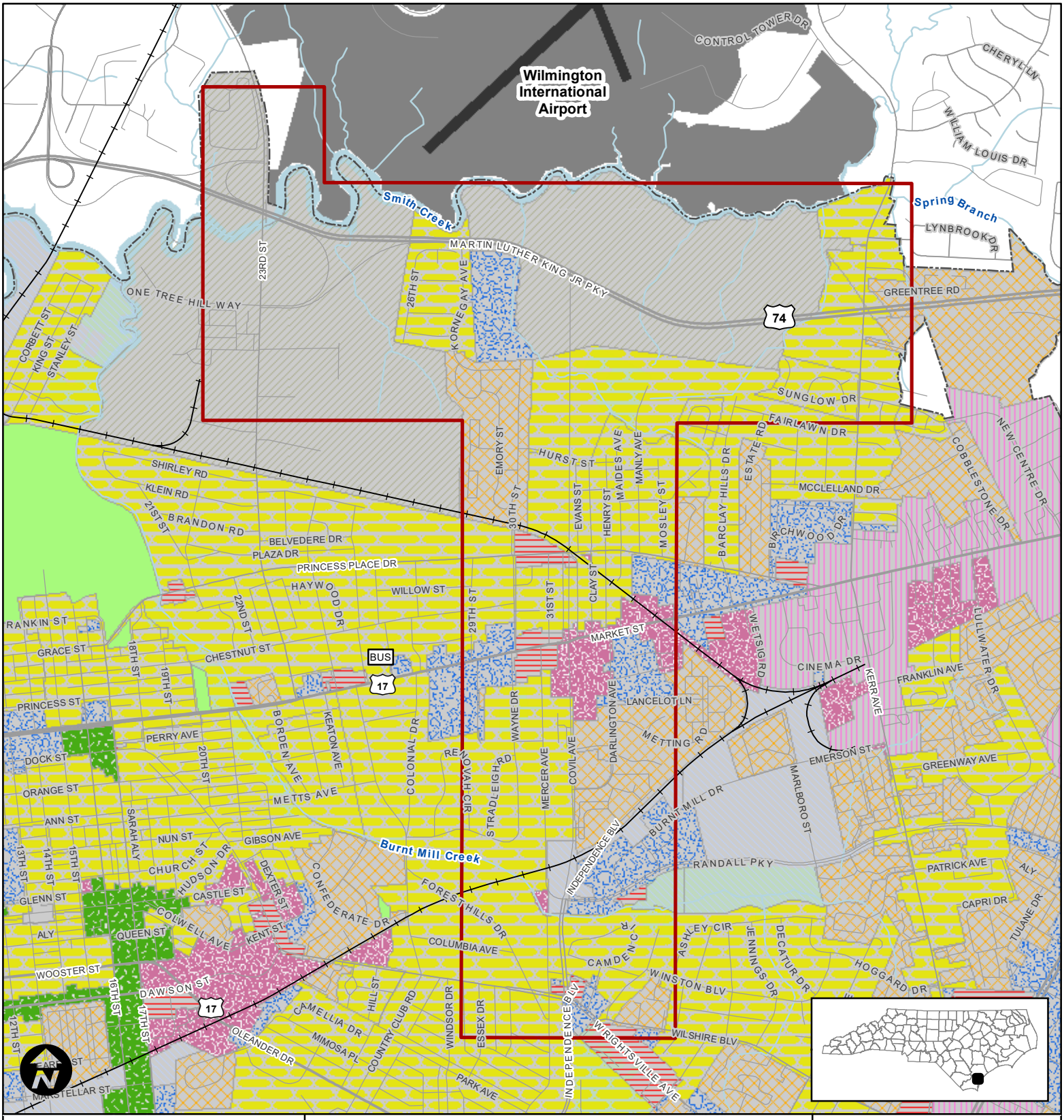
Table 3-3: Potential Impacts and Associated Mitigation Measures

Impact Identified	Potential Mitigation Measure and Comments	Responsible Party / Anticipated Method of Implementation	Tentative Timelines
Safety			
Citizens fear cul-de-sacs and overpasses will increase criminal activity and homeless populations. There is concern that the cul-de-sacs would result in increased crime since there would be no through traffic and law enforcement do not typically patrol dead end streets. There were requests for lighting and fencing to deter homeless from camping out beneath the bridges and accessing private property adjacent to the bridges. There was a preference noted for an alternative that had less openings beneath the bridge (bridge from Market to Hurst Street); citizens fear that crime would increase with the overpasses being so close to homes. Also are concerns from property owners adjacent to the multi-use path. They would like to see some fencing or other amenity to keep people away from their property.	▪ Connect cul-de-sac streets ▪ Incorporation of lighting ▪ Add emergency phones ▪ Implement tall, controlled access measures along end bents of bridges	NCDOT/Design Team: ▪ Small group workshops ▪ Public outreach NCDOT will continue conversations with the community regarding the potential mitigation measures that have been identified. Examples and visualizations will be developed to further community understanding of how each measure may mitigate the impacts to their community. Mitigation measures will be selected during the FEIS and ROD phases of the project and incorporated into final design, as warranted.	Design Phase
Connectivity			
Citizens are concerned that accessibility will be an issue for school buses and emergency service vehicles due to reduced connectivity and ease of access. Citizens feel the road bisects the community and want to ensure that it will remain walkable. They prefer the TUDI Option due to pedestrian accommodations at the intersection with Market Street.	▪ Connect cul-de-sac streets ▪ Add extra sidewalk connections ▪ Consider other enhanced community connectivity options (additional sidewalks on existing streets, additional crosswalks, mid-block crosswalks) ▪ Implement community access and safety improvements (lighting and emergency phones)	NCDOT/Design Team: ▪ Small group workshops ▪ Public outreach NCDOT will continue conversations with the community regarding the potential mitigation measures that have been identified. Examples and visualizations will be developed to further community understanding of how each measure may mitigate the impacts to their community. Mitigation measures will be selected during the FEIS and ROD phases of the project and incorporated into final design, as warranted.	Design Phase
Bridging from Market Street to Hurst Street			
Citizens are opposed to the long bridge from Market Street to Hurst Street. Are concerned that the large overpass area will be a safety issue and will be visually unappealing. Concerns were also raised about the noise of vehicles on the bridge. If the road were at-grade, noise walls could be used to block some of the roadway noise.	▪ Implement tall, controlled access measures along end bents ▪ Use Mechanically Stabilized Earth (MSE) retaining wall ▪ Add a park area or other amenities	NCDOT/Design Team: ▪ Small group workshops ▪ Public outreach NCDOT will continue conversations with the community regarding the potential mitigation measures that have been identified. Examples and visualizations will be developed to further community understanding of how each measure may mitigate the impacts to their community. Mitigation measures will be selected during the FEIS and ROD phases of the project and incorporated into final design, as warranted.	Design Phase

Impact Identified	Potential Mitigation Measure and Comments	Responsible Party / Anticipated Method of Implementation	Tentative Timelines
Relocation and Property Values			
Citizens are very concerned with finding comparable housing in Wilmington. The neighborhood is one of the only affordable areas remaining in the city. Moving out of the city to find affordable housing would be an undue burden and decrease their quality of life. Those not being displaced are concerned their property values will drop significantly.	NCDOT will continue coordination and outreach with impacted residences to identify appropriate mitigation for property impacts and relocations. Early coordination among the City of Wilmington, Wilmington Housing Authority, Wave Transit, and NCDOT relocation assistance staff will occur to identify affordable housing near transit services and pedestrian infrastructure and may be beneficial in minimizing impacts to relocated, low-income residents. NCDOT is committed to exploring enhanced relocation options and efforts.	NCDOT: ▪ Uniform Act provisions and requirements ▪ Housing of Last Resort detailed provisions may be found at 49 CFR 24.404 NCDOT will continue conversations with the community, the City of Wilmington, Wilmington Housing Authority, Wave Transit, and NCDOT relocation assistance staff regarding the potential mitigation measures for relocations and loss of property value. This will begin following the public hearing and continue through the FEIS, ROD, and right of way phases of the project and beyond as necessary.	ROW Acquisition Phase
Community Cohesion			
Citizens are concerned about neighborhood continuity/community cohesion because the neighborhood is well established and many that live there grew up there. If the neighborhood is destroyed, their history is lost.	Development of Working Groups and Community Plan to Discuss Potential: ▪ Lighting and other amenities along sidewalks and multi-use paths ▪ Community improvement options ▪ Community history documentation ▪ Landscaping improvements ▪ Fencing	NCDOT/Design Team: ▪ Small group workshops ▪ Public outreach NCDOT will continue conversations with the community, the City of Wilmington, Wilmington Housing Authority, Wave Transit, and NCDOT relocation assistance staff regarding the potential mitigation measures for relocations and loss of property value. This will begin following the public hearing and continue through the FEIS, ROD, and right of way phases of the project and beyond as necessary.	Design Phase
Other Potential Topics for Discussion			
Construction Noise and Access	▪ Construction Noise and Monitoring Plan ▪ Construction Access Plan ▪ Maintenance of Traffic Plan ▪ Construction Time Restrictions ▪ Construction Outreach and Coordination Plan	NCDOT/Design Team NCDOT will continue conversations with the community regarding noise concerns. Limits on time of construction will be put in place to minimize noise disruption to the extent practicable. Noise abatement measures will be implemented wherever reasonable.	Preconstruction Phase

3.2 Land Use and Transportation Planning

Land use and transportation planning for the study area were studied in the Community Impact Assessment (CIA), CIA Update Memo, and LUSA. Much of the information presented in this section comes from the findings of these assessments (NCDOT 2019f, 2019g, 2022a). The Future Land Use Study Area (FLUSA) is the area surrounding the proposed project that could be indirectly affected by increased development pressure, as shown on Figure 3-5.



Legend

- Railroad
- Stream
- Study Area

Zoning

- Community Business
- Regional Business
- Commercial Services
- Industrial & Light Industrial
- Airport Industrial
- Office & Institutional
- Cemetery
- Urban Mixed Use
- Multi-Family Residential
- Residential R-3 through R-20

Land Use Shown Within Municipal Boundary Only

Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Figure 3-5
Future Land Use Study Area

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

3.2.1 Existing Land Use

Land use within the study area is primarily dense commercial and residential development with some undeveloped lands immediately south of Martin Luther King Jr. Parkway. Commercial development is found at Randall Parkway and along Market Street. Residential development, both single-family and multi-family dwellings, is located throughout the study area.

3.2.2 Zoning Characteristics

The predominant zoning in Wilmington is residential, commercial services, and industrial. According to the City of Wilmington Zoning Map, the vacant land surrounding Martin Luther King Jr. Parkway is zoned as light industry (City of Wilmington 2022). The area within the immediate vicinity of Market Street is zoned commercial services and community business. Within the study area, between Randall Parkway and Market Street, zoning also includes single-family residential, multi-family residential, office and institutional, and light industry (Figure 3-5).

3.2.3 Local Plans and Goals

The entirety of the study area is located within the jurisdiction area for the City of Wilmington.

3.2.3.1 Create Wilmington Comprehensive Plan

The City of Wilmington adopted the Create Wilmington Comprehensive Plan (City of Wilmington 2016) in early 2016. The plan is a series of five documents that include growth factors report, foundations report, policies, and growth strategies maps and report. The plan focuses on growing Wilmington inward and upward by concentrating on infill and redevelopment, job growth, housing options, integrating land uses to reduce traffic congestion, and improve housing, working, and shopping opportunities.

The Covil Avenue and Market Street intersection area was identified as an Urban Mixed-Use Center and encourages moderate to high-density development patterns. Concentrated investment and revitalization are proposed to accommodate walkability, improve vitality, and create a sense of place. The plan further identifies the area around Market Street and Covil Avenue as an area for suburban commercial retrofit, which would seek to encourage infill development in surface parking lots, improve pedestrian movement, and use access management techniques to reduce the number of driveways along corridors.

The Create Wilmington Comprehensive Plan also identifies several roads in the project vicinity as corridors and complete streets. Independence Boulevard and Market Street were designated as major corridors and regional parkways, which would prioritize motor vehicle mobility with some walkable qualities such as buffered sidewalks and crosswalks. Mercer Avenue, 30th Street, Princess Place Drive, and a small southern portion of Darlington Avenue (from Frog Pond Place south to Covil Avenue) were designated as community connectors. Community connectors are used to protect existing residential character and to create transitions from regional-scale roadways (such as major corridors) to neighborhood areas. Finally, Darlington Avenue, from Market Street to Frog Pond Place, is designated as a Main Street, which prioritizes pedestrians and encourages a mixture of land uses.

The Create Wilmington Comprehensive Plan also identifies an opportunity for developing a transit/greenway loop around the city by relocating the freight rail corridor across the Cape Fear River and away from the city. The rail corridor currently passes through the study area twice, just to the north of Randall Parkway and just to the north of Princess Place Drive. In its place, the plan recommends replacing the rail with a trolley line that would loop around the city and would include an adjacent greenway.

3.2.3.2 State Transportation Improvement Program Plans

The Strategic Transportation Investments (STI) law, passed in 2013, allows NCDOT to use its funding more efficiently and encourages thinking from a statewide and regional perspective while working to meet local needs. STI established the Strategic Mobility Formula, which uses data-driven scoring and local input to develop NCDOT's STIP and prioritize projects. The proposed project is included as project number U-4434 in NCDOT's 2024-2033 STIP. STIP projects within 1 mile of the study area are listed in Table 3-4. The general locations of the STIP projects are shown on Figure 3-6.

3.2.3.3 Cape Fear Moving Forward 2045 Metropolitan Transportation Plan

The proposed project is included in the WMPO Cape Fear Moving Forward 2045 MTP (WMPO 2020). The plan calls for a safe, realistic, efficient, and reliable multimodal transportation network that embraces innovation and is environmentally and socially responsible. The plan recommends WMPO complete access management plans for the major corridors within Wilmington. The proposed project is listed in the fiscally constrained roadway project list. The proposed project is ranked #8 of 79.

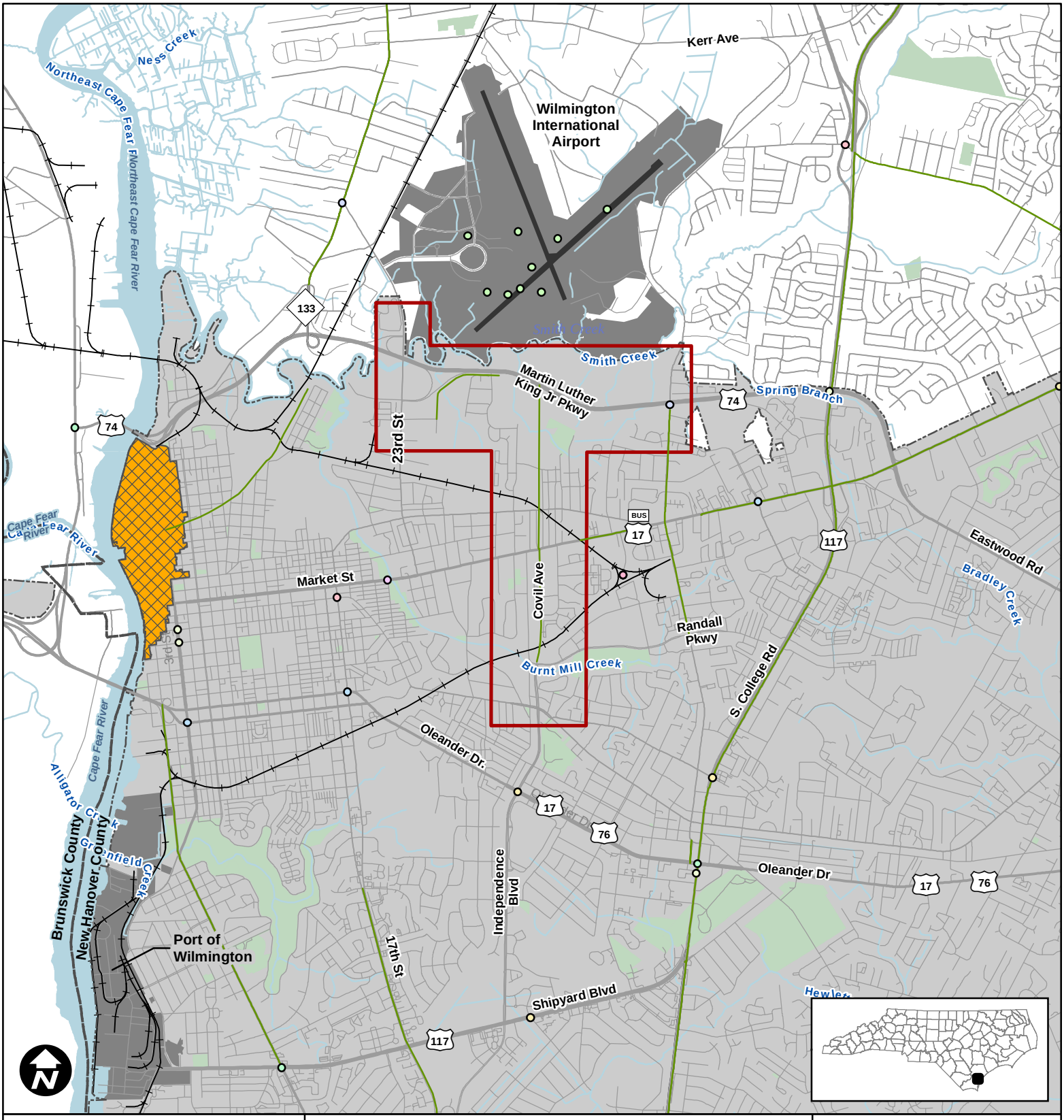
3.2.3.4 Comprehensive Greenway Plan: Wilmington/ New Hanover (2013)

The goal of this plan is to create a framework in which the local governments and its partners can build a network of greenways in Wilmington and New Hanover County. One of the proposed trails is the Independence Boulevard Trail, which is a 1.1-mile trail that connects McCrary Park to Maides Park. Another proposed trail, 17th/ Independence Boulevard Trail, is 4 miles and would connect Greenfield Lake and New Hanover Regional Medical Center to River Road (WMPO 2013).

Table 3-4: Other STIP Projects in the Vicinity of the Study Area

STIP No.	Description	Schedule (Fiscal Year)
U-3338B	Kerr Avenue (SR 1175) widening from Randall Parkway to MLK Jr. Parkway.	Completed in 2019
U-3338C	Kerr Avenue (SR 1175) Interchange at Martin Luther King Jr. Parkway (US 74).	Right-of-way: In progress Construction: 2028
U-4902B	CSX Railroad to Cinema Drive; Jacksonville Street to north of US 117/NC 132 (College Road).	Not funded
BL-0045	Wilmington Rail Trail. Construct multi-use path from 3rd Street in downtown Wilmington to the Love Grove Bridge multi-use path facility.	Not scheduled
P-5740	CSX SE Line Wilmington Beltline Speed Improvement Project	Construction: Underway
P-5740A	Tie and rail rehabilitation, curve realignment, and upgrade rail bridges	Construction: Underway
P-5740B	Improvements to highway grade crossings, close and improve various existing at-grade crossings.	Right-of-way: In progress Construction: 2025
P-5740C	Installation of railroad grade crossing signals and gates at various at-grade crossings.	Construction: Underway
U-5926	23rd Street (SR 1302) to 26th Street; construct route on new location. This is an economic development project for Salvation Army/AAI. Construction is being accomplished Under U-4434.	Right-of-way and Utilities: Underway
U-5863	Castle Hayne Road (NC 133) widening to multi-lanes from Wilmington Bypass (I-140/US 17) to Division Drive (SR 1310).	Not funded
U-5954	Castle Hayne Road (NC 133) at North 23rd Street. Construct a roundabout.	Right-of-way: 2025 Construction: 2027
U-5702A	College Road access management and travel time improvements from New Centre Drive to Shipyard Boulevard (US 117)	Funded for preliminary engineering only
U-5792	Martin Luther King Jr. Parkway (US 74) from US 17 Business (Market Street) to SR 2048 (Gordon Road). Upgrade roadway.	Right-of-way: 2025 Construction: 2028
U-5881	College Road (NC 132) from South of SR 1272 (New Centre Drive) to US 17 Business (Market Street). Upgrade roadway	Funded for preliminary engineering only
EB-6028	Construct signalized pedestrian crossing at US 17 Business (Market Street) and 21st Street	Construction: Underway

Notes: P – Passenger Rail; TD – Public Transportation; U – Urban Projects



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Railroad
- Stream
- Study Area
- Central Business District
- Park
- Municipal Boundary
- County Boundary

STIP Projects

- Regional Highway
- Signalized Pedestrian Crossing (EB-6028)
- Rail (P-5740)
- Highway

Figure 3-6
STIP Projects

Date: December 2024

0 0.25 0.5 1
Miles

1 inch = 4,500 feet

3.2.3.5 Market Street Corridor Study (2010)

The City of Wilmington, New Hanover County, WMPO, and NCDOT collaboratively developed the Market Street Corridor Study for the portion of Market Street between Colonial Drive and Porters Neck Road that was completed in 2010 (City of Wilmington 2010). The integrated study evaluated both land use and transportation for the corridor and outlined a vision for the Market Street Corridor that bisects the study area. One of the main goals of the plan is to strengthen the economic and fiscal impact of commercial development along the Market Street corridor.

The corridor study recommends a grade-separated interchange with connections between Market Street and Independence Boulevard using collector-distributor roads on the existing Wayne Drive and Darlington Avenue alignments. The report states that the entry points onto Independence Boulevard are proposed to operate with right-in/right-out operations, with the provision of adequate acceleration and deceleration lanes onto the freeway. The area along Market Street, adjacent to the project, from a land use perspective is identified as a location that may include significant redevelopment. The Market Street corridor is identified as having a substantial opportunity to inject mixed-use office and commercial buildings.

3.2.3.6 US 17 Corridor Study (2007/2016)

WMPO completed a study in 2007 to evaluate the Market Street corridor based on changes in travel patterns due to the completion of Martin Luther King Jr. Parkway and a portion of I-140 (WMPO 2007). The study's preferred alternative recommended reducing Market Street from four lanes of traffic down to one lane in either direction with a landscaped median, bicycle lanes, and limited on-street parking. In addition, the study recommended reducing the number of intersections with full access down to only the major intersections and to maintain 16th and 17th Streets as a one-way pair. The study noted that the Independence Boulevard Extension project would need to be completed before work can begin on the proposed improvements along Market Street. Improvements in this area are needed in order to remove left turning traffic out of the through lane and to provide a divided median to enhance safety.

The study was updated in 2016 to evaluate and in some cases re-evaluate affected intersections to guide the decision-making process towards action (WMPO 2016b). Based on the results of the analysis, the recommendation of a road reconfiguration was removed due to negative impacts to Market Street. The study noted that additional – as in the original report – connectivity and capacity, similar to what would be provided by the proposed project, is needed in the region to redistribute trips from Market Street before the road reconfiguration would be viable for the proposed limits from 3rd Street to Covil Avenue.

3.2.3.7 Walk Wilmington: Wilmington Pedestrian Plan Update

The City of Wilmington and the WMPO, in collaboration with NCDOT, developed the Walk Wilmington: Wilmington Pedestrian Plan Update (City of Wilmington 2023) to update their 2009 pedestrian plan, Walk Wilmington: A Comprehensive Pedestrian Plan. The updated plan builds on the successes of the previous plan and provides guidance for the area's prioritization of safe, healthy, and equitable pedestrian infrastructure projects, policies, and programs. The study area falls within the plan's Priority

Focus Area F: Market Street. Within the focus area, sidewalks and sidepaths are recommended along Independence Boulevard, Covil Avenue, Montgomery Avenue, Evans Street, and Clay Street. Additionally, pedestrian crossings improvements are recommended at the intersections of Independence Boulevard and Randall Parkway, Covil Avenue and Darlington Avenue, Covil Avenue and Broad Street, Covil Avenue and Market Street, and Montgomery Avenue and Princess Place Drive.

3.2.3.8 Wilmington – New Hanover County Joint Coastal Area Management Plan

The Wilmington – New Hanover County Joint Coastal Area Management Plan (City of Wilmington 2006) was developed to provide protection of coastal areas of environmental concern for the county. As part of the plan, a land use classification system was developed to chart a course of growth, development, and conservation. The land classification map shows the study area for the proposed project crossing mostly urban land uses, with conservation areas along Burnt Mill Creek and Smith Creek and its tributaries. As indicated in this plan update, substantial annexations during the 1990s led to high population growth rates for the City of Wilmington and misleadingly decreased growth rates for New Hanover County. Local planning staff estimated future population growth based on slow, medium, and rapid growth rates, which was used to evaluate the city's development capacity. They estimated that the City of Wilmington would grow anywhere from 0.5 percent to 1.5 percent annually between 2000 and 2020. The 1.5 percent rapid growth rate would lead to a population of 120,727 in 2020. The population of New Hanover County (excluding the City of Wilmington) would grow anywhere from 1.0 percent to 2.25 percent annually in the same time period, with a population of up to 110,917 in 2020.

3.2.4 Available Land

Available land for development was determined to include undeveloped parcels of land (those without building structures) and underutilized parcels. The available land analysis excludes protected lands such as city-owned parks (e.g., Maides Park), transportation right-of-way, rivers, streams, and floodways. Within the FLUSA, 160 acres were excluded from the available land analysis.

There are approximately 529 acres of undeveloped and underutilized land within the FLUSA. Underutilized lands were identified by selecting parcels in which the total value of improvements (i.e., buildings/structures) is less than the value of the parcel (i.e., land) without improvements. Table 3-5 provides a summary of the available land within the FLUSA.

Table 3-5: Summary of Available Land

Area	Acres	Percentage of FLUSA
FLUSA	1,408	100%
Developed land	946	67%
Land available for development: Undeveloped (vacant) and underutilized	529	38%

3.2.5 Development Pressure

The FLUSA is centrally located east of the CBD, west of UNCW, and south of ILM. The proximity of the land within the FLUSA to such points of interest has influenced development patterns. Access to I-40 and the northern section of the Wilmington Bypass (I-140) are present north of the FLUSA. A notable amount of undeveloped and underutilized land is present within and around the FLUSA, particularly at the northern end of the FLUSA.

Notable development has occurred in the Burnt Mill Business Park. Two multi-tenant commercial buildings were completed in 2022 as was an additional commercial building along Jaeckle Drive. The Wilmington Corps of the Salvation Army's "Center of Hope" at 1220 North 30th Street began construction in early 2024.

Over the last 10 years, several new housing developments have been constructed within the FLUSA in the general vicinity of Princess Place Drive. One of the driving forces has been the Wilmington Housing Authority who has been shifting residents from its older, concentrated housing projects to scattered site developments. The Annexe at the Reserve, a luxury apartment complex completed in 2017, is located near the now vacant Market North Apartments (low-income housing). The Cypress Cove Apartments, constructed in 2019, is a low-income housing development just west of Creekwood North. In addition, three large apartment complexes were constructed along Randall Parkway, primarily to provide off-campus housing for UNCW students. The City of Wilmington identified the Grey Commons Apartments at 15 South 29th Street as a planned development within the FLUSA.

3.2.6 Impacts

The City of Wilmington has been aware of the proposed project and has included it in major planning documents that have been developed by the city. The proposed project would likely have positive impacts in terms of encouraging mixed-use type development at the intersection of Covil Avenue and Market Street because access to the intersection would be improved. The proposed project is also consistent with the Create Wilmington Comprehensive Plan in that it would provide additional bicycle and pedestrian connection through the area. This is especially the case with the inclusion of the adjacent mixed-use path, which would run along the proposed project. The mixed-use path also supports the recommendation in the Wilmington-New Hanover County Comprehensive Greenway Plan to construct a greenway connection between McCrary Park and Maides Park (City of Wilmington 2013). It would also address the recommendation for crossing facilities at the current intersection of Covil Avenue and Market Street made in Walk Wilmington: Wilmington Pedestrian Plan Update (City of Wilmington 2023).

3.3 Physical Environment

This section considers the impacts of the DSAs on a variety of other physical characteristics of the study area.

3.3.1 Noise

In accordance with 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise and the 2016 NCDOT Traffic Noise Policy (NCDOT 2016b), each Type I highway project must be analyzed for predicted traffic noise impacts. In general, Type I projects are proposed state or federal highway projects for construction of a highway or interchange on new location, improvements of an existing highway that substantially change the horizontal or vertical alignment or add new through lanes, or projects that involve new construction or substantial alteration of transportation facilities such as weigh stations, rest stops, ride-share lots, or toll plazas.

Traffic noise impacts are determined through implementing the current Traffic Noise Model (TNM) approved by FHWA and following procedures detailed in 23 CFR 772, the 2016 NCDOT Traffic Noise Policy (NCDOT 2016b), and the 2016 NCDOT Traffic Noise Manual (NCDOT 2016a). When traffic noise impacts are predicted, examination and evaluation of alternative noise abatement measures must be considered for reducing or eliminating these impacts. Construction noise impacts may occur if noise-sensitive receptors are in close proximity to project construction activities. Reasonable efforts should be made to minimize exposure of noise sensitive areas to construction noise impacts.

3.3.1.1 Affected Environment

A Traffic Noise Report was prepared for the proposed project (NCDOT 2019e). The analysis contained within the report used computer models created with the FHWA Traffic Noise Model (FHWA TNM v.2.5) to predict future noise levels and define impacted receptors along the proposed project. Noise Study Areas (NSAs) were developed to group noise-sensitive land uses (receptors) that are geographically near one another and influenced by similar noise sources. The 15 NSAs identified are shown on Figure 3-7.

3.3.1.2 Impacts

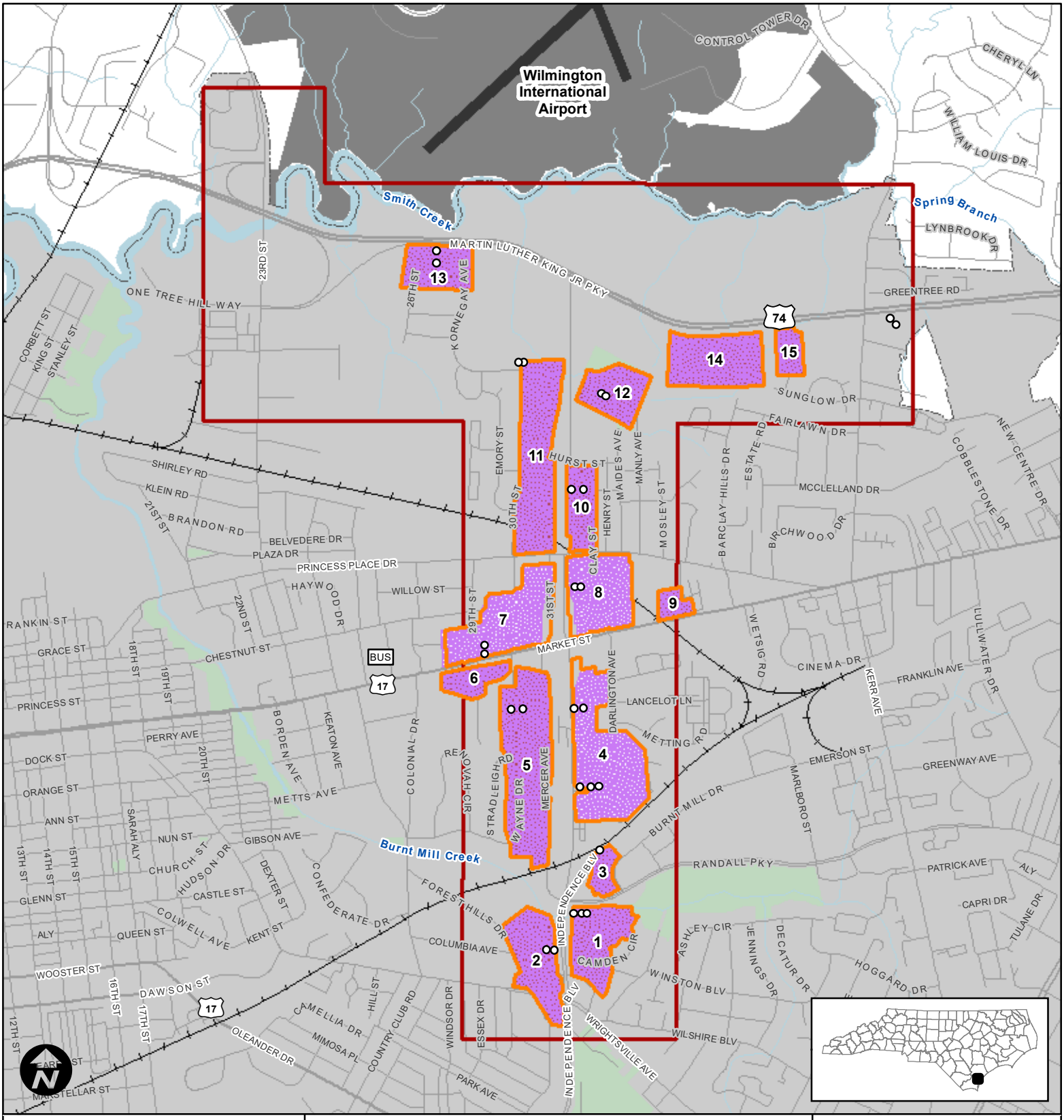
Traffic Noise Impacts and Noise Contours

The maximum number of receptors in each project alternative predicted to become impacted by future traffic noise is shown in Table 3-6. The table includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA Noise Abatement Criteria (NAC) or by a substantial increase in exterior noise levels as defined in the NCDOT Traffic Noise Policy (NCDOT 2016b).

Table 3-6: Predicted Traffic Noise Impacts by Alternative

Alternative	Residential (NAC B)	Places of Worship/Schools, Parks, etc. (NAC C and D)	Businesses (NAC E)	Total
Alternative 7 with SPUI Option	179	2	1	182
Alternative 7 with TUDI Option	192	2	1	195

Note: Predicted Traffic Noise Impacts are per TNM 2.5 and in accordance with 23 CFR Part 772.



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Railroad
- Stream
- Study Area
- Park
- Municipal Boundary
- County Boundary
- Municipal Boundary
- Noise Monitoring Locations

Noise Study Area

- SPUI and TUDI Alternatives
- SPUI Alternative
- TUDI Alternative

Figure 3-7
Noise Study Areas and Monitoring Locations

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

Traffic Noise Abatement Measures

Measures for reducing or eliminating traffic noise impacts were considered for impacted receptors in each alternative. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures, establishment of buffer zones, noise barriers, and noise insulation (NAC D only). For each of these measures, benefits versus allowable abatement quantity (reasonableness), engineering feasibility and effectiveness, and other factors were included in the noise abatement considerations.

Substantially changing the highway alignment to minimize noise impacts is not considered to be a viable option for the proposed project due to engineering and/or environmental factors. Traffic system management measures are not considered viable for noise abatement due to the negative impact they would have on the capacity and LOS of the proposed roadway. Costs to acquire buffer zones for impacted receptors would exceed the NCDOT base dollar value of $22,500 per benefited receptor plus an incremental increase as defined in the NCDOT Traffic Noise Manual (NCDOT 2016a), causing this abatement measure to be unreasonable.

Noise Barriers

Noise barriers include two basic types: earthen berms and noise walls. These structures act to diffract, absorb, and reflect highway traffic noise. For this project, earthen berms are not a viable abatement measure because the additional right-of-way, materials, and construction costs are estimated to exceed the NCDOT maximum allowable base quantity of 4,200 cubic yards per benefited receptor plus an incremental increase as defined in the NCDOT Traffic Noise Policy (NCDOT 2016b).

A noise barrier evaluation was conducted for this project utilizing the Traffic Noise Model (TNM 2.5) software developed by FHWA. Table 3-7 and Table 3-8 summarize the results of the evaluation for Alternative 7 with the SPUI Option and TUDI Option, respectively. Table 3-9 and Table 3-10 summarize the number of total receptors, impacted receptors, and benefited receptors within each NSA. A benefited receptor is a property that receives a minimum 5 A-weighted decibel (dB(A)) reduction in future noise levels. Additional information is included in the Traffic Noise Report that was prepared for the proposed project (NCDOT 2019e).

The project will continue to comply with the latest NCDOT Traffic Noise Policy and communication with the community regarding noise impacts, and possible noise abatement will occur at the start of the noise study process and continue throughout the development of the project. NCDOT will communicate with the public to present information on the nature of highway traffic noise and discuss the effects of noise abatement and how public preferences for noise abatement is solicited via a balloting process. Property owners and tenants who are being balloted for a recommended noise barrier will be provided a visual of the potential barrier location prior to their casting a ballot.

Table 3-7: Preliminary Noise Barrier Evaluation Results for Alternative 7 with SPUI Option

NSA	Noise Barrier Name and Location	Approximate Length / Height[a] (feet)	Approximate Area (square feet)	Number of Benefited Receptors[b]	Square Feet per Benefited Receptor / Allowable Square Feet per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely" for Construction)[c]
NSA 1	Barrier 1 Along Independence Boulevard Northbound between Wrightsville Avenue and Randall Parkway	750 / 10	7,500	6	1,250 / 2,000	Yes[c]
NSA 2	Barrier 2 Along Independence Boulevard Southbound between Mercer Avenue and Wrightsville Avenue	850 / 10	8,500	10	850 / 2,000	Yes[c]
NSA 4	Barrier 4 Along proposed Independence Boulevard Northbound between Randall Parkway and Market Street	2,000 / 14	28,000	98	286 / 1,500	Yes[c]
NSA 5	Barrier 5 Along proposed Independence Boulevard Southbound between Market Street and Mercer Avenue	3,150 / 22	70,514	47	1,500 / 2,500	Yes[c]
NSA 810	Barrier 810 Along proposed Independence Boulevard Northbound between Market Street and Hurst Street	2,600 / 18	46,800	56	836 / 2,000	Yes[c]
NSA 11	Barrier 11 Along proposed Independence Boulevard Southbound between Martin Luther King Jr. Parkway and Market Street	1,806 / 12	21,672	41	529 / 2,500	Yes[c]

NSA	Noise Barrier Name and Location	Approximate Length / Height[a] (feet)	Approximate Area (square feet)	Number of Benefited Receptors[b]	Square Feet per Benefited Receptor / Allowable Square Feet per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely" for Construction)[c]
NSA 15	Barrier 15 Along the proposed ramp from eastbound Martin Luther King Jr. Parkway to Kerr Avenue	1,493 / 16	23,694	13	1,823 / 1,500	No[d]
			Total	**271**		

[a] Average wall height. Actual wall height at any given location may be higher or lower.

[b] A benefited receptor is a property that receives a minimum 5 dB(A) reduction in future noise levels.

[c] The likelihood for barrier construction is preliminary and subject to change, pending completion of final design and the public involvement process.

[d] Barrier is not reasonable due to the quantity per benefited receptor exceeding the allowable quantity per benefited receptor OR barrier is not reasonable due to an inability to achieve at least 7 dBA noise reduction for at least one benefited receptor.

Table 3-8: Preliminary Noise Barrier Evaluation Results for Alternative 7 with TUDI Option

NSA	Noise Barrier Name and Location	Approximate Length / Height[a] (feet)	Approximate Area (square feet)	Number of Benefited Receptors[b]	Square Feet per Benefited Receptor / Allowable Square Feet per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely" for Construction)[c]
NSA 1	Barrier 1 Along Independence Boulevard Northbound between Wrightsville Avenue and Randall Parkway	750 / 10	7,500	6	1,250 / 2,000	Yes[c]
NSA 2	Barrier 2 Along Independence Boulevard Southbound between Mercer Avenue and Wrightsville Avenue	850 / 10	8,500	10	850 / 2,000	Yes[c]
NSA 4	Barrier 4 Along proposed Independence Boulevard Northbound between Randall Parkway and Market Street	2,400 / 14	33,600	103	326 / 1,500	Yes[c]
NSA 5	Barrier 5 Along proposed Independence Boulevard Southbound between Market Street and Mercer Avenue	3,150 / 20	63,189	52	1,215 / 2,500	Yes[c]
NSA 7	Barrier 7 Along proposed Independence Boulevard Southbound between Princess Place Drive and Market Street	2,211 / 17	36,940	22	1,679 / 2,500	Yes[c]
NSA 810	Barrier 810 Along proposed Independence Boulevard Northbound between Market Street and Hurst Street	2,550 / 16	40,800	55	742 / 2,500	Yes[c]

NSA	Noise Barrier Name and Location	Approximate Length / Height[a] (feet)	Approximate Area (square feet)	Number of Benefited Receptors[b]	Square Feet per Benefited Receptor / Allowable Square Feet per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely" for Construction)[c]
NSA 11	Barrier 11 Along proposed Independence Boulevard Southbound between Martin Luther King Jr. Parkway and Market Street	1,806 / 12	21,672	41	529 / 2,500	Yes[c]
NSA 15	Barrier 15 Along the proposed ramp from eastbound Martin Luther King Jr. Parkway to Kerr Avenue	1,493 / 16	23,694	13	1,823 / 1,500	No[d]
			Total	**302**		

[a] Average wall height. Actual wall height at any given location may be higher or lower.

[b] A benefited receptor is a property that receives a minimum 5 dB(A) reduction in future noise levels.

[c] The likelihood for barrier construction is preliminary and subject to change, pending completion of final design and the public involvement process.

[d] Barrier is not reasonable due to the quantity per benefited receptor exceeding the allowable quantity per benefited receptor OR barrier is not reasonable due to an inability to achieve at least 7 dBA noise reduction for at least one benefited receptor.

Table 3-9: Impacted Receptor Summary for Alternative 7 with SPUI Option

NSA	Noise Barrier Name and Location	Number of Receptors	Number of Impacted and Benefited Receptors	Number of Benefited Receptors
NSA 1	Barrier 1 Along Independence Boulevard Northbound between Wrightsville Avenue and Randall Parkway	54	3	6
NSA 2	Barrier 2 Along Independence Boulevard Southbound between Mercer Avenue and Wrightsville Avenue	15	8	10
NSA 4	Barrier 4 Along proposed Independence Boulevard Northbound between Randall Parkway and Market Street	198	21	98
NSA 5	Barrier 5 Along proposed Independence Boulevard Southbound between Market Street and Mercer Avenue	118	39	47
NSA 810	Barrier 810 Along proposed Independence Boulevard Northbound between Market Street and Hurst Street	108	38	56
NSA 11	Barrier 11 Along proposed Independence Boulevard Southbound between Martin Luther King Jr. Parkway and Market Street	74	31	41
NSA 15	Barrier 15 Along the proposed ramp from eastbound Martin Luther King Jr. Parkway to Kerr Avenue	31	4	13

Table 3-10: Impacted Receptor Summary for Alternative 7 with TUDI Option

NSA	Noise Barrier Name and Location	Number of Receptors	Number of Impacted and Benefited Receptors	Number of Benefited Receptors
NSA 1	Barrier 1 Along Independence Boulevard Northbound between Wrightsville Avenue and Randall Parkway	54	3	6
NSA 2	Barrier 2 Along Independence Boulevard Southbound between Mercer Avenue and Wrightsville Avenue	15	8	10
NSA 4	Barrier 4 Along proposed Independence Boulevard Northbound between Randall Parkway and Market Street	194	26	103
NSA 5	Barrier 5 Along proposed Independence Boulevard Southbound between Market Street and Mercer Avenue	118	42	52
NSA 7	Barrier 7 Along proposed Independence Boulevard Southbound between Princess Place Drive and Market Street	41	7	22
NSA 810	Barrier 810 Along proposed Independence Boulevard Northbound between Market Street and Hurst Street	103	40	55
NSA 11	Barrier 11 Along proposed Independence Boulevard Southbound between Martin Luther King Jr. Parkway and Market Street	74	31	41
NSA 15	Barrier 15 Along the proposed ramp from eastbound Martin Luther King Jr. Parkway to Kerr Avenue	31	4	13

3.3.2 Air Quality

The Federal Clean Air Act Amendments of 1970 established the National Ambient Air Quality Standards (NAAQS). These were established in order to protect public health, safety, and welfare from known or anticipated effects of air pollutants. The NAAQS lists the "criteria pollutants," which include sulfur dioxide (SO_2), particulate matter 10 micrometers in aerodynamic diameter and smaller (PM_{10}), particulate matter 2.5 micrometers in aerodynamic diameter and smaller ($PM_{2.5}$), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb). Table 3-11 lists these pollutants and the standards.

Air pollution originates from various sources. Emissions from industry and internal combustion engines are the most prevalent sources. The impact resulting from highway construction ranges from intensifying existing air pollution problems to improving the ambient air quality. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. Motor vehicles emit the criteria pollutants CO, NOx, PM, SO_2, and Pb. Additionally, motor vehicles emit CO_2(e), hydrocarbons (HC), and toxic air pollutants generally referred to as Mobile Source Air Toxics (MSAT). $O_3$is a secondary pollutant, formed in the atmosphere from directly related pollutants such as HC and oxides of nitrogen (NO_x). Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants such as ozone are often found at varying distances downwind of the precursor sources and as such are regional problems.

A project-level air quality analysis was prepared for this project (NCDOT 2020a).

Table 3-11: National Ambient Air Quality Standards

Pollutant	Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)	Primary	8 hours	9 ppm	Not to be exceeded more than once per year
		1 hour	35 ppm	
Lead (Pb)	Primary and Secondary	Rolling 3 month average	0.15 µg/m^3 [a]	Not to be exceeded
Nitrogen Dioxide (NO_2)	Primary	1 hour	100 ppb	mean98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	1 year	53 ppb [b]	Annual mean
Ozone (O_3)	Primary and Secondary	8 hours	0.070 ppm [c]	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	Primary	1 year	9.0 µg/m^3	Annual mean, averaged over 3 years
	Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
	Primary and Secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
PM_{10}	Primary and Secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	Primary	1 hour	75 ppb [d]	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	1 year	10 ppb	Annual mean, averaged over 3 years

Source: EPA 2024 (https://www.epa.gov/criteria-air-pollutants/naaqs-table)

[a] In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m^3 as a calendar quarter average) also remain in effect.

[b] The level of the annual NO_2 standard is 0.053 parts per million (ppm). It is shown here in parts per billion (ppb) for the purposes of clearer comparison to the 1-hour standard level.

[c] Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards are not revoked and remain in effect for designated areas. Additionally, some areas may have certain continuing implementation obligations under the prior revoked 1-hour (1979) and 8-hour (1997) O_3 standards.

[d] The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

3.3.2.1 Affected Environment

Mobile Source Air Toxics

Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments of 1990, whereby Congress mandated that the US Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (*Federal Register*, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (EPA 2020a). In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 2011 National Air Toxics Assessment (EPA 2020c). These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority MSAT, the list is subject to change and may be adjusted in consideration of future EPA rules.

According to EPA, the latest model of the Motor Vehicle Emission Simulator (MOVES3.0.1) is a major update to MOVES2014b (EPA 2020b). MOVES3.0.1 includes new emission rates, updated fuel standards, and changes for functional improvement and vehicle population/activity since the release of MOVES2014b.

MOVES2014b incorporated and/or updated the effects of three new federal emissions standard rules. These new standards improved MSAT emissions and included Tier 3 emissions and fuel standards starting in 2017 (79 *Federal Register* 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 *Federal Register* 60344), and the second phase of light-duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR 60344). MOVES3.0.1 has kept these changes in addition to the new changes previously listed. Due to decreased emissions of newer vehicles, MOVES3.0.1 indicates a large reduction in future emissions, even with an increase in VMT.

Diesel PM is a dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES3.0.1 will notice differences in emissions compared with MOVES2014b due to various updates previously noted.

MSAT quantitative analyses are intended to capture the net change in emissions within an affected environment, defined as the transportation network affected by the project. The affected environment for MSATs may be different than the affected environment defined in the NEPA document for other environmental effects, such as noise or wetlands. Analyzing MSATs only within a geographically defined “study area” will not capture the emissions effects of changes in traffic on roadways outside of that area, which is particularly important where the project creates an alternative route or diverts traffic from one roadway class to another. At the other extreme, analyzing a metropolitan area’s entire roadway network will result in emissions estimates for many roadway links not affected by the project, diluting the results of the analysis.

Incomplete or Unavailable Information for Project-Specific MSAT Health Impact Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

EPA is responsible for protecting public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. They maintain the Integrated Risk Information System, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects." Each Integrated Risk Information System report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Several HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents (FHWA 2023). Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations or in the future as vehicle emissions substantially decrease (HEI 2007).

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by the HEI. As a result, there is no national consensus on air dose-response values assumed to protect public health and welfare for MSAT compounds, including

diesel PM. EPA states that with respect to diesel engine exhaust, "[t]he absence of adequate data to develop a sufficiently confident dose-response relationship from the epidemiologic studies has prevented the estimation of inhalation carcinogenic risk."

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the US Court of Appeals for the District of Columbia Circuit upheld EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable (US Court of Appeals 2008).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

3.3.2.2 Impacts

There may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. Because the estimated VMT under the two interchange options of Alternative 7 are nearly the same, varying by less than 1 percent, it is expected there would be no appreciable difference in overall MSAT emissions between the interchange options. The localized increases in MSAT emissions would likely be most pronounced between the Mercer Avenue/Randall Parkway intersection at the southern terminus of the proposed project and Martin Luther King Jr. Parkway at the northern terminus of the proposed project, and along the proposed ramps of Alternative 7 for both the TUDI and SPUI Options, along with a corresponding decrease in MSAT emissions along parallel routes such as Mercer Avenue, Covil Avenue, Darlington Avenue, and Kerr Avenue. However, even if these increases do occur, they too would be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In sum, under Build Alternative 7 in the 2040 Design Year, it is expected there would be reduced MSAT emissions in the immediate area of the project, relative to the No-Build Alternative, due to EPA's MSAT reduction programs.

Vehicles are a major contributor to decreased air quality because they emit a variety of pollutants into the air. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. New highways or the widening of existing highways increases localized levels of vehicle emissions, but these increases could be offset due to increases in speeds from reductions in congestion and because vehicle emissions would decrease in areas where traffic shifts to the new roadway. Significant progress has been made in reducing criteria pollutant emissions from motor vehicles and improving air quality, even as vehicle travel has increased rapidly.

The proposed project, located in New Hanover County, complies with the NAAQS. The proposed project is located within an area that is in conformance with the NAAQS; therefore, 40 CFR Parts 51 and 93 addressing conformity compliance are not applicable. The project is not anticipated to create any adverse effects on the air quality of this attainment area.

3.3.3 Farmlands

Criteria for identifying and considering the effects of federal programs on the conversion of farmland to nonagricultural uses are established in the Farmland Protection Policy Act of 1981 (FPPA) (7 CFR 658; 7 United States Code [U.S.C.] 4201-4209). North Carolina Executive Order Number 96, Conservation of Prime Agricultural and Forest Lands of 1993, requires all state agencies to consider the impact of land acquisition and construction projects on prime farmland soils, as defined by the Natural Resources Conservation Service.

For the purposes of the FPPA, farmland is divided into three categories: prime, unique, or local or statewide importance (Public Law 97-98, Subtitle 1, Section 1540). The three categories are defined as follows:

- **Prime farmland** is land that has "the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soils erosion" (Public Law 97-978, Subtitle 1, Section 1540). Land already in or committed to urban development or water storage is not included.
- **Unique farmland** is land other than prime farmland used for production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed (Public Law 97-98, Subtitle 1, Section 1540).
- **State and locally important farmland** is land of statewide or local importance for the production of food, fiber, forage, or oilseed crops as determined by the appropriate state agency.

3.3.3.1 Affected Environment

There are no farmland soils eligible for protection under the FPPA as the entire study area is within the urbanized area of the City of Wilmington. Lands identified as urbanized area on US Census Bureau mapping are not subject to the provisions of the FPPA.

3.3.3.2 Impacts

There would be no impacts to farmlands as a result of the proposed project.

3.3.4 Utilities

Utility services present within the study area include electric, water, wastewater, natural gas, telephone, and cable.

3.3.4.1 Affected Environment

Electric

Electric service to residents and businesses is provided by Duke Energy. Numerous aboveground transmission lines that provide local service are present along and across roadways throughout the study area. One large high-voltage transmission line crosses the proposed project just north and west of Maides Park, south of Martin Luther King Jr. Parkway.

Water and Wastewater

The Cape Fear Public Utility Authority provides water and wastewater or sewer services to the study area.

Natural Gas

Natural gas is distributed and serviced in some portions of the study area by Piedmont Natural Gas. At the southern end of the proposed project, natural gas is available up until the intersection of Independence Boulevard and Randall Parkway. Natural gas is not available along Covil or Mercer Avenues but is available on the northern side of Market Street and extends to the north until approximately Hurst Street.

Telephone and Cable

Telephone service is provided throughout the study area by AT&T as well as several other fiber optic, satellite, and cable providers, including Verizon, DIRECTTV, DISH, Spectrum, and Viasat.

3.3.4.2 Impacts

Both DSAs would impact both private and public utilities. Impacts would include the relocation, adjustment, or modification of gas, water, sewer, electric, telephone, and fiber optic cable lines. The relocation of power poles would also be required as a result of the proposed project.

3.3.5 Hazardous Materials

Hazardous material sites are regulated by the Resource Conservation Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. Hazardous materials are generally defined as material or a combination of materials that present a potential hazard to human health or the environment.

3.3.5.1 Affected Environment

The NCDOT GeoEnvironmental Section of the Geotechnical Engineering Unit investigated the study area and prepared a GeoEnvironmental Phase I Report (NCDOT 2019c) for the proposed project. The purpose of the report was to document sites of concern within the study area that are or may be contaminated. Field reconnaissance was conducted on July 7, 2019. Thirty-one sites of concern were identified within the study area, most of which are located outside of the proposed project footprint of the DSAs (Figure 3-8).

The report identifies sites that may contain underground storage tanks (17 sites), automotive repair facilities (5 sites), dry cleaning facilities (0 sites), hazardous waste producing sites (2 sites), Superfund sites (2 sites), landfills (1 site), and other potentially contaminated sites (4 sites).

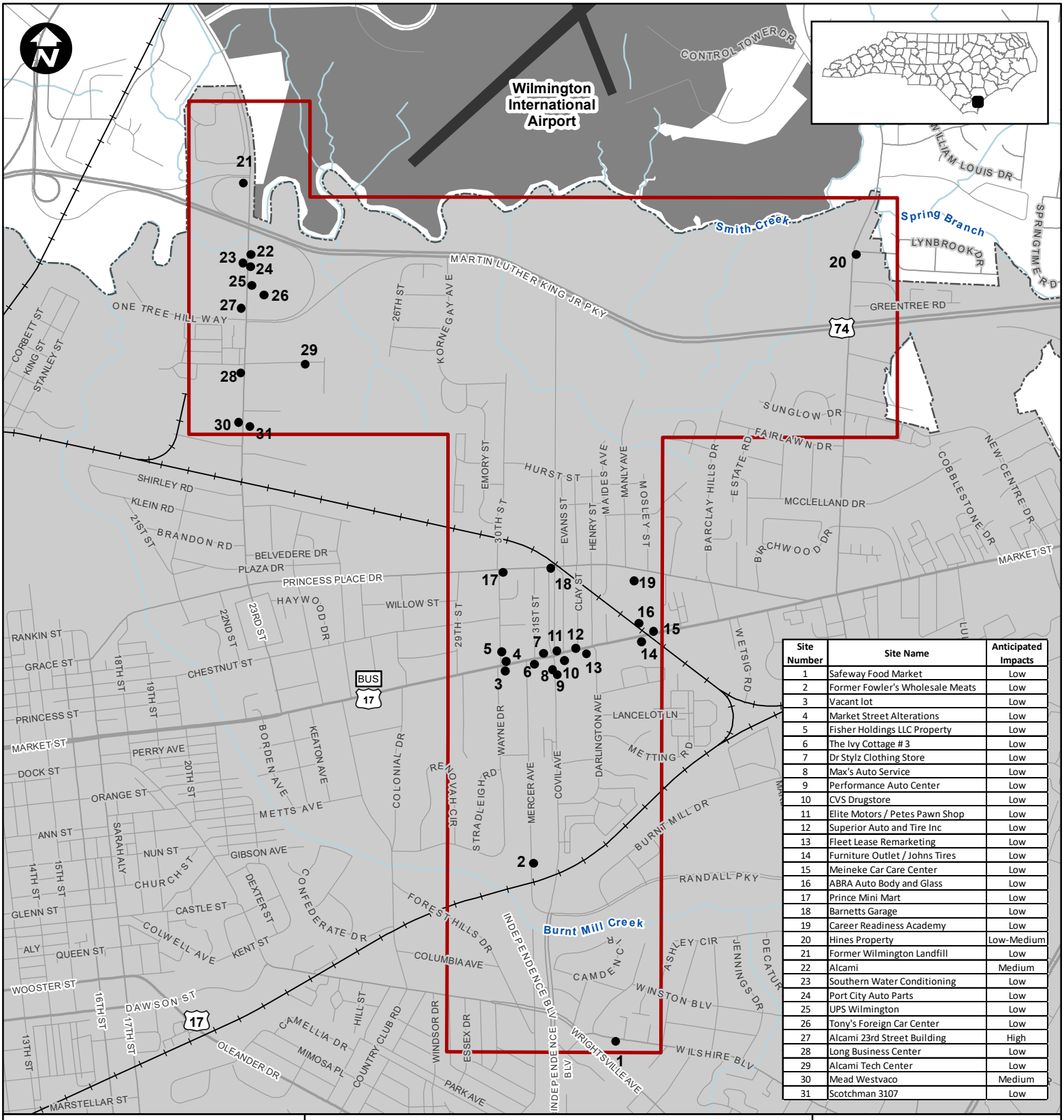
3.3.5.2 Impacts

Of the 31 sites identified in the GeoEnvironmental Phase I Report, 11 would be impacted by the proposed project (Figure 3-9 and Figure 3-10). Impacted sites are consistent between the two DSAs and include the following:

- Site 4. Market Street Alterations
- Site 5. Fisher Holdings LLC Property
- Site 6. The Ivy Cottage # 3
- Site 7. Dr Stylz Clothing Store
- Site 8. Max's Auto Service
- Site 9. Performance Auto Center
- Site 10. CVS Drugstore
- Site 11. Elite Motors / Petes Pawn Shop
- Site 12. Superior Auto and Tire Inc
- Site 13. Fleet Lease Remarketing
- Site 18. Barnetts Garage

The Superfund sites consist of a vacant residential lot (Site 20. Hines Property) and a business office complex (Site 27. Alcami 23rd Street Building). Both sites are beyond the proposed project footprint for the DSAs.

The landfill that was identified is a pre-regulatory (former) landfill owned by the City of Wilmington (Site 21. Former Wilmington Landfill). It is located at the corner of Martin Luther King Jr. Parkway and 23rd Street and would not be impacted by the proposed project.



Site Number	Site Name	Anticipated Impacts
1	Safeway Food Market	Low
2	Former Fowler's Wholesale Meats	Low
3	Vacant lot	Low
4	Market Street Alterations	Low
5	Fisher Holdings LLC Property	Low
6	The Ivy Cottage # 3	Low
7	Dr Stylz Clothing Store	Low
8	Max's Auto Service	Low
9	Performance Auto Center	Low
10	CVS Drugstore	Low
11	Elite Motors / Petes Pawn Shop	Low
12	Superior Auto and Tire Inc	Low
13	Fleet Lease Remarketing	Low
14	Furniture Outlet / Johns Tires	Low
15	Meineke Car Care Center	Low
16	ABRA Auto Body and Glass	Low
17	Prince Mini Mart	Low
18	Barnetts Garage	Low
19	Career Readiness Academy	Low
20	Hines Property	Low-Medium
21	Former Wilmington Landfill	Low
22	Alcami	Medium
23	Southern Water Conditioning	Low
24	Port City Auto Parts	Low
25	UPS Wilmington	Low
26	Tony's Foreign Car Center	Low
27	Alcami 23rd Street Building	High
28	Long Business Center	Low
29	Alcami Tech Center	Low
30	Mead Westvaco	Medium
31	Scotchman 3107	Low

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New Hanover County

Legend

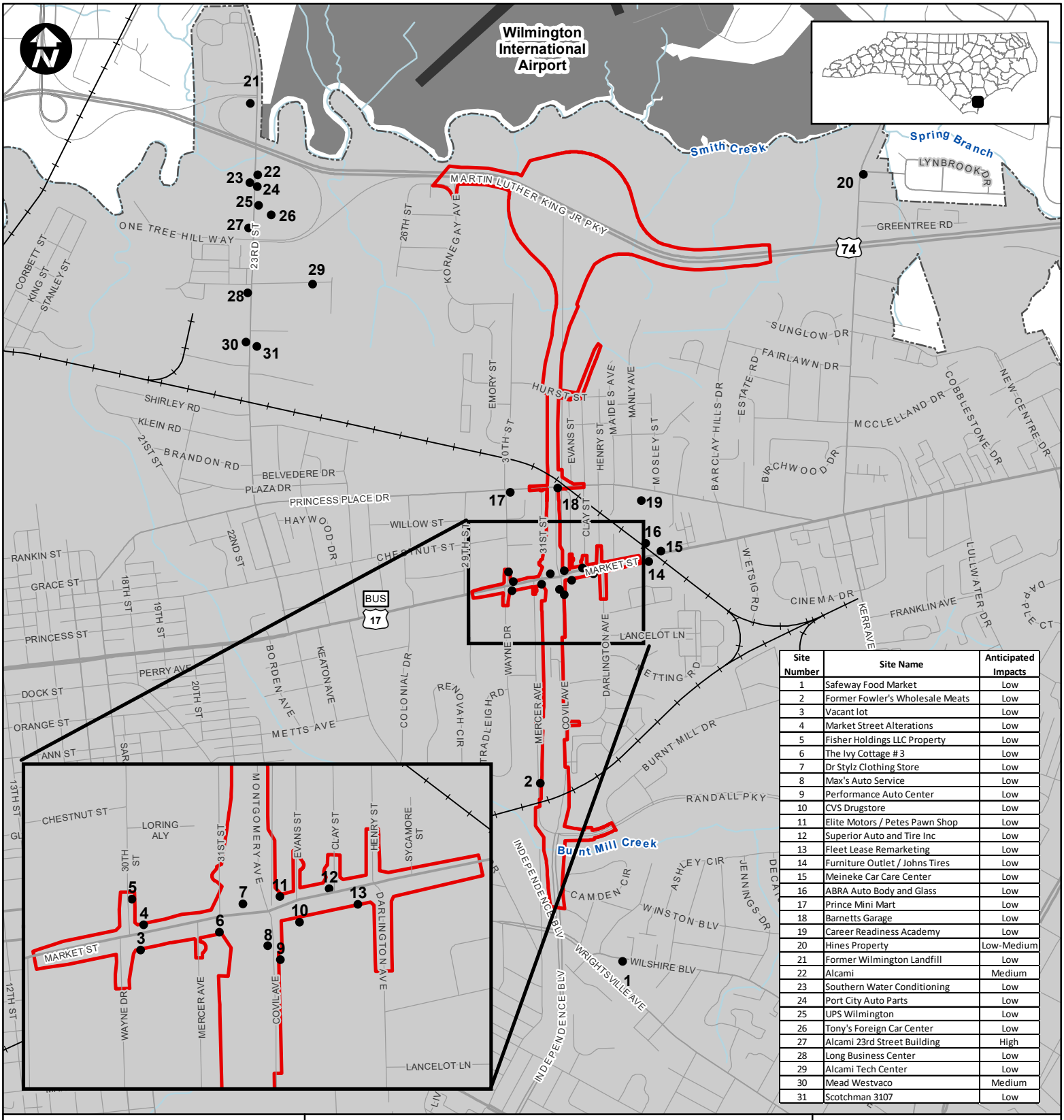
- Geoenvironmental Site of Concern
- Railroad
- Stream
- Study Area
- Municipal Boundary
- County Boundary
- Municipal Boundary

Figure 3-8
Geoenvironmental Sites of Concern

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet



Site Number	Site Name	Anticipated Impacts
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10	CVS Drugstore	Low
11	Elite Motors / Petes Pawn Shop	Low
12	Superior Auto and Tire Inc	Low
13	Fleet Lease Remarketing	Low
14	Furniture Outlet / Johns Tires	Low
15	Meineke Car Care Center	Low
16	ABRA Auto Body and Glass	Low
17	Prince Mini Mart	Low
18	Barnetts Garage	Low
19	Career Readiness Academy	Low
20	Hines Property	Low-Medium
21	Former Wilmington Landfill	Low
22	Alcami	Medium
23	Southern Water Conditioning	Low
24	Port City Auto Parts	Low
25	UPS Wilmington	Low
26	Tony's Foreign Car Center	Low
27	Alcami 23rd Street Building	High
28	Long Business Center	Low
29	Alcami Tech Center	Low
30	Mead Westvaco	Medium
31	Scotchman 3107	Low

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New Hanover County

Legend

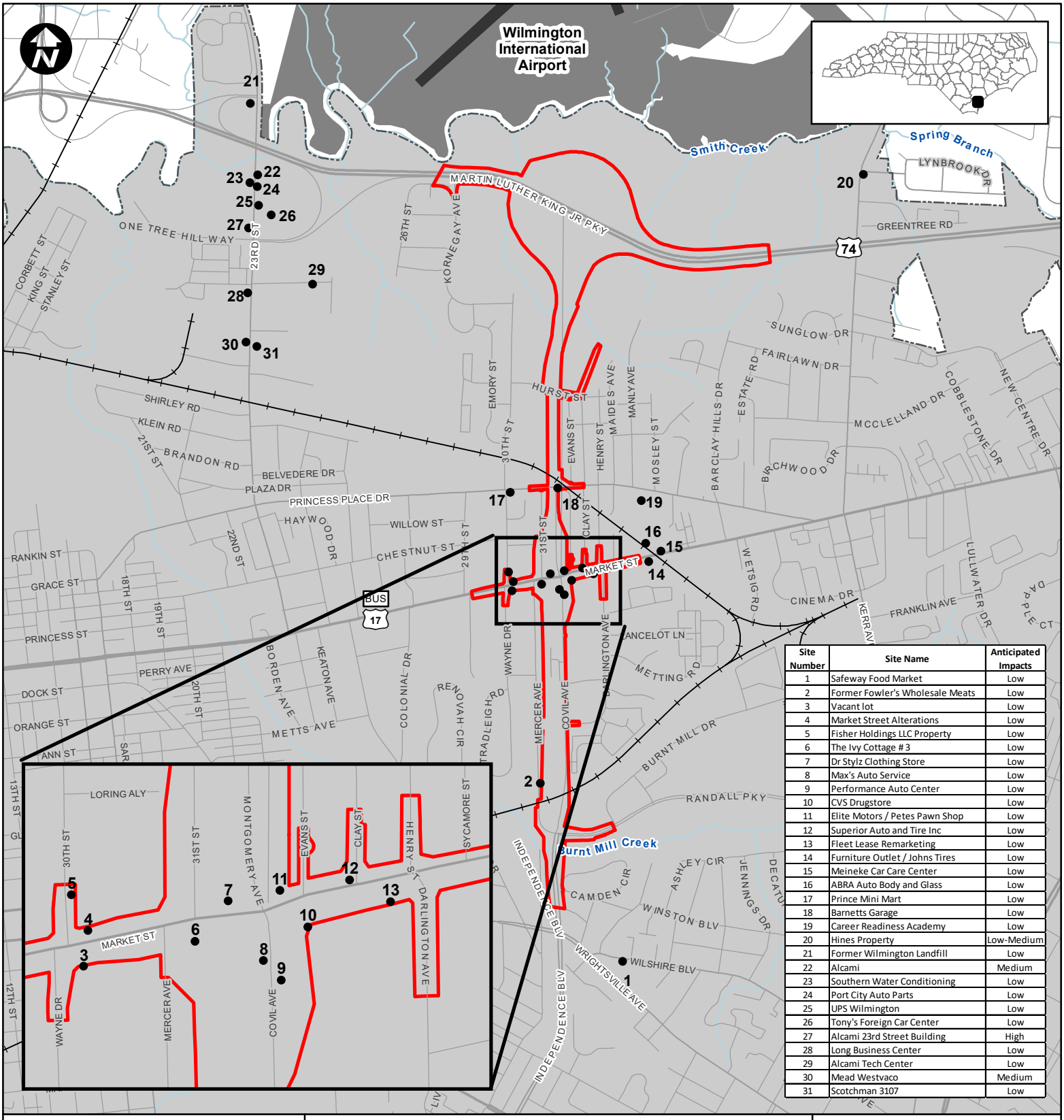
- Geoenvironmental Site of Concern
- Railroad
- Stream
- Municipal Boundary
- County Boundary
- Municipal Boundary
- SPUI Right-of-Way

Figure 3-9
Geoenvironmental Sites of Concern - Alt 7 SPUI Option

Date: January 2025

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet



Site Number	Site Name	Anticipated Impacts
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12	Superior Auto and Tire Inc	Low
13	Fleet Lease Remarketing	Low
14	Furniture Outlet / Johns Tires	Low
15	Meineke Car Care Center	Low
16	ABRA Auto Body and Glass	Low
17	Prince Mini Mart	Low
18	Barnetts Garage	Low
19	Career Readiness Academy	Low
20	Hines Property	Low-Medium
21	Former Wilmington Landfill	Low
22	Alcami	Medium
23	Southern Water Conditioning	Low
24	Port City Auto Parts	Low
25	UPS Wilmington	Low
26	Tony's Foreign Car Center	Low
27	Alcami 23rd Street Building	High
28	Long Business Center	Low
29	Alcami Tech Center	Low
30	Mead Westvaco	Medium
31	Scotchman 3107	Low

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New Hanover County

Legend

- Geoenvironmental Site of Concern
- Railroad
- Municipal Boundary
- County Boundary
- Municipal Boundary
- SPUI Right-of-Way

Figure 3-10
Geoenvironmental Sites of Concern - Alt 7 TUDI Option

Date: January 2025

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

3.3.6 Mineral Resources

The proposed project is located within the Coastal Plain physiological province. This province is characterized by flat land to gently rolling hills and valleys. Elevations range from sea level near the coast to about 600 feet in the sandhills of the southern Inner Coastal Plain.

The study area is underlain by the Castle Hayne Formation, which is characterized by cobble to pebble sized clasts, usually rounded, coated with phosphate and glauconite in a limestone matrix. The New Hanover member for the formation is the oldest member. The formation is known for containing fossils dating back to the Paleogene period and preserves many of North Carolina's renowned Eocene fossils. The most common fossils are shark and ray teeth (United States Geological Survey [USGS] 2021).

Thorium, iron, chromium, sand, and crushed stone are mined in the Wilmington area.

3.3.6.1 Affected Environment

There are no active mining operations located within the study area (NCDEQ 2021, USGS 2021).

3.3.6.2 Impacts

There would be no impacts to mineral resources as a result of the proposed project.

3.3.7 Floodplains/Floodways

Floodplains and floodways are mapped by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program. Floodplains are low-lying areas adjacent to a water feature that experience frequent flooding. FEMA designates the severity of such flooding by assigning flood zones. A floodway is defined as the channel of a river or watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations (FEMA 2024).

3.3.7.1 Affected Environment

The study area is contained within the Cape Fear River Basin in eastern North Carolina. The entire basin covers approximately 9,000 square miles and flows through 29 counties. The study area lies within the Northeast Cape Fear sub-basin.

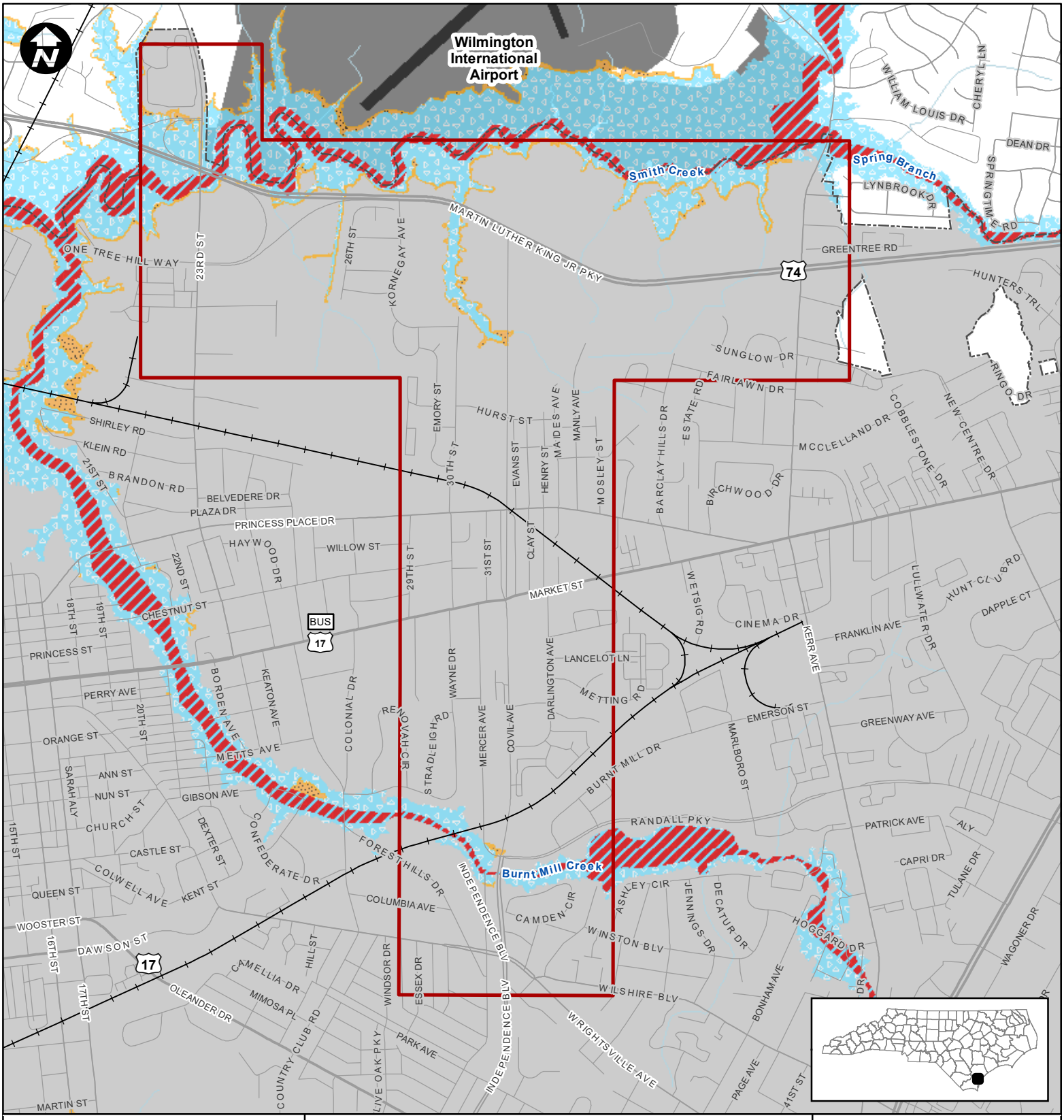
New Hanover County is a participant in the National Flood Insurance Program administered by FEMA. Flood Insurance Rate Maps indicate that 100-year and 500-year floodplains as well as FEMA regulated floodways are present within the study area (FEMA 2024).

The Hydraulic Aspects Report (NCDOT 2014b) identifies four major hydraulic crossings associated with the proposed project (Table 3-12). Crossings 1 and 3 are within the mapped flood boundaries of Smith Creek. Crossing 2 is within mapped floodway limits for Burnt Mill Creek.

Within the study area, Burnt Mill Creek and Smith Creek are located within FEMA regulatory floodways. Floodplains and floodways are shown on Figure 3-11.

Table 3-12: Major Hydraulic Crossing Summary

Crossing	Waterbody	FEMA Flood Study	Existing Structure	Recommended Structure
1	Tributary to Smith Creek	Backwater	None	1 at 9 feet by 8 feet RCBC with 1 foot buried
2	Burnt Mill Creek	Detailed study	2 at 12 feet x 10 feet RCBC	2 at 12 feet by 10 feet RCBC extension with 1 foot buried
3	Tributary to Smith Creek	Backwater	1 at 72 inches RCP 1 at 9 feet by 6 feet RCBC 3 at 72 inches RCP	1 at 72 inches RCP extension 1 at 9 feet by 6 feet RCBC extension 3 at 72 inches RCP extension



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New Hanover County

Legend

- Railroad
- Stream
- Municipal Boundary
- County Boundary
- Municipal Boundary

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

Figure 3-11
Floodplains and Floodways

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

3.3.7.2 Impacts

Impacts to floodplains and floodways would occur with either DSA and are presented in Table 3-13 and shown on Figure 3-12 and Figure 3-13.

Table 3-13: Floodplain and Floodway Impacts

FEMA Designation	Alternative 7 with SPUI Option (acres)	Alternative 7 with TUDI Option (acres)
Floodplains – 100-year including Floodway	4.9	5.0
Floodplains – 500-year	1.3	1.3
Floodway	0.4	0.4

Note: Impacts are based on preliminary design slope stake limits plus a 25-foot buffer.

3.3.8 Protected Lands

Protected lands include wild and scenic rivers, state and national forests, gamelands, and other preservation areas.

3.3.8.1 Affected Environment

Wild and Scenic Rivers

No rivers or sections of river within or near the study area are designated as wild, scenic, or recreational under the National Wild and Scenic Rivers Act of 1968.

State/National Forests

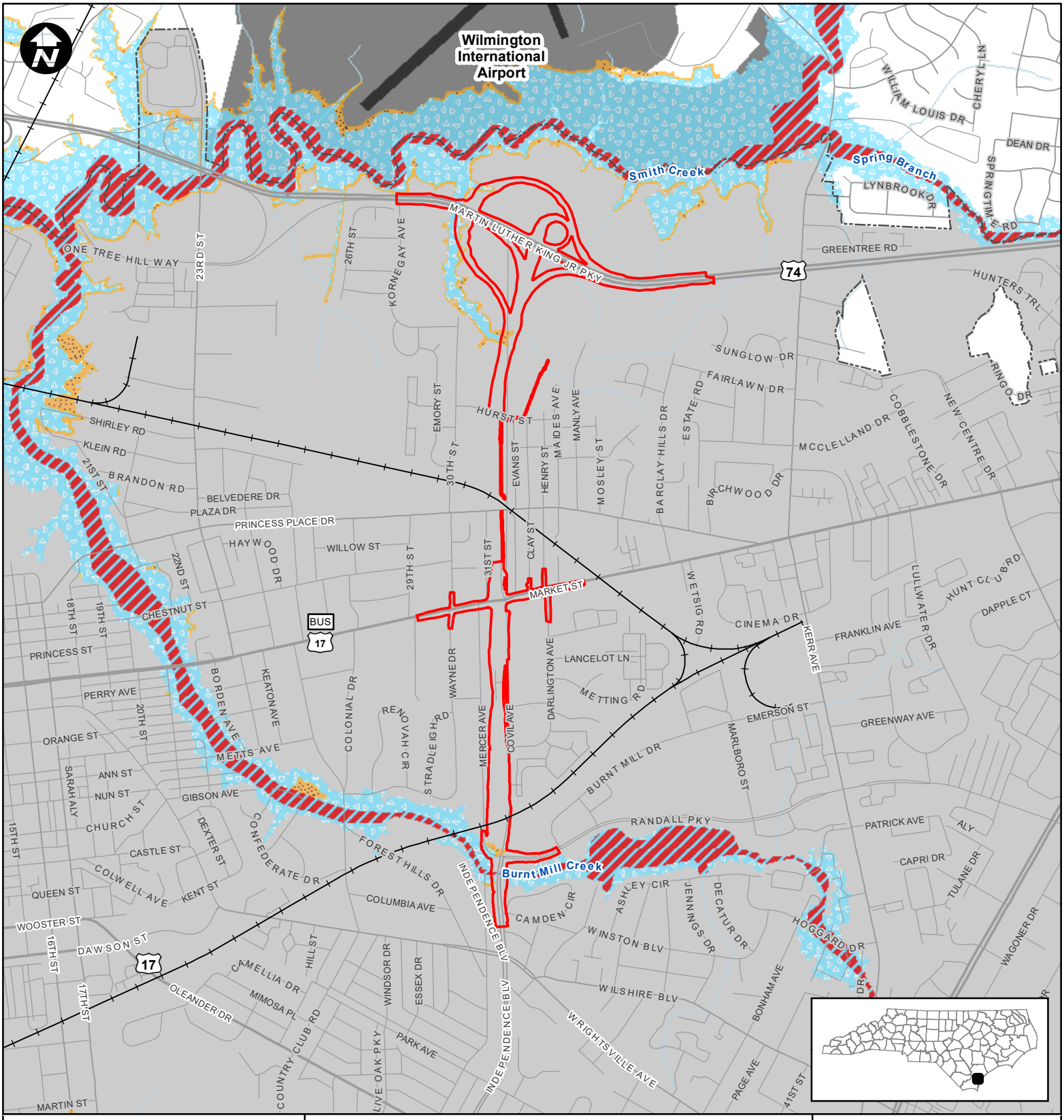
No state or national forests are located within the study area.

Gamelands and Preservation Areas

There are no gamelands, NCDOT mitigation sites, or natural areas located within the study area. There is one property, Maides Park, designated as New Hanover County Open Space located within the study area (North Carolina Natural Heritage Program [NCNHP] 2022).

3.3.8.2 Impacts

The proposed greenway along the east side of the proposed roadway connects the Cross-City Trail at Randall Parkway to Maides Park. In order to make the connection, minor impacts are anticipated within Maides Park; however, the impacts anticipated include minor ground disturbance and would not impact the use of the park.



Independence Boulevard Extension Project
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New Hanover County

Legend

- Railroad
- Stream
- SPUI Slope Stakes plus 25 feet
- Municipal Boundary
- County Boundary
- Municipal Boundary

Flood Hazard Zones

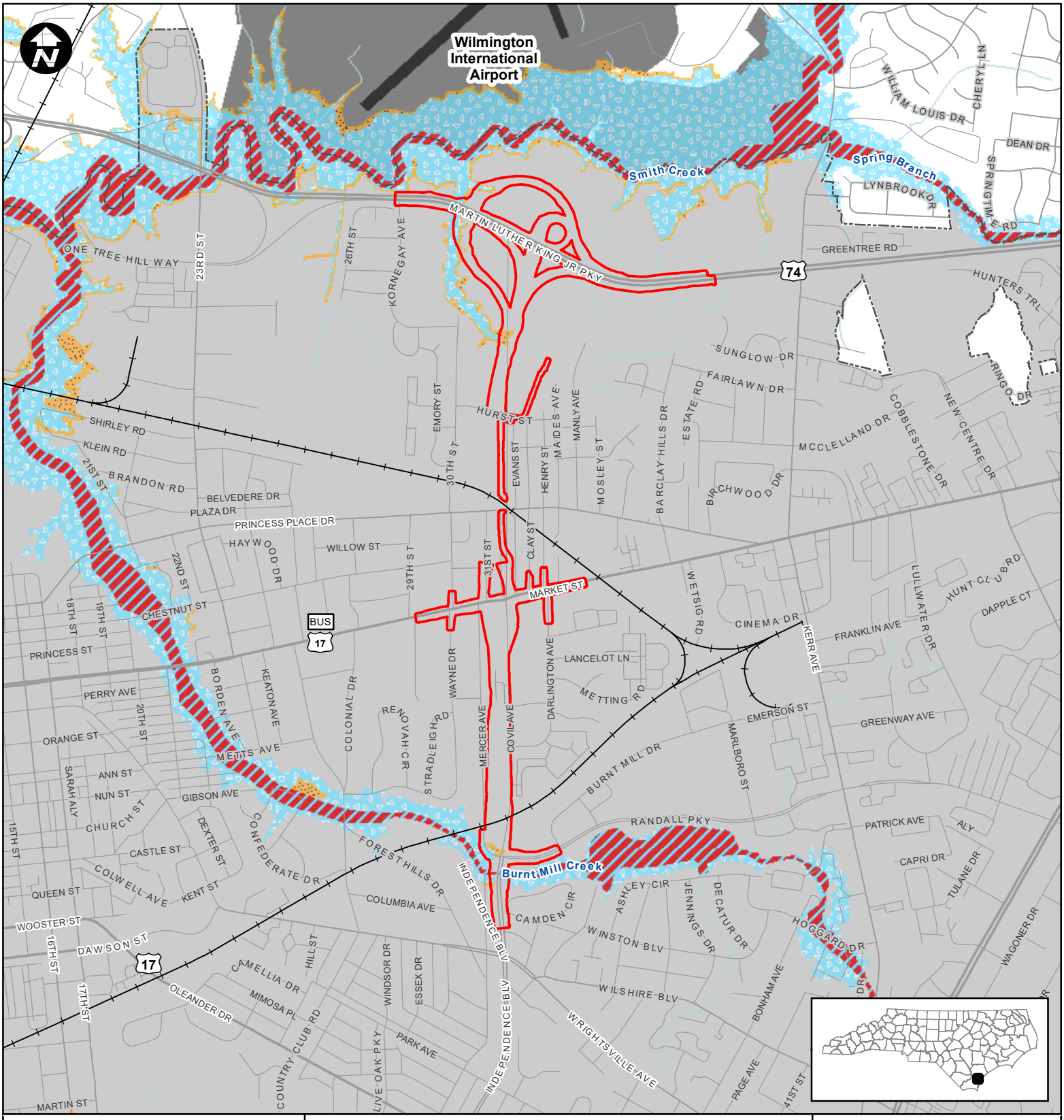
- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

Figure 3-12
Floodplains and Floodways - Alternative 7 with SPUI Option

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet



Independence Boulevard Extension Project
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New Hanover County

Legend

- Railroad
- Stream
- TUDI Slope Stakes plus 25 feet
- Municipal Boundary
- County Boundary
- Municipal Boundary

Flood Hazard Zones

- Regulatory Floodway
- 100-year Floodplain
- 500-year Floodplain

Figure 3-13
Floodplains and Floodways - Alternative 7 with TUDI Option

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

3.3.9 Visual and Aesthetics

The FHWA *Guidelines for the Visual Impact Assessment of Highway Projects* (FHWA 2015) was referenced as guidance in conducting analyses related to visual and aesthetic conditions and impacts of the proposed project.

3.3.9.1 Affected Environment

The proposed project is located in the coastal plain regional landscape of North Carolina characterized by flat terrain with limited background views. Along Market Street, overhead powerlines are located on both sides of the street. Single powerline poles and wires are also located along many of the residential side streets within the study area. Land uses within the study area are primarily dense commercial and residential development with some undeveloped lands immediately south of Martin Luther King Jr. Parkway.

The FHWA guidelines recognize three types of visual perception that determine the visual quality. Visual quality is evaluated by identifying the vividness, intactness, and unity in the project. The three criteria for evaluating visual quality are defined below:

- Natural Harmony – when viewing the components of a scene's natural environment, viewers inherently evaluate the natural harmony of the existing scene, determining whether the composition is harmonious or inharmonious.
- Cultural Order – when viewing the components of the cultural environment, viewers evaluate the scene's cultural order, determining whether the composition is orderly or disorderly.
- Project coherence – when viewing the project environment, viewers evaluate the coherence of the project components, determining whether the project's composition is coherent or incoherent.

Overall, existing visual quality in the study area is low. Existing foreground views within much of the study area are dominated by varying heights of vegetation and utility infrastructure with transportation infrastructure located at-grade. Background views include varying heights, forms, lines, and colors, such as a mix of greens and tans from vegetation and grays from roadway features.

3.3.9.2 Impacts

Viewers are defined by their relationship to the project and their visual preferences. Neighbors (people with views to the road) and highway users (people with views from the road) would be affected by the proposed project. Highway users predominately include travelers on Market Street and other side streets. Neighbors include residential and pedestrian viewers. Viewer exposure and viewer sensitivity determine the overall viewer response to the proposed changes.

Viewer exposure for highway users would be moderate with regular exposure for a short period of time and moderate proximity to the view. Exposure for neighbors, specifically those bordering the project would be high as there are many viewers with consistent exposure for long periods of time, and some with an unobstructed line of sight. Viewer sensitivity for highway users and neighbors would be

moderate as their focus is on the roadway and existing views of the area are not important to the values and goals of the viewer.

The proposed project would result in a moderately high level of impact to viewers. While there are no distinctive visual resources within the study area, viewers would be introduced to additional transportation infrastructure that includes new heights, forms, colors, and elements not currently in the view of neighbors. Adverse effects would likely result from the location, proximity, and size of the proposed infrastructure relative to potential viewers. Mitigation measures with input from the public such as landscaping, street tree plantings, and context-sensitive design solutions could decrease the level of adverse effects on viewers.

3.4 Cultural Resources

The proposed project is subject to compliance with Sections 106 and 110 of the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800; 54 U.S.C. 300101-307108), which requires federal agencies to take into account the effects of their undertaking on properties listed on or eligible for listing on the National Register of Historic Places (NRHP) (including archaeological sites) and afford the Advisory Council on Historic Preservation an opportunity to comment on the effects of the undertaking.

Section 110(f) of the NHPA requires that federal agencies considering undertakings that may directly and adversely affect National Historic Landmarks, "to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark, and shall afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking" [Section 110(a)(2)(B) and Section 110(f)].

A historic property, or historic resource, is defined in the NHPA as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to such a property or resource.

The methods used to identify historic architectural and archaeological resources in the study area and the results of those investigations are described in this section.

3.4.1 Historic Architectural Resources

Historic architectural resources are defined the same as historic properties above, and include sites, buildings, structures, and other modifications to the landscape.

1.1.1.2 Affected Environment

The North Carolina State Historic Preservation Office (NC HPO) reviewed the study area for historic architectural resources in 2012 and again in 2019. In a letter dated April 23, 2012, and email correspondence dated March 28, 2019, it was determined the project would not have an effect on any historic structures (Appendix G).

1.1.1.3 Impacts

There would be no impacts to historic architectural resources as a result of the proposed project.

3.4.2 Archaeological Resources

Archaeological sites are defined the same as historic properties and are further defined as a location that contains the physical evidence of past human behavior that allows for interpretation.

1.1.1.4 Affected Environment

An archaeological survey (Phase I and II studies) for the proposed project was completed in August 2019 (NCDOT 2019d). During the survey, two sites were recorded within the study area. Site 1 (31NH886) is a historic cemetery (Maides Cemetery). Site 2 (31NH887) is a prehistoric site on the south side of Martin Luther King Jr. Parkway that produced numerous ceramic sherds. The site was found to consist of artifacts from at least four different time periods.

31NH886, as a historic cemetery, does not meet special criteria consideration for being considered eligible for the NRHP. Site 1 is not recommended as eligible and is outside the Area of Potential Effect (APE) for the proposed project.

31NH887 is recommended as eligible for the NRHP under Criterion D based on the vertical and horizontal integrity of the prehistoric occupations represented. The site produced prehistoric lithic and ceramic artifacts. The spread of cultural materials manifests as three loci of artifact concentrations horizontally across the site. Initial analysis of pottery types indicates that the different loci represent use during different time periods suggesting horizontally discrete occupations within the site. Prehistoric cultural periods represented, and their associated locus include Late Archaic Hamp's Landing Phase (Locus 3), Early Woodland New River Phase (Locus 1), Middle Woodland Cape Fear River Phase (Loci 1 and 3), and Late Woodland Hanover Phase II (Locus 2).

In a letter dated March 31, 2020, the NC HPO concurred with the findings of the archaeological assessment (Appendix G).

1.1.1.5 Impacts

Site 31NH887 would be impacted by either DSA. The entirety of the site (1.53 acres) falls within the proposed project footprint.

The archaeological assessment recommends avoidance of 31NH887 if possible. If not possible, the assessment recommended that adverse effects to the site be mitigated as appropriate prior to any ground disturbing activities.

In a letter dated March 31, 2020, the NC HPO concurred with the findings of the archaeological assessment and recommended "mitigation in the form of additional data recovery be conducted. The mitigation is recommended because the site's proximity to Martin Luther King Jr Parkway and the future Independence Boulevard intersection make avoidance of this important archaeological site improbable. We further recommend that disturbance by the NCDOT Wildlfower Program, for which a portion of the site is currently being used, be discontinued until the archaeology is complete" (Appendix G).

3.5 Natural Environmental Characteristics

Aspects of the existing natural environment in the study area presented in this section were obtained from the Natural Resources Technical Report (NRTR) (NCDOT 2019b). The NRTR identified resources including soils and geology, biotic communities and wildlife, water resources, and jurisdictional issues such as wetlands and protected species within the NRTR study area boundary, different from the study area for the proposed project, as shown on Figure 3-14.

The study area is in the Coastal Plain physiographic province of North Carolina. Topography in the project vicinity is characterized as nearly level, with wide upland surfaces. Elevations in the study area range from sea level to 75 feet above mean sea level. Land use within the project vicinity includes a mixture of residential, commercial, industrial, and forested woodland areas.

3.5.1 Soils/Topography/Geology

3.5.1.1 Affected Environment

The New Hanover County Soil Survey identifies 16 soil unit types within the study area (United States Department of Agriculture [USDA] 2019).

3.5.1.2 Impacts

Soil properties along the DSAs could affect the final engineering design of the proposed project. The most common soil limitations within the study area include poor drainage, high water table, susceptibility to flooding, and loose, sandy soils.

3.5.2 Terrestrial Communities and Wildlife

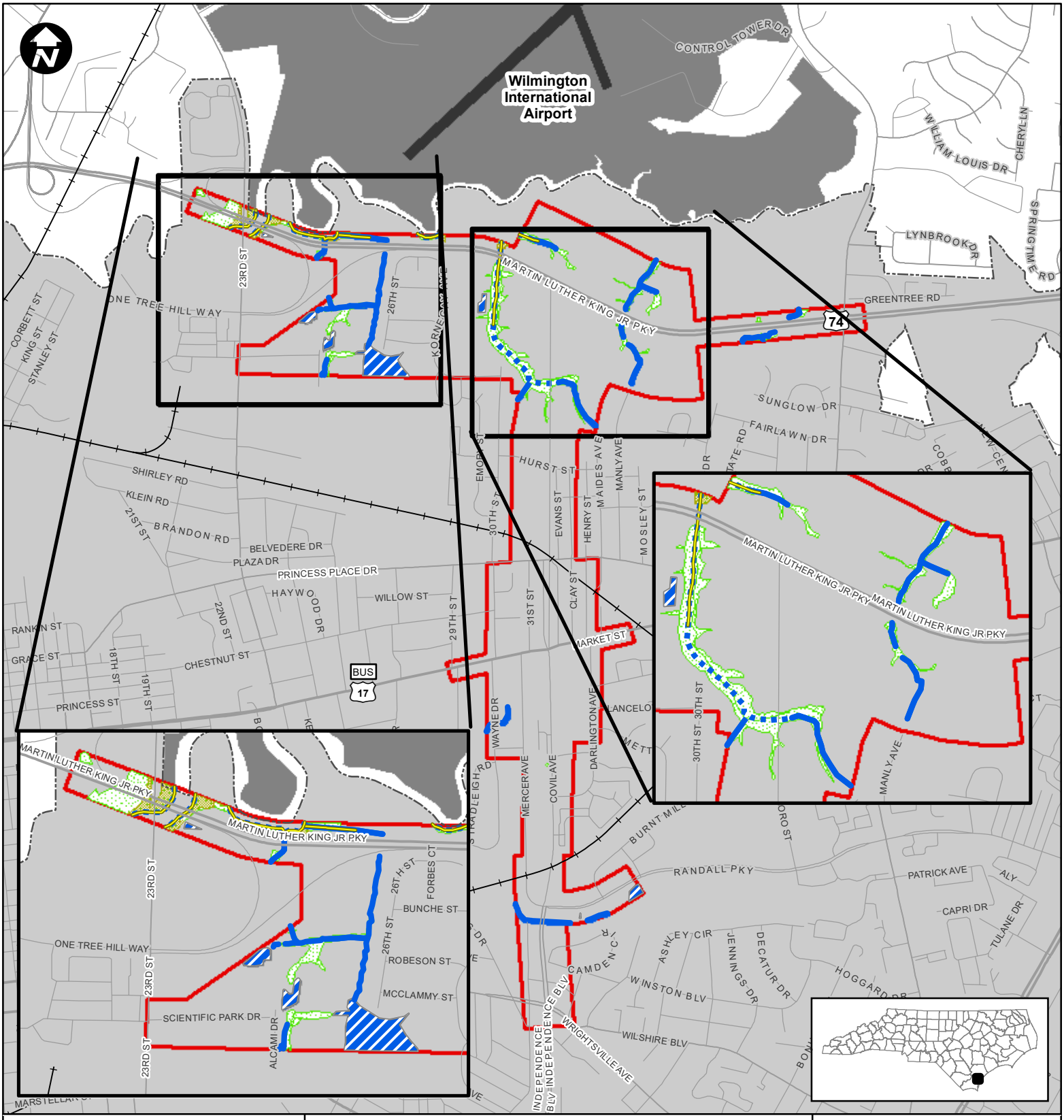
3.5.2.1 Affected Environment

Seven terrestrial communities were identified in the study area. Forest areas provide connectivity between populations, allowing for gene flow, as well as a means of safe travel from one foraging area to another. Terrestrial community data are presented in the context of total coverage of each type within the study area in Table 3-14.

1.1.1.6 Impacts

Terrestrial communities found along the DSAs serve as shelter, nesting, and foraging habitat for a number of wildlife species. Both DSAs would result in direct impact to both natural and altered terrestrial communities through clearing of vegetation, grading, and paving. Impacts to terrestrial communities and forest habitats are shown in Table 3-15.

Fragmentation and loss of forested habitat may impact wildlife in the area by reducing potential nesting and foraging areas, as well as displacing animal populations.



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Approximated Stream
- Streams
- Railroad
- Surface Waters
- Wetlands
- CAMA Estuarine Waters
- CAMA Wetlands
- NRTR Study Area
- Municipal Boundary
- County Boundary
- Municipal Boundary

Figure 3-14
Jurisdictional Resources

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

Table 3-14: Coverage of Terrestrial Communities

Community	Dominant Species (scientific name)	Coverage (acres)
Maintained/disturbed	Chinese privet (*Ligustrum sinense*) Kudzu (*Pueraria montana*) Grasses (*Graminae* spp.)	374
Pine Flatwoods[a]	Loblolly pine (*Pinus taeda*) Sweetgum (*Liquidambar styraciflua*) Red maple (*Acer rubrum*)	185.8
Mesic Mixed Hardwood Forest (Coastal Plain Subtype) [a]	Loblolly pine (*Pinus taeda*) American sycamore (*Platanus occidentalis*) Live oak (*Quercus virginiana*)	22.1
Cypress Gum Swamp (Brownwater Subtype) [a]	Bald cypress (*Taxodium distichum*) Black gum (*Nyssa sylvatica*) Giant cane (*Arundinaria gigantea*)	11.5
Coastal Plain Bottomland Hardwood Forest (Brownwater Subtype) [a]	Sweetgum (*Liquidambar styraciflua*) Smooth alder (*Alnus serrulata*) Royal fern (*Osmunda regalis*)	9.2
Tidal Cypress Gum Swamp[a]	Bald cypress (*Taxodium distichum*) Titi (*Cyrilla racemiflora*) Swamp rose (*Rosa palustris*)	13.6
Pine Scrub Oak Sandhill[a]	Longleaf pine (*Pinus palustris*) Southern red oak (*Quercus falcata*) Wiregrass (*Aristida stricta*)	16.2
	Total	**632.4**

[a]Terrestrial communities considered to be forested lands.

Table 3-15: Terrestrial Community Impacts

Terrestrial Community	Alternative 7 with SPUI Option (acres)	Alternative 7 with TUDI Option (acres)
Maintained/disturbed	93.2	100.7
Pine Flatwoods[a]	68.3	68.7
Mesic Mixed Hardwood Forest (Coastal Plain Subtype) [a]	0.3	0.9
Cypress Gum Swamp (Brownwater Subtype) [a]	1.3	1.3
Coastal Plain Bottomland Hardwood Forest (Brownwater Subtype) [a]	1.4	1.4
Tidal Cypress Gum Swamp[a]	2.0	2.0
Pine Scrub Oak Sandhill [a]	3.9	3.9
Forest Impacts	77.2	78.2

Note: Impacts were calculated using the preliminary design right-of-way limits.

[a]Terrestrial communities considered to be forested lands and used to calculate forest impacts.

Temporary fluctuation in populations of animal species that use terrestrial areas is anticipated during construction. Slow-moving, burrowing, and subterranean organisms would be directly impacted by construction activities, while mobile organisms would be displaced to adjacent communities. Habitat reduction can occur when project construction affects undisturbed areas surrounding an existing man-dominated environment. When this occurs, competitive forces in the adapted communities would result in a redefinition of population equilibrium.

3.5.3 Water Resources

3.5.3.1 Affected Environment

Water resources in the study area are part of the Cape Fear River basin (USGS Hydrologic Unit 03030007).

The NRTR study area contains delineations from overlapping projects, including a jurisdictional determination for Bruce B. Cameron – Trustee/Cameron Management (SAW-2006-41650), Kerr Avenue Widening (STIP Project U-3338B&C), and the 23rd Street to 26th Street Connector Project (STIP Project U-5926). The approved Preliminary Jurisdictional Determination, associated mapping, and Stream Determination Letter are located in Appendix H.

Streams

Fourteen jurisdictional streams were identified within the study area. The physical and jurisdictional characteristics of these streams are provided in Table 3-16 and Table 3-17, and the location of these streams is reflected on Figure 3-14. No high-quality waters, outstanding resource waters, or water supply watersheds are within 1 mile downstream of the study area. Surface waters are protected based on their designated "best uses" as defined in the surface water classifications established in Title 15A of the North Carolina Administrative Code (NCAC), subchapter 02B. Waters within the NRTR study area are classified as C;Sw (Critical Area; Swamp Waters). Class C waters are protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life, and agriculture. Secondary recreations include wading, boating, and other uses involving human body contact with water. Swamp waters recognize waters that have low velocities and other natural characteristics that are different from adjacent streams.

Table 3-16: Streams in the Study Area

Stream Name	ID [a]	Stream Index Number	Best Usage Classification	Bank Height (feet)	Bankful Width (feet)	Water Depth (inches)
Smith Creek [b]	Smith Creek	18-74-63	C;Sw	1	300	60
UT to Smith Creek	SA	18-74-63	C;Sw	1	2	6
UT to Smith Creek	SB	18-74-63	C;Sw	20-30	40-50	36
UT to Smith Creek	SD	18-74-63	C;Sw	1-2	3-4	6-8
UT to Smith Creek	SF	18-74-63	C;Sw	1-2	2-3	4

Stream Name	ID [a]	Stream Index Number	Best Usage Classification	Bank Height (feet)	Bankful Width (feet)	Water Depth (inches)
UT to Smith Creek	SG	18-74-63	C;Sw	2	7-8	3
UT to Smith Creek	SH	18-74-63	C;Sw	4-6	10-15	6-36
UT to Smith Creek	SJ	18-74-63	C;Sw	2	4	3
UT to Burnt Mill Creek	SK	18-74-63-2	C;Sw	2-3	4-5	2-36
UT to Burnt Mill Creek	SL	18-74-63-2	C;Sw	10-15	15-20	36-48
UT to Smith Creek	SM	18-74-63	C;Sw	1-2	1-2	3-6
UT to Smith Creek	SN	18-74-63	C;Sw	3	4-5	3-6
UT to Smith Creek	SO	18-74-63	C;Sw	1-2	4-5	6-12
UT to Smith Creek	SR	18-74-63	C;Sw	2	3	6-12

[a] Refer to Figure 3-14.

[b] Smith Creek was not field delineated. Estimated location is shown on Figure 3-14.

UT = Unnamed Tributary

Table 3-17: Characteristics of Jurisdictional Streams in the Study Area

ID [a]	Length (feet)	Classification	Compensatory Mitigation Required	River Basin Buffer
Smith Creek	1,877 [b]	Perennial	Yes	Not Subject
SA	338	Intermittent	Yes	Not Subject
SB (U-5926, 2011, and 2019)	2,199 [c]	Perennial	Yes	Not Subject
SD (U-5926 and 2011)	863 [d]	Intermittent/ Perennial	Yes	Not Subject
SF (U-5926)	186	Intermittent	Yes	Not Subject
SG	356	Perennial	Yes	Not Subject
SH	3,777 [e]	Perennial	Yes	Not Subject
SJ	1,831	Perennial	Yes	Not Subject
SK	590	Intermittent	Yes	Not Subject
SL	1,319	Perennial	Yes	Not Subject
SM	263	Intermittent	Yes	Not Subject
SN	510	Perennial	Yes	Not Subject
SO	349	Perennial	Yes	Not Subject
SR	601 [f]	Intermittent/ Perennial	Yes	Not Subject
Total	**15,059**			

[a] Refer to Figure 3-14.

[b] All of Smith Creek is estuarine waters (1,877 feet)

[c] 504 feet of Stream SB are estuarine waters

[d] 64 feet of Stream SD are tributary waters

[e] 1,279 feet of Stream SH are estuarine waters

[f] 304 feet of Stream SR are estuarine waters

Wetlands

Eighteen jurisdictional wetlands were identified within the study area (Table 3-18). The locations of these wetlands are shown on Figure 3-14. All wetlands in the study area are located within the Cape Fear River Basin, USGS Hydrologic Unit 03030007.

Wetlands labeled ”C-”are features and/or portions of features contained within the approved delineation for the Bruce B Cameron-Trustee/Cameron Management property (as shown on Figure 3-14). The approved Preliminary Jurisdictional Determination, associated mapping, and Stream Determination Letter are located in Appendix H.

Table 3-18: Characteristics of Jurisdictional Wetlands in the Study Area

ID [a]	NCWAM Classification	Hydrologic Classification	NCDWQ Wetland Rating [b]	Area (acres)
WA	Tidal Freshwater Marsh	Tidal	85	6.41 [c]
WC	Floodplain Pool	Riparian	19	0.19
WD	Non-Tidal Freshwater Marsh	Riparian	38	0.15
WE	Riverine Swamp Forest	Tidal/Riparian	77	8.34 [d]
C-WE	Riverine Swamp Forest	Riparian	77	3.47
WG	Riverine Swamp Forest	Riparian	26	1.02
WJ	Headwater Forest	Riparian	34	0.03
WK	Headwater Forest	Riparian	34	0.02
WL	Headwater Forest	Riparian	34	0.08
WN	Riverine Swamp Forest	Riparian	43	0.75
WO	Riverine Swamp Forest	Riparian	51	0.16
C-WO	Tidal Freshwater Marsh	Tidal	81	2.59
WS	Non-Riverine Swamp Forest	Non-Riparian	40	0.06
WT	Headwater Forest	Riparian	48	0.07
C-WT	Headwater Forest	Riparian	48	0.36
C-WU	Riverine Swamp Forest	Riparian	40	1.60
WV	Riverine	Riparian	N/A	2.30
WW	Non-Riverine Swamp Forest	Non-Riparian	N/A	0.09
			Total	**27.69**

[a] Refer to Figure 3-14.
[b] NCDWQ Wetland Ratings are no longer required per the new 2017 NRTR Guidance (NCDOT 2017a). These features were delineated prior to the implementation of NCSAM/NCWAM ratings.
[c] 2.52 acres of Wetland WA are coastal wetland.
[d] 0.31 acre of Wetland WE are coastal wetland.
NCWAM – NC Wetland Assessment Method

Ponds

Six ponds are located within the study area and are identified as jurisdictional surface waters SWB, SWF, SWH, SWM, SWQ, and SWR. They all maintain surface water connection to other jurisdictional features within the study area. SWB is connected via a drop inlet and culvert to WA. SWF is connected via a drop inlet and culvert to WI. SWH flows directly into SB. SWM is connected via a drop inlet and culvert to WE. SWQ is connected via a dam structure to SL, and SWR is connected via a drop inlet and culvert to SL. SWS was formerly delineated as SC but is now considered a surface water per a June 27, 2019, field meeting with USACE and the North Carolina Division of Water Resources. The 2012 Preliminary Jurisdictional Determination included all surface waters within the study area as jurisdictional features (Table 3-19).

Table 3-19: Surface Waters in the Study Area

Surface Water	Jurisdictional	Map ID of Connection	Area in Study Area (acres)
SWB	Yes	WA	0.6
SWF	Yes	WI	0.6
SWH	Yes	SB	5.0
SWM	Yes	WE	0.5
SWQ	Yes	SL	0.7
SWR	Yes	SL	<0.1
SWS (former Stream SC)	Yes	WC	<0.1
		Total	**7.5**

Rivers and Harbors Act Section 10 Navigable Waters

Smith Creek is considered a Navigable Water under Section 10 of the Rivers and Harbors Act of 1899; however, it lies beyond the project limits. A portion of Stream SH (unnamed tributary to Smith Creek) within the study area near Smith Creek is also tidally influenced and is considered a Section 10 water.

3.5.3.2 Impacts

Primary sources of water quality degradation in urban and developed areas are non-point sources of discharge, which include surface water runoff and runoff from construction activities. Short-term impacts to water quality from construction-related activities include sedimentation and turbidity in nearby water resources. Long-term impacts include substrate destabilization, bank erosion, increased turbidity, altered flow rates, and possible temperature fluctuations within the channel due to removal of streamside vegetation.

The removal of streamside vegetation and placement of fill material during construction contributes to erosion and possible sedimentation. Erosion and sedimentation may carry soils, toxic compounds, trash, and other materials into the aquatic communities at the construction site. As a result, sand bars may be formed both at the site and downstream. Increased light penetration from the removal of streamside vegetation may also increase water temperatures. Warmer water contains less oxygen, thus reducing

aquatic life that depends on high oxygen concentrations. Quick revegetation of these areas helps to reduce the impacts by supporting the underlying soils. In accordance with the North Carolina Sedimentation Pollution Control Act of 1973 (General Statutes Chapter 113A, Article 4), as amended, and 15A NCAC Chapter 4 (Sedimentation Control), an erosion and sedimentation control plan must be prepared for land-disturbing activities that cover one or more acres to protect runoff from a 10-year storm.

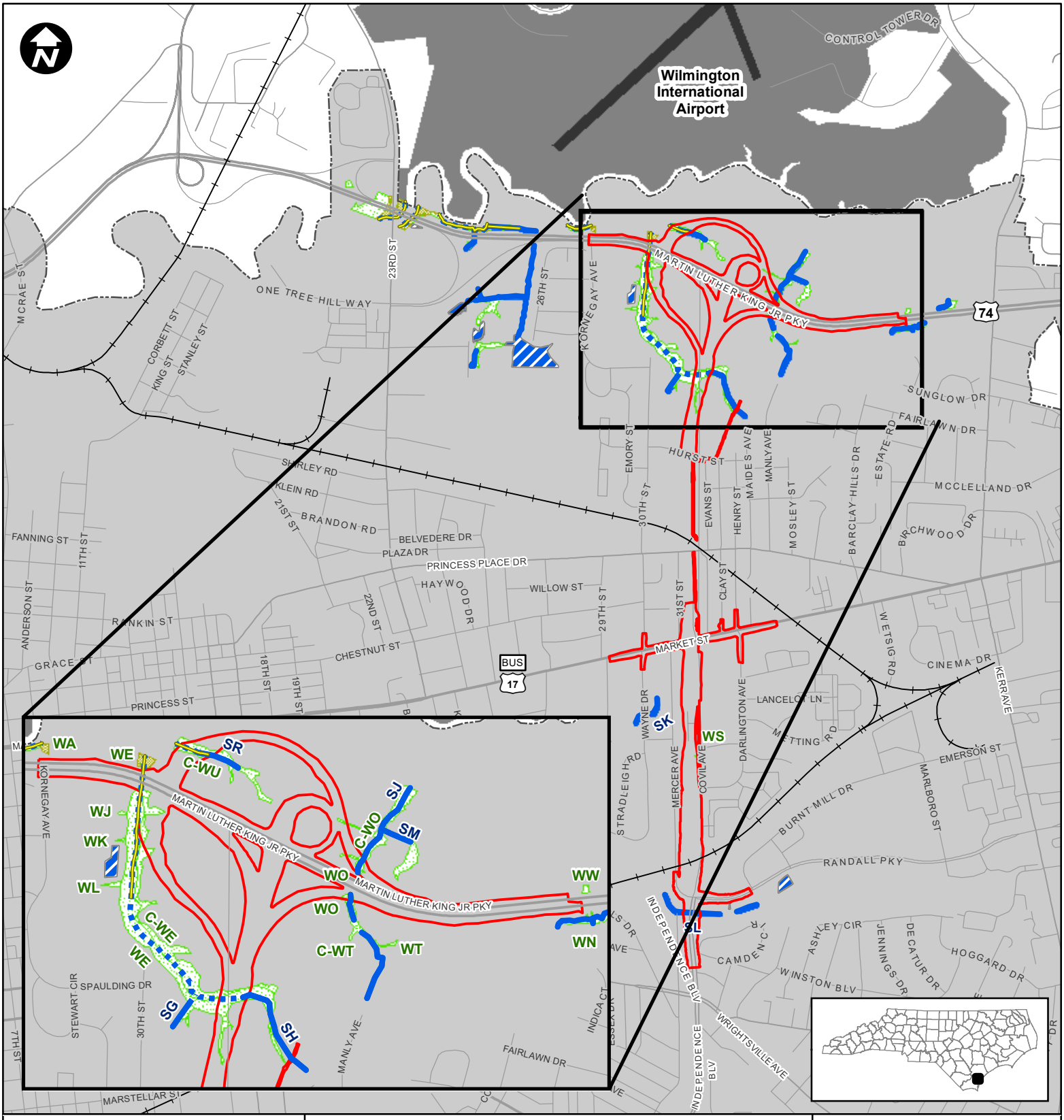
Streams

Approximate permanent impacts to jurisdictional streams for each DSA are summarized in Table 3-20 and shown on Figure 3-15 and Figure 3-16. The linear feet shown in Table 3-20 do not include areas where bridges would be placed over larger stream systems. The bridged areas have been removed from the analysis. The approximate impacts the DSAs would have on jurisdictional streams have been quantified to the nearest linear foot using the preliminary design construction slope stake limits plus 25 feet.

Table 3-20: Jurisdictional Stream Impacts

Stream ID	Stream Name	Best Usage Classification	Alternative 7 with SPUI Option (linear feet)	Alternative 7 with TUDI Option (linear feet)
SH	UT to Smith Mill Creek	C;Sw	972[a]	991[b]
SJ	UT to Smith Mill Creek	C;Sw	245	245
SL	Burnt Mill Creek	C;Sw	317	317
SR	UT to Smith Mill Creek	C;Sw	366[c]	366[d]
		Total	**1,900**	**1,919**

Note: Impacts were calculated using preliminary design construction slope stake limits plus 25 feet.
[a] 570 feet of Stream SH impacts (SPUI) would impact estuarine waters
[b] 570 feet of Stream SH impacts (TUDI) would impact estuarine waters
[c] 289 feet of Stream SR impacts (SPUI) would impact estuarine waters
[d] 289 feet of Stream SR impacts (TUDI) would impact estuarine waters



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Approximated Stream
- Streams
- Railroad
- Surface Waters
- Wetlands
- CAMA Estuarine Waters
- CAMA Wetlands
- SPUI Slope Stakes plus 25 feet
- Municipal Boundary
- County Boundary
- Municipal Boundary

Figure 3-15
Jurisdictional Resource Impacts - Alternative 7 with SPUI Option

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

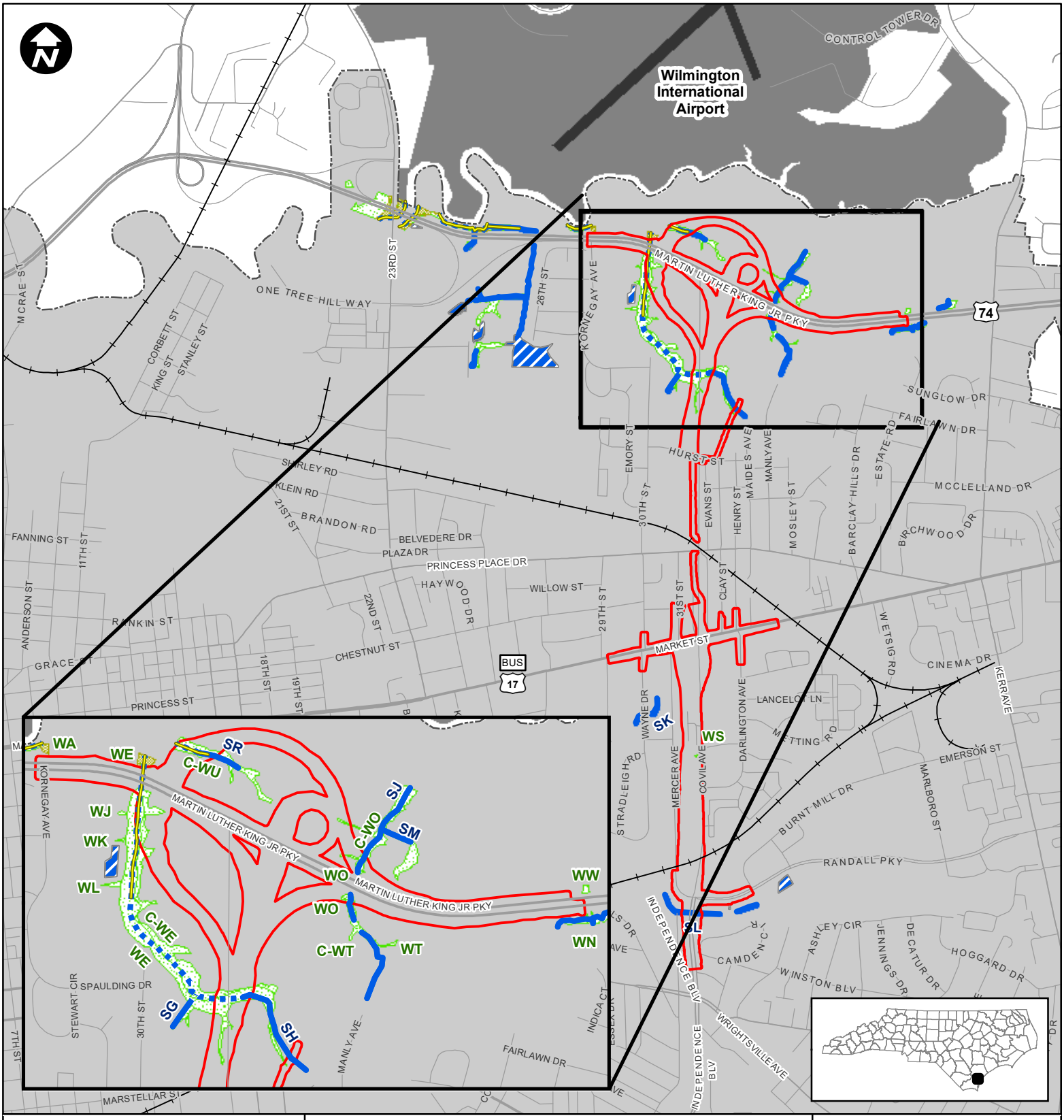


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Figure 3-16
Jurisdictional Resource Impacts - Alternative 7 with TUDI Option

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

Wetlands

Approximate permanent impacts to jurisdictional wetlands for the DSAs are summarized in Table 3-21 and shown on Figure 3-15 and Figure 3-16. The acreages shown do not include areas where bridges would be placed over large wetland systems. The bridged areas were removed from the analysis.

Table 3-21: Jurisdictional Wetland Impacts

Jurisdictional Wetland Type	Alternative 7 with SPUI Option (acres)	Alternative 7 with TUDI Option (acres)
Riparian Wetlands	3.7	3.8
Non-Riparian Wetlands	0.1	0.1
TOTAL[a]	**3.8**	**3.9**

Note: Impacts were calculated using preliminary design construction slope stake limits plus 25 feet.
[a] There would be no impacts to coastal wetlands associated with either DSA.

Ponds

There would be no impacts to ponds as a result of the proposed project.

Groundwater

Expected effects of the project on groundwater are similar for both DSAs. Any wells within the proposed project's right-of-way would be surveyed prior to project construction. NCDOT would purchase these wells and cap and abandon them in accordance with 15A NCAC 2C.0100, Well Construction Standards. Any subsurface contamination would be reported to the Wilmington Regional Office of the NCDEQ. During the final design phase of the project, NCDOT would also identify wells adjacent to the project right-of-way that could be impacted by roadway construction. Mitigation for these wells could be provided through land purchase, compensation for damages, or the provision of new wells.

A roadway alignment is in a cut section if the elevation of the roadway is below the original ground elevation. Well drawdown (reduced yield) may occur around areas of cut sections. Due to the already urban/disturbed land areas in the vicinity, the proposed project is not expected to substantially impact aquifer recharge volumes.

Pollutants associated with highway construction and use could potentially affect aquifer groundwater quality in localized areas. Possible pollutants include pesticides, herbicides, fertilizers, petrochemicals, oil, grease, heavy metals, and hazardous materials. Note that no sole or principal drinking water aquifers are present in the study area (EPA 2007).

Impacts to Cape Fear Public Utility Authority drinking water suppliers are not anticipated.

3.5.3.3 Jurisdictional Issues

Section 404 of the Clean Water Act (CWA) of 1977 requires regulation of discharges into "Waters of the United States." EPA is the principal administrative agency of the CWA; however, USACE is responsible for implementation, permitting, and enforcement of the CWA.

Surface waters (lakes, rivers, and streams) and wetlands are subject to jurisdictional consideration under Section 404 of the CWA. Section 401 of the CWA grants authority to individual states for regulation of discharges into "Waters of the United States." Jurisdictional waters are shown on Figure 3-14.

3.5.4 Protected Species

Federally listed endangered and threatened species are legally protected under the provisions of Section 7 of the Endangered Species Act of 1973, as amended. As a result, any action that is likely to adversely affect a federally protected species is subject to review by the US Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service.

3.5.4.1 Affected Environment

The study area was evaluated for the potential presence of federally protected threatened and endangered species using the USFWS IPaC (Information for Planning and Consultation) web tool on December 23, 2024 (USFWS 2024a). The official IPaC species list identified 14 federally protected species, under the Endangered Species Act of 1973 (ESA) for the study area, as shown in Table 3-22. No waterways within the study area are identified as habitat by the National Oceanic and Atmospheric Administration (NOAA) Southeast Region ESA Section 7 Mapper (NOAA 2024).

American alligator

USFWS Optimal Survey Window: year-round (only warm days in winter)

Biological Conclusion: Not Required

The American alligator remains on the protected species list due to its similarity in appearance to the endangered American crocodile (*Crocodylus acutus*). In North Carolina, alligators have been recorded in nearly every coastal county, and many inland counties to the fall line. The alligator is found in rivers, streams, canals, lakes, swamps, and coastal marshes. There are three streams documented within the study area (one intermittent; two perennial) that may provide marginal habitat for the American alligator; however, no individuals were observed during any of the site visits in 2019, 2021, or 2022. A review of the NCNHP records on December 18, 2024, indicated a known occurrence within 1.0 mile of the study area.

Cooley's meadowrue

USFWS Optimal Survey Window: mid-June – early July

Biological Conclusion: No Effect

Cooley's meadowrue, documented in the Pine Savanna natural community, occurs in circumneutral soils in sunny, moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and savannah-like areas, often at the ecotones of intermittent drainages or non-riverine swamp forests. This rhizomatous perennial herb is also found along plowed firebreaks, roadside ditches and rights-of-way, forest clearings dominated by grass or sedge, and powerline or utility rights-of-way. The species requires some type of disturbance (e.g., mowing, clearing, periodic fire) to maintain its open habitat. The plant typically

occurs on slightly acidic (pH 5.8 to 6.6) soils that are loamy fine sand, sandy loam, or fine sandy loam; at least seasonally moist or saturated; and mapped as Foreston, Grifton, Muckalee, Torhunta, or Woodington series. Marginal habitat for Cooley's meadowrue is present in the study area in the form of maintained roadside rights-of-way, powerline and sewer easements, and ecotones of intermittent drainages. A review of NCNHP records on December 18, 2024, indicated no known occurrences in or within 1.0 mile of the study area. A pedestrian survey performed by AECOM biologists on June 10, 2021, determined there are no specimens of Cooley's meadowrue present within the study area. The study area will be re-surveyed prior to the publication of the FEIS.

Golden sedge

USFWS Optimal Survey Window: mid-April – mid June

Biological Conclusion: No Effect

Golden sedge, a very rare endemic of the Atlantic Coastal Plain, grows in sandy soils overlying calcareous deposits of coquina limestone, where the soil pH, typically between 5.5 and 7.2, is unusually high for this region. The perennial prefers the ecotone between the pine savanna and adjacent wet hardwood or hardwood/conifer forest. Most plants occur in the partially shaded savanna/swamp where occasional to frequent fires favor an herbaceous ground layer and suppress shrub dominance. Soils supporting the species are very wet to periodically shallowly inundated. Other occurrences may occur on disturbed areas such as roadside and drainage ditches or powerline rights-of-way, where mowing and/or very wet conditions suppress woody plants. Poorly viable occurrences may occur in significantly disturbed areas where ditching activities that lower the water table and/or some evidence of fire suppression threatens the species. Marginal habitat for golden sedge is present in the study area in the form of maintained roadside rights-of-way and portions of powerline and sewer easements where mowing and/or very wet conditions suppress woody plants. It is unlikely that the species is present within the study area due to the lack of regular-enough disturbance to suppress woody plant or shrub dominance. No wet pine savanna communities are present within the study area. A review of NCNHP records on December 18, 2024, indicated no known golden sedge occurrences within 1.0 mile of the study area. A pedestrian survey performed by AECOM biologists on June 10, 2021, determined there are no specimens of golden sedge present within the study area. The study area will be re-surveyed prior to the publication of the FEIS.

Green sea turtle

USFWS Optimal Survey Window: April – August

Biological Conclusion: No Effect

The green sea turtle is found in temperate and tropical oceans and seas as well as in shallow waters, including lagoons, reefs, mangrove swamps, and inlets. Suitable habitat for green sea turtle is not present in the study area as no marine areas are present in the study area; therefore, the proposed project would have no effect on this species. A review of NCNHP records on December 18, 2024, indicated no known green sea turtle occurrences within 1.0 mile of the study area.

Kemp's ridley sea turtle

USFWS Optimal Survey Window: April – August

Biological Conclusion: No Effect

Kemp's ridley sea turtles prefer neritic areas with sandy or muddy bottoms and prefer to nest on beach areas backed up by swamps or large bodies of open water with a well-defined dune area. Suitable habitat for Kemp's ridley sea turtle is not present in the study area as no marine or estuarine areas are present in the study area. Therefore, the proposed project would have no effect on this species. A review of NCNHP records on December 18, 2024, indicated no known Kemp's ridley sea turtle occurrences within 1.0 mile of the study area.

Leatherback sea turtle

USFWS Optimal Survey Window: April – August

Biological Conclusion: No Effect

Leatherback sea turtles are found throughout the world in tropical waters of the Atlantic, Pacific, and Indian Oceans. Suitable habitat for leatherback sea turtle is not present in the study area as no marine or open ocean areas are present in the study area. Therefore, the proposed project would have no effect on this species. A review of NCNHP records on December 18, 2024, indicated no known leatherback sea turtle occurrences within 1.0 mile of the study area.

Magnificent ramshorn

USFWS Optimal Survey Window: Unknown

Biological Conclusion: No Effect

The magnificent ramshorn is an air-breathing freshwater gastropod mollusk. It is an integral part of a complex food web that was historically only from freshwater ponds in coastal NC. The proposed project would not impact any designated critical habitat for the species and therefore would have no effect. A review of NCNHP records on December 18, 2024, indicated no known magnificent ramshorn occurrences within 1.0 mile of the study area.

Monarch butterfly

USFWS Optimal Survey Window: Unknown

Biological Conclusion: Undetermined

A proposal to list the monarch butterfly as threatened and designate critical habitat was published in the *Federal Register* on December 12, 2024. A 90-day comment period will occur from December 12, 2024, to March 12, 2025. Two public informational meetings and hearings will be held on January 14 and 15, 2025 (USFWS 2024b). Monarch butterflies are found across North America and are one of the few migratory insects. The eastern population of the species ranges as far north as southern Canada in the summer and travel up to 2,800 miles between summer breeding habitat and winter habitat in the mountains of central Mexico. Milkweeds (*Asclepias* sp.) are the only plants that monarch butterflies use

to lay their eggs and the only plant that young caterpillars use as a food source. Upon listing, USFWS is expected to provide habitat descriptions and an area of influence/distribution range for the species. When this information is provided, it will help to inform NCDOT's determinations on habitat that could be impacted by NCDOT actions. The biological conclusion for the species is undetermined at this time. A review of NCNHP records on December 18, 2024, indicated no known monarch butterfly occurrences within 1.0 mile of the study area.

Piping plover

USFWS Optimal Survey Window: year-round

Biological Conclusion: No Effect

The piping plover breeds along the entire eastern coast of the United States. North Carolina is uniquely positioned in the species' range, being the only state where the piping plover's breeding and wintering ranges overlap and the birds are present year-round. They nest most commonly where there is little or no vegetation, but some may nest in stands of beach grass. The nest is a shallow depression in the sand that is usually lined with shell fragments and light-colored pebbles. There is no suitable habitat present within the study area or within 1 mile of the study area for the piping plover. A review of NCNHP records on December 18, 2024, indicated no piping plover occurrences within 1.0 mile of the study area.

Red-cockaded woodpecker

USFWS Optimal Survey Window: year-round; November-early March (optimal)

Biological Conclusion: No Effect

The red-cockaded woodpecker (RCW) typically occupies open, mature stands of southern pines, particularly longleaf pine (*Pinus palustris*), for foraging and nesting/roosting habitat. RCW excavates cavities for nesting and roosting in living pine trees, aged 60 years or older, and that are contiguous with pine stands at least 30 years of age to provide foraging habitat. The foraging range of the RCW is normally no more than 0.5 mile. Marginal foraging habitat exists within the study area for the RCW; however, there is no connectivity to the stands of open-canopied longleaf pine present in the northern portion of the study area, to the north of Martin Luther King Jr. Parkway. It is unlikely that suitable nesting habitat is present within 0.5 mile of the study area. A review of NCNHP records on December 18, 2024, indicated no known RCW occurrences within 1.0 mile of the study area.

Rough-leaved loosestrife

USFWS Optimal Survey Window: mid-May – June

Biological Conclusion: No Effect

Rough-leaved loosestrife, endemic to the Coastal Plain and Sandhills of North and South Carolina, generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins in dense shrub and vine growth on moist to seasonally saturated sands and on shallow organic soils overlying sand (spodosolic soils). Occurrences are found in such disturbed habitats as roadside depressions, maintained powerline and utility line rights-of-way, firebreaks, and trails. The species

prefers full sunlight, is shade intolerant, and requires areas of disturbance (e.g., clearing, mowing, periodic burning) where the overstory is minimal. It can, however, persist vegetatively for many years in overgrown, fire-suppressed areas. The plant is known to occur on the Blaney, Gilead, Johnston, Kalmia, Leon, Mandarin, Murville, Torhunta, and Vaucluse soil series. Marginal habitat for rough-leaved loosestrife is present in the study area in the form of maintained roadside rights-of-way and portions of powerline and sewer easements. It is unlikely that the species is present within the study area due to the lack of regular-enough disturbance to suppress woody plant or shrub dominance and provide areas of full sun. No pond pine pocosins were observed within the study area during site visits in 2019, 2021, or 2022. A review of NCNHP records on December 18, 2024, indicated no known rough-leaved loosestrife occurrences within 1.0 mile of the study area. A pedestrian survey performed by AECOM biologists on June 10, 2021, determined there are no specimens of rough-leaved loosestrife present within the study area. The study area will be re-surveyed prior to the publication of the FEIS.

Rufa red knot

USFWS Optimal Survey Window: Year Round

Biological Conclusion: No Effect

Habitats used by red knots in migration and wintering areas are similar in character: coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In North America, red knots are commonly found along sand, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks. Ephemeral features such as sand spits, islets, shoals, and sandbars often associated with inlets can be important habitat for roosting. The study area does not contain any tidal areas, inlet areas, or beaches; therefore, the proposed project would have no effect on this species. A review of NCNHP records on December 18, 2024, indicated no known occurrences within 1.0 mile of the study area.

Tricolored bat

USFWS Optimal Survey Window: June 1 – August 15

Biological Conclusion: May Affect, Likely to Adversely Affect

USFWS issued a programmatic conference opinion (PCO) in conjunction with FHWA, USACE, and NCDOT for the tricolored bat in eastern North Carolina. The PCO covers the entire NCDOT program in Divisions 1 to 8, including all NCDOT projects and activities. NCDOT, FHWA, and USACE have agreed to three conservation measures (listed in the PCO), which will avoid/minimize take to tricolored bats. These conservation measures apply to all counties in Divisions 1 to 8. The programmatic determination for tricolored bat for the NCDOT program is May Affect, Likely to Adversely Affect. Once the tricolored bat is officially listed, the PCO will become the programmatic biological opinion (PBO) by formal request from FHWA and USACE. The PBO will ensure compliance with Section 7 of the ESA for approximately 5 years (effective through December 31, 2028) for all NCDOT projects with a federal nexus in Divisions 1 to 8, which includes New Hanover County, where U-4434 is located.

West Indian manatee

USFWS Optimal Survey Window: year-round

Biological Conclusion: No Effect

Manatees are found in canals, sluggish rivers, estuarine habitats, salt water bays, and as far off-shore as 3.7 miles. They utilize freshwater and marine habitats at shallow depths of 5 to 20 feet. Suitable habitat for West Indian manatee is not present as no open freshwater or marine habitats are present in the study area. The study area does not contain any large rivers in close proximity (within 5 miles of) to the ocean. Therefore, the proposed project would have no effect on this species. A review of NCNHP records on December 18, 2024, indicated no known occurrences within 1.0 mile of the study area.

Northern long-eared bat

USFWS Optimal Survey Window: June 1 – August 15

Biological Conclusion: May Affect, Likely to Adversely Affect

USFWS issued a PBO in conjunction with FHWA, USACE, and NCDOT for the northern long-eared bat (NLEB) (*Myotis septentrionalis*) in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1 to 8, including all NCDOT projects and activities. Although the PBO covers Divisions 1 to 8, USFWS only considers NLEBs to be known or potentially found in 30 counties within Divisions 1 to 8. NCDOT, FHWA, and USACE have agreed to two conservation measures that would avoid/minimize mortality of NLEBs. These conservation measures only apply to the 30 current known/potential counties shown on Figure 2 of the PBO at this time (USFWS 2022). The programmatic determination for NLEB for the NCDOT program is “May Affect, Likely to Adversely Affect.” The PBO will ensure compliance with Section 7 of the ESA for 10 years (effective through December 31, 2030) for all NCDOT projects with a federal nexus in Divisions 1 to 8, which includes New Hanover County, where STIP U-4434 is located. A review of NCNHP records on December 18, 2024, indicated the NLEB occurring within 1.0 mile of the study area.

3.5.4.2 Summary of Impacts

Table 3-22 summarizes the federally protected species listed for New Hanover County and the biological conclusion for the proposed project’s likely effect on each species.

Table 3-22: ESA Federally Protected Species Listed for New Hanover County

Common Name	Scientific Name	Federal Status	Habitat Present	Biological Conclusion
American alligator	*Alligator mississippiensis*	T (S/A)	Yes	Not Required
Cooley's meadowrue	*Thalictrum cooleyi*	E	Yes	No Effect
Golden sedge	*Carex lutea*	E	Yes	No Effect
Green sea turtle	*Chelonia mydas*	T	No	No Effect
Kemp's ridley sea turtle	*Lepidochelys kempii*	E	No	No Effect
Leatherback sea turtle	*Dermochelys coriacea*	E	No	No Effect
Magnificent ramshorn	*Planorbella magnifica*	E	No	No Effect
Monarch butterfly	*Danaus plexippus*	PT	Unknown	Undetermined
Piping plover	*Charadrius melodus*	T	No	No Effect
Red-cockaded woodpecker	*Picoides borealis = Dryobates borealis*	E	Yes	No Effect
Rough-leaved loosestrife	*Lysimachia asperulaefolia*	E	Yes	No Effect
Rufa red knot	*Calidris canutus rufa*	T	No	No Effect
Tricolored bat	*Perimyotis subflavus*	PE	Yes	MA-LAA
West Indian manatee	*Trichechus manatus*	E	No	No Effect

E - Endangered
T - Threatened
T(S/A) - Threatened due to similarity of appearance
MA-LAA - May Affect – Likely to Adversely Affect

3.5.5 Areas of Environmental Concern

The Coastal Area Management Act of 1972 (CAMA) requires permits for development in areas of environmental concern (AEC) within North Carolina's 20 coastal counties. An AEC is an area of natural importance. It may be easily destroyed by erosion or flooding; or it may have environmental, social, economic, or aesthetic values that make it valuable to the state.

3.5.5.1 Affected Environment

Smith Creek, its associated floodplain wetlands, and its tidal tributaries north of Martin Luther King Jr. Parkway are all identified within the study area as AECs, with the designation of Estuarine and Ocean System.

3.5.5.2 Impacts

Neither DSA for the proposed project would impact Smith Creek or any designated coastal wetlands. Both DSAs for the proposed project would impact 859 linear feet of tidal, estuarine waters.

3.5.6 Essential Fish Habitat

There is no Essential Fish Habitat located within the study area, and no impacts are anticipated as a result of the proposed project.

3.5.7 Bald Eagle and Golden Eagle Protection Act

The bald eagle is protected under the Bald and Golden Eagle Protection Act of 1940, which is enforced by USFWS. Habitat for the bald eagle primarily consists of mature forests in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.

3.5.7.1 Affected Environment

A desktop GIS assessment of the study area, as well as the area within a 1.13 mile radius (1.0 mile plus 660 feet) of the study area, was performed on December 23, 2024, using 2024 color aerials. There are no mature forests adjacent to large bodies of open water within the study area. There is a large stormwater pond in the southeastern portion of the study area; however, it is surrounded by infrastructure and residential development. The main body of Smith Creek, outside of the study area, could present marginal habitat, with foraging habitat between Smith Creek and ILM.

3.5.7.2 Impacts

Foraging habitat is not present within the study area as it is dominated by young pocosin, plantation-type forests, and urban/residential areas. A review of NCNHP records on December 18, 2024, indicated no known occurrences of this species within 1.0 mile of the study area. Due to the lack of habitat, known occurrences, and minimal impact anticipated for this project, it has been determined that the proposed project would not affect this species.

3.5.8 Anadromous Fish Habitat

There are no trout waters or designated anadromous fish spawning habitat present within the study area, and no impacts are anticipated as a result of the proposed project.

3.6 Alternative Comparison Matrix

Estimated environmental impacts associated with the DSAs are provided in Table 3-23.

Table 3-23: Alternative Comparison Matrix

Resource	Alternative 7 with SPUI Option	Alternative 7 with TUDI Option
Project Features		
Length of Corridor (miles)	1.7	1.7
Number of Interchanges	2	2
Number of Railroad Crossings	2	2
Number of Major Power Easement Crossings	1	1
Level of Service at Market Street Interchange (a.m., p.m.)	D, D	C, C
Construction Cost	$130,500,000	$122,350,000
Right-of-way Cost	$70,350,000	$88,667,000
Utility Cost	$3,940,700	$3,632,000
Total Cost	$**204,790,700**	$**214,649,000**
Socioeconomic Features		
Parks (number)	1	1
Places of Worship (number)	2	2
Cemeteries (number)	0	0
Schools (number)	2	2
Daycares (number)	1	1
Libraries (number)	0	0
Community Centers (number)	0	0
Greenways (number)	1	1
Fire Stations (number)	0	0
Hospitals (number)	0	0
Relocations		
Business Relocations (number)	31	37
Residential Relocations (number)	59	71
Church / Non-Profit (number)	1	2
Total (number)	**91**	**110**
Physical Environment		
Potential Noise Receptor Impacts (number)	174	183
Farmland Soils (acres)	N/A	N/A
Hazardous Materials Sites (number)	11	11
Floodplains – 100-year including Floodway (acres)[a]	4.9	5.0
Floodplains – 500-year (acres)[a]	1.3	1.3
Floodway (acres)[a]	0.4	0.4
Preservation Areas[b] (number)	1	1

Resource	Alternative 7 with SPUI Option	Alternative 7 with TUDI Option
Cultural Resources and Section 4(f)/6(f)		
Archaeological Sites (number)	1	1
Historic Properties (number)	0	0
Section 4(f) Resources (number)	1	1
Section 6(f) Resources (number)	0	0
Natural Environment		
Forested Land (acres)[c,d,e]	77.3	78.3
Stream Crossings (number)	5	5
Streams (linear feet)[a,f]	1,900	1,919
Wetlands (acres)[a]	3.8	3.9
Ponds (number)	0	0
Federally Protected Species Habitat Present	Yes	Yes
Terrestrial Communities		
Coastal Plain Bottomland Hardwoods	1.4	1.4
Cypress Gum Swamp	1.3	1.3
Maintained Disturbed	93.2	100.7
Mesic Mixed Hardwood Forest	0.3	0.9
Pine Flatwoods	68.3	68.7
Pine Scrub Oak Sandhill	3.9	3.9
Tidal Cypress Gum Swamp	2.0	2.0
Total Terrestrial Communities (acres)	**170.4**	**178.9**

[a] Impacts calculated using preliminary design slope stake limits plus a 25-foot buffer.
[b] Maides Park – NCNHP Managed Area
[c] Includes Coastal Plain Bottomland Hardwoods, Cypress Gum Swamp, Mesic Mixed Hardwood Forest, Pine Flatwoods, Pine Scrub Oak Sandhill, and Tidal Cypress Gum Swamp.
[d] Impacts calculated using preliminary design right-of-way limits.
[e] 0.52 acre of the right-of-way limits were missing from the original terrestrial communities' survey (NCDOT 2012a). These 0.52 acre were added as impacts to Pine Flatwoods based on surrounding surveyed communities and review of aerial imagery.
[f] Impacts associated with both DSAs include 859 feet of estuarine waters.

3.7 Reasonably Foreseeable Effects

The reasonably foreseeable effects associated with the proposed project are identified and assessed in the LUSA and CIA (NCDOT 2019f, 2019g). The time horizon for reasonably foreseeable effects is 2040 and a summary of anticipated effects is provided in this section of the DEIS. Further information can be found in the aforementioned technical reports.

Reasonably foreseeable effects were assessed within the FLUSA by predicting changes in development types within defined probable development areas (PDA) as a result of the build and no-build scenarios. The development pressures and regulations, proposed future land use, infrastructure, and proximity to

proposed economic centers were considered to determine the degree of impact to notable features and waterways within each PDA with and without the proposed project.

As discussed in Section 1.2.4, the City of Wilmington has been aware of the proposed project and has included it in major planning documents that have been developed by the city. The proposed project would likely have positive impacts in terms of encouraging mixed-use type of development. The proposed project is not associated with an explicit economic development purpose nor is it intended to serve a specific development.

Based on the information gathered, most of the categories on the screening tool reflected moderate to high concern for effects potential. A summary of justification for each category rating follows.

Scope of Project - The proposed project would be a north-south thoroughfare that would connect with other existing thoroughfares. In addition, the proposed project would have full control of access, two lanes in each direction, and would be approximately 1.7 miles in length. This category was rated medium.

Travel Time Savings – Travel time savings is expected to be less than 5 minutes based on qualitative methods. The proposed project proposes a four-lane divided, full-controlled-access thoroughfare that would connect with existing thoroughfares. Time savings is anticipated due to existing congestion in the area. This category was rated medium.

Forecasted Population Growth - The ACS indicated the annualized growth rate between 2000 and 2010 for the FLUSA was 2.6 percent. This growth rate is anticipated to continue based on recent and planned housing developments within the FLUSA. For these reasons, a medium-high ranking was selected.

Forecasted Employment Growth – Employment projections for the region are expected to have an average annual growth rate of 2.5 percent through 2035. With the land use plan designating several large tracts of land for the purpose of office, commercial, and industrial development, the FLUSA is likely to see a large increase in employment opportunities through 2030. Therefore, this category received a rating of high (City of Wilmington 2004).

Available Land - There is approximately 529 acres of undeveloped and underutilized land within the FLUSA, 272 parcels with unique owners resulting in a parcel-to-owner ratio of 1.2. A weighting factor of 0.75 was assigned and resulted in a 30 percent weighted available land score. This score denotes a medium amount of available land.

Water and Sewer Availability – The entire FLUSA is served by all public utilities. Thus, this category was rated high.

Market for Development – The major planned development areas are the Burnt Mill Business Park and residential development near North 30th Street and Princess Place Drive. This category was rated high.

Public Policy – Existing city ordinances and plans encourage new development and redevelopment. In addition, the project is required to follow CAMA regulations. Thus, this category was rated medium.

Notable Environmental Features - Stream and wetland systems exist within the FLUSA that would be crossed by the project; a low rating was selected.

The overall result, considering the scope of the project, annual population growth in the FLUSA, and the amount of economic growth expected in the area, suggested assessment through a Land Use Scenario Assessment would be warranted.

The Land Use Scenario Assessment Matrix resulted in "Indirect Land Use Impacts Not Likely."

The City of Wilmington's Land Development Code, Create Wilmington Comprehensive Plan, and Market Street Corridor Plan include policies that intend to encourage high intensity development, redevelopment, and infill within the FLUSA. These policies have increased development pressure within the FLUSA under a no-build scenario.

Under a build scenario, the scope of development, development intensity, and future shift of regional population growth is not anticipated to change because the proposed project includes full control of access and would not result in new access to undeveloped parcels. If built, the proposed project is likely to increase the rate of commercial development in the PDA, creating a future shift in regional employment. The proposed project is within the municipal boundaries of the City of Wilmington, so the no-build and build scenarios were ranked similarly for development outside of regulated areas and planned area.

3.8 Irreversible and Irretrievable Commitment of Resources

An irreversible or irretrievable commitment of resources refers to losses or impacts that cannot be reversed or recovered (i.e., the losses are permanent). Examples include permanent conversion of wetlands and streams or loss of cultural resources, soils, wildlife, and socioeconomic conditions.

A commitment of resources is considered irreversible if impacts to a resource, either directly or indirectly, limit the future option for the resource. A commitment of irreversible impacts to resources typically applies primarily to the effects of use of nonrenewable resources, such as minerals and cultural resources. Irretrievable impacts or commitment of resources refer to loss of production or use of natural resources.

The consumption of resources is evaluated to ensure that it is justified as a result of the proposed project. The proposed project would require the irretrievable commitment of natural resources through direct consumption of construction materials such as wood, aggregate, and cement to construct roadways and bridges, and to fossil fuels such as gasoline and diesel to power construction equipment.

3.9 Relationship Between Long-Term and Short-Term Uses of the Environment and Anticipated Benefits

This section defines the balance, or trade-off, between short-term uses and long-term productivity needs in relation to the proposed project. The short-term effects on and uses of the environment in the vicinity of the DSAs are related to the long-term effects and maintenance and enhancement of long-term productivity. Short-term relates to the total duration of construction of the proposed project. Long-term refers to an indefinite period after construction of the proposed project and includes the long-term mitigation measures that may be implemented, as well as the ongoing operation and maintenance of the newly constructed roadway.

The most disruptive short-term impacts associated with the proposed project would occur during land acquisition and project construction, such as construction hauling, noise, lighting, and/or dust. However, these short-term uses of human, physical, economic, cultural, and natural resources would contribute to the long-term productivity of the study area.

The relocation report (Appendix D) noted that, based on the type of residential properties affected by the proposed project, finding low income rentals in the Wilmington and New Hanover County area may be difficult (NCDOT 2022b). Early coordination among the City of Wilmington, Wilmington Housing Authority, Wave Transit, and NCDOT relocation assistance staff to identify affordable housing near transit services and pedestrian infrastructure may be beneficial in minimizing impacts to relocated, low-income residents. The proposed project is consistent with the objectives of state and local transportation plans. It is anticipated that the proposed project would enhance long-term access and connectivity in New Hanover County and would support local, regional, and statewide commitments to transportation improvement and economic viability.

3.10 Mitigation Measures

Once a preferred alternative is selected, project-specific avoidance, minimization, and mitigation measures would be determined as necessary. General mitigation measures that would be employed include the following:

- Relocation benefits under the Uniform Relocation Act will be available to anyone relocated by the proposed project.
- Context sensitive designs will be used in areas along the preferred alternative where visual/aesthetic impacts or community cohesion impacts are likely.
- Appropriate mitigation measures for impacts to community cohesion will be implemented. NCDOT will work closely with impacted communities to identify measures that are desirable specific to relocatees and those impacted.
- Best management practices and sediment and erosion control plans will be implemented to minimize soil compaction and erosion outside of the construction area as required and to the maximum extent practicable.
- Prior to the start of project construction activities, an erosion and sedimentation control plan will be prepared in accordance with the NCDOT guidelines in *Best Management Practices for Protection of Surface Waters* (NCDOT 1997a) and *NCDOT Stormwater Best Management Practices Toolbox* (NCDOT 2014c).
- Best management practices will be used to minimize transport and distribution of non-native vegetation cuttings and seeds. Newly disturbed areas will be replanted with designed species as required and as soon as practicable.
- Jurisdictional streams in the study area will be designated as warm water streams for the purposes of stream mitigation. Mitigation requirements will be coordinated with NCDEQ and USACE. NCDOT will investigate potential on-site stream and wetland mitigation opportunities once the preferred alternative has been selected. On-site mitigation measures will be used as much as possible. Off-site mitigation measures needed to satisfy the federal

CWA requirements for this project will be provided by the NCDEQ Division of Mitigation Services in accordance with applicable In-Lieu Fee mitigation programs.

- Total avoidance of surface waters is not practicable. The DSAs were developed to minimize impacts to streams and wetlands. NCDOT will continue to attempt to avoid and minimize impacts to streams and wetlands to the greatest extent practicable in identifying the preferred alternative and during project final design.
- Avoidance, minimization, and mitigation measures will be taken in compliance with Section 106 for cultural resources within the corridor of the preferred alternative. It has been recommended that data recovery excavations (Phase III archaeological study) be performed at Site 31NH887 to mitigate the adverse effects the proposed project would cause at the site (NCDOT 2019d). Phase III studies typically take the form of large-scale excavations at a site to document cultural features and artifact patterns, coupled with analytical tasks to help further understand past lifeways. The work is guided by a data recovery plan that contains a research design specific to each site. The research design for 31NH887 will be developed by NCDOT in consultation with the NC HPO, and will detail a number of research questions the work may address, the level of effort required, field tasks, and analytical tasks (including any specialized analyses deemed appropriate), as well as appropriate reporting avenues (e.g., technical reports, public outreach). Once agreed upon, the data recovery excavations will be carried out prior to any ground disturbing activities for the construction of the proposed project.
- Once the preferred alternative is selected, a design noise report will determine more specific details regarding noise abatement measures.

3.11 Required Permits and Actions

Through agency coordination, the following permits and actions have been identified as necessary for the proposed project.

3.11.1 Required Permits

3.11.2 North Carolina Division of Water Resources

Section 401 Certification. Any activity that may result in discharge to jurisdictional waters and that requires a federal permit must obtain a certification that such discharge would comply with applicable state water quality standards.

Authority. North Carolina General Statute 143, Article 215, Part 1. Regulations promulgated in 15A NCAC-2H and 2B.

3.11.3 North Carolina Division of Coastal Management

CAMA Major Permit. A CAMA Major Permit from North Carolina Division of Coastal Management would be required for all impacts to designated AECs within the study area. CAMA AECs were identified in the study area in the form of estuarine and ocean system waters. It is anticipated that a CAMA Major Permit would be required under this project.

Authority. Coastal Area Management Act of 1974, Parts 1-6 (1973, c. 1284, s. 1;1975, c. 452, s. 5;1981, c. 932, s. 2.1.).

3.11.4 United States Army Corps of Engineers

Section 404 Permit. A Section 404 Permit from USACE is required for any activity in water or wetlands that would discharge dredged or fill materials into waters of the United States and adjacent wetlands. To obtain permit approval, impacts to wetlands must be mitigated through avoidance, minimization, and compensation measures in accordance with the "Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines" (EPA and Department of the Army 1990).

Authority. Federal Water Pollution Control Act Amendments of 1972 and Section 404 of the CWA of 1977. Regulations promulgated in 33 CFR 323.

4 Section 6(f) and Section 4(f)

In this chapter, resources subject to Section 6(f) and Section 4(f) are identified and shown on Figure 4-1, potential uses of those resources are discussed, avoidance alternatives and other measures to minimize harm to the resources are assessed, and coordination with the public official having jurisdiction over each resource is documented.

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act of 1965 (16 U.S.C. 4601-4 et seq.) states that parks developed or improved using LWCF grant funds cannot be acquired unless no other reasonable and feasible alternative exists and requires coordination with the National Park Service.

Section 4(f) of the US Department of Transportation Act of 1966 provides protection for publicly owned parks, recreation areas, and wildlife and waterfowl refuges as well as significant historic sites. Historic sites protected by this regulation include sites that are eligible for listing or are listed on the NRHP.

There are no state or national parks or forests within the study area. There are six local parks within the study area: Maides Park, Beaumont Park, McCray Park, Mother's Park, Triangle Park, and Empie Park. Empie Park was developed using LWCF grant funds. All the parks are publicly owned resources owned by the City of Wilmington. Maides Park would be accessible by the proposed project via the multi-use path. None of the other parks are accessed by the proposed project.

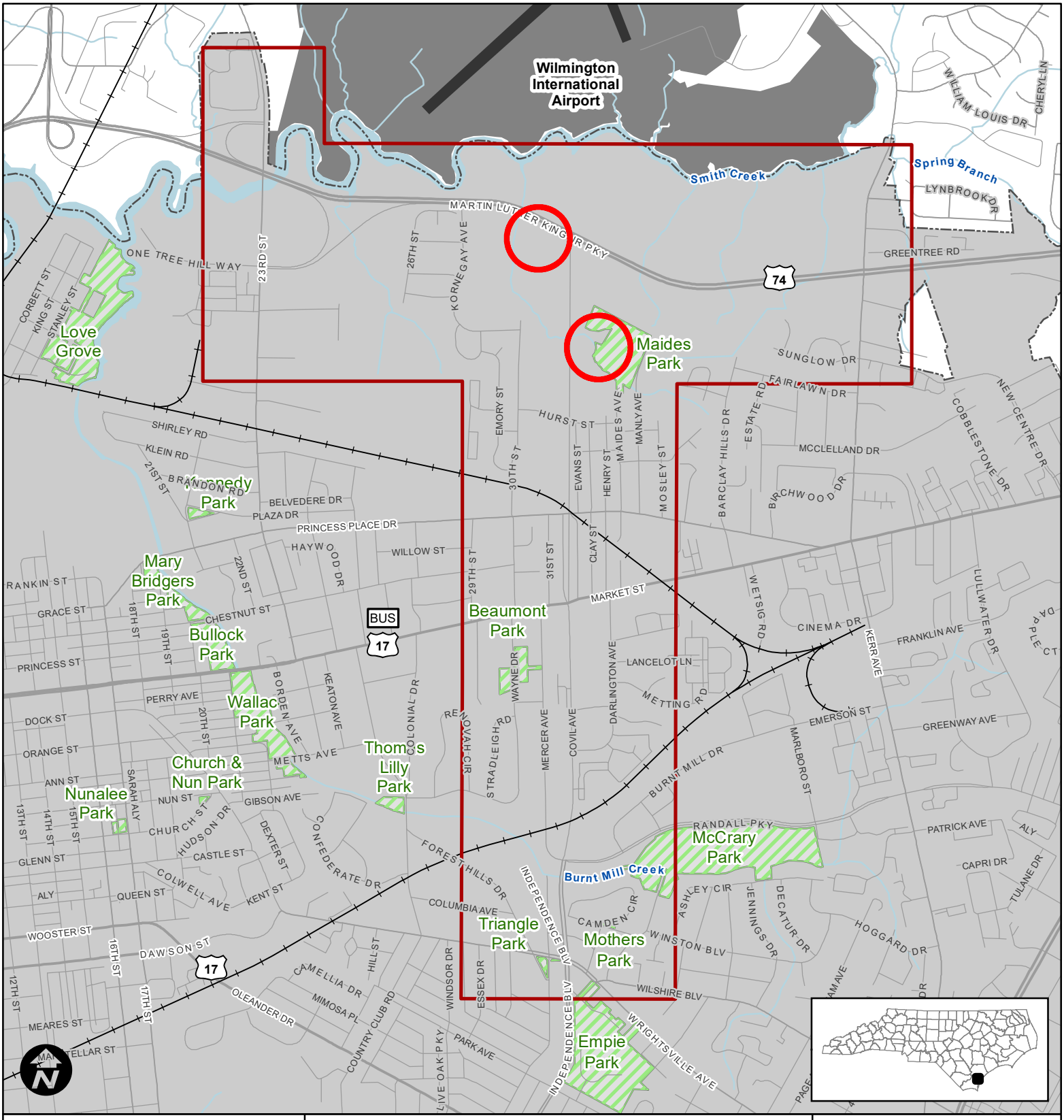
Archaeological surveys resulted in the discovery of two historic sites, one of which has been recommended as eligible for the NRHP (NCDOT 2019d).

4.1 Description of Section 6(f) Resources

Empie Park, at the southern end of the study area, is a Section 6(f) resource. The park received a grant from the LWCF in 1967 for the development of the park. The City of Wilmington purchased the land. The park is a 32-acre City of Wilmington Park that contains the Althea Gibson Tennis Complex, which has 18 lighted tennis courts and a clubhouse. The park also has playgrounds, ball fields, a dog park, basketball courts, and shuffleboard and bocce courts. The LWCF grant covers the entirety of the park.

4.2 Use of Section 6(f) Resources

There would be no impact to Empie Park because of the proposed project. While within the study area, the park is outside of any proposed right-of-way or construction areas.



Independence Boulevard Extension Project
STIP U-4434

New Hanover County

Legend

- Railroad
- Stream
- Approximate Archaeological Site
- Study Area
- Park
- County Boundary

Figure 4-1
Section 6(f) and Section 4(f) Resources

Date: December 2024

0 0.125 0.25 0.5
Miles

1 inch = 2,000 feet

4.3 Description of Section 4(f) Resources

4.3.1 Historic Sites

The NC HPO reviewed the study area for historic architectural resources in 2012 and again in 2019. In a letter dated April 23, 2012, and email correspondence dated March 28, 2019, it was determined the project would not have an effect on any historic structures (Appendix G).

4.3.2 Archaeological Resources

An archaeological survey (Phase I and II studies) for the proposed project was completed in August 2019 (NCDOT 2019d). During the survey, two sites were recorded. Site 1 (31NH886) is a historic cemetery (Maides Cemetery). Site 2 (31NH887) is a prehistoric site on the south side of Martin Luther King Jr. Parkway that produced numerous ceramic sherds. The site was found to consist of artifacts from at least four different time periods.

Site 31NH886, as a historic cemetery, does not meet special criteria consideration for being considered eligible for the NRHP. Site 1 is not recommended as eligible and is outside the APE for the proposed project.

Site 31NH887 is recommended as eligible for the NRHP under Criterion D based on the vertical and horizontal integrity of the prehistoric occupations represented. The archaeological assessment recommends avoidance of Site 31NH887 if possible. If not possible, it is recommended that adverse effects to the site be mitigated as appropriate prior to any ground disturbing activities.

In a letter dated March 31, 2020, the NC HPO concurred with the findings of the archaeological assessment. The letter confirms “testing revealed that site 31NH887 contains material evidence of 5000 years of short-term habitations. Despite the site’s proximity to the MLK Parkway, it still retails integrity indicating its likelihood to yield information important to prehistory. ” NC HPO recommends “mitigation in the form of additional data recovery be conducted. The mitigation is recommended because the site’s proximity to Martin Luther King Jr Parkway and the future Independence Boulevard intersection make avoidance of this important archaeological site improbable. We further recommend that disturbance by the NCDOT Wildlfower Program, for which a portion of the site is currently being used, be discontinued until the archaeology is complete” (Appendix G).

4.3.3 Public Parks and Recreation Areas

There are no state or national parks or forests within the study area. There are six local parks within the study area. Maides Park, located north of Princess Place Drive along Manly Avenue, is a neighborhood park owned and operated by the City of Wilmington. The park went through extensive renovations and had a grand re-opening in May 2009. Park amenities include picnic shelters, grills, basketball courts and athletic fields with lights, walking trails, and a community center that includes a full-service kitchen, multi-purpose rooms, space for arts and crafts, and a computer lab. Other notable features within Maides Park include a small cemetery and a stream.

In addition to Maides Park, the City of Wilmington operates Beaumont Park, located between Wayne Drive and Mercer Avenue just south of Market Street. Beaumont Park is a neighborhood park, approximately 3 acres in size and contains a playground, picnic areas, and basketball courts.

McCray Park is located at the intersection of Randall Parkway and Marlboro Street, northeast of Colonial Village. Park amenities include shelters, picnic tables, a canoe/kayak launch, and fishing. A segment of the Cross-City Trail is located north of the park along Randall Parkway.

Mother's Park, a neighborhood park, is in the Colonial Park neighborhood. It includes playground equipment, tables, and benches.

Triangle Park and Empie Park are in the southern portion of the study area. Triangle Park is a triangular 0.5-acre parcel bounded by Wrightsville Avenue to the north and Forest Hills Drive to the south and east. There are no facilities within the park. The Cross-City Trail traverses the park. Empie Park is owned and operated by the City of Wilmington. It includes playgrounds, tennis courts, open space, picnic shelters, a concession stand, basketball courts, athletic fields, lighted facilities, and a dog park.

All these parks are publicly owned resources owned by the City of Wilmington. Maides Park would be accessible by the proposed project via the multi-use path. None of the other parks are accessed by the proposed project.

4.4 Use of Section 4(f) Resources

Two types of Section 4(f) resources would be affected by this project: archaeological sites and public parks/recreation areas. Table 4-1 lists the resources located within the study area that are protected under Section 4(f).

Section 106 coordination has confirmed that Section 4(f) would not apply to Site 31NH887. In a letter dated March 31, 2020, NC HPO concurred with the findings that "mitigation in the form of additional data recovery be conducted. The mitigation is recommended because the site's proximity to Martin Luther King Jr Parkway and the future Independence Boulevard intersection make avoidance of this important archaeological site improbable. We further recommend that disturbance by the NCDOT Wildlfower Program, for which a portion of the site is currently being used, be discontinued until the archaeology is complete" (Appendix G). Section 4(f) does not apply to this resource as the site is important chiefly because of what can be learned by data recovery and has not been recommended for preservation in place (23 CFR 771.135(g)).

A *de minimis* finding is anticipated for Maides Park due to the minor impacts proposed to the property that would not affect its intended use.

Table 4-1: Section 4(f) Applicability Evaluation

Resource	Section 4(f) Applicable
Maides Park	Yes
Beaumont Park	Yes
McCray Park	Yes
Mothers Park	Yes
Triangle Park	Yes
Empie Park	Yes
Site 31NH886	No
Site 31NH887	No

4.4.1 Permanent Incorporation of Property

A summary of the property that would be incorporated by the project due to right-of-way and/or easement impacts is provided in Table 4-2.

The proposed greenway along the east side of the proposed roadway connects the Cross-City Trail at Randall Parkway to Maides Park. In order to make the connection, minor impacts are anticipated; however, the impacts anticipated include minor ground disturbance and would not impact the use of the park.

Table 4-2: Use of Section 4(f) Properties in Acres

Resource	Alternative 7 with SPUI Option[a]	Alternative 7 with TUDI Option[a]
Maides Park	*De Minimis* (0.004 acre)	*De Minimis* (0.005 acre)
Beaumont Park	No use	No use
McCray Park	No use	No use
Mothers Park	No use	No use
Triangle Park	No use	No use
Empie Park	No use	No use
Site 31NH887	Not Applicable	Not Applicable

[a] Amount within preliminary design right-of-way limits

4.4.2 Temporary Occupancy of Property

A temporary occupancy does not constitute a Section 4(f) use when all five conditions listed in 23 CFR Section 774.13(d) are satisfied. Those conditions are as follows:

> (1) Duration [of the occupancy] must be temporary, i.e., less than the time needed for construction of the project, and there should be no change in ownership of the land; (2) Scope of the work must be minor, i.e., both the nature and the magnitude of the changes to the Section 4(f) property are minimal; (3) There are no anticipated permanent adverse physical impacts, nor will there be interference with the protected activities, features, or attributes of the property, on either a temporary or permanent basis; (4) The land being used must be fully

restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and (5) There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

Both DSAs may temporarily impact Maides Park during construction of the multi-use path. Once a preferred alternative is identified, coordination with the officials with jurisdiction over the property would take place prior to FHWA's official determination regarding temporary occupancy to ensure that there is documented agreement of the conditions. Any future coordination regarding temporary occupancy would be included in the FEIS.

4.4.3 Constructive Use of Property

Constructive use is determined by the criteria within 23 CFR 774.15. A constructive use of a Section 4(f) property is possible only in the absence of a permanent incorporation of land or a temporary occupancy of the type that constitutes a Section 4(f) use. Constructive use occurs when the proximity impacts of a project on an adjacent or near-by Section 4(f) property, after incorporation of impact mitigation, are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs when the protected activities, features, or attributes of the Section 4(f) property are substantially diminished. As a general matter, this means that the value of the resource, in terms of its Section 4(f) purpose and significance, would be meaningfully reduced or lost.

It is not anticipated that there would be a constructive use of any Section 4(f) resource(s) as a result of the proposed project.

4.5 Summary of Use and Minimization of Section 4(f) Properties

Both DSAs would result in the "use" of one Section 4(f) resource as defined by 23 CFR 774.17, Maides Park. A *de minimis* finding is anticipated for Maides Park due to the minor impacts proposed to the property that would not affect its intended use.

4.6 Coordination

Written correspondence would be exchanged and meetings would be held, if necessary, with officials with jurisdiction over the Section 4(f) resource identified.

5 Agency Coordination and Public Involvement

This chapter summarizes the coordination efforts with federal, state, and local agencies and the public throughout the environmental documentation process for the proposed project.

5.1 Agency Coordination

The proposed project was coordinated with the appropriate federal, state, and local agencies. Comments and concerns received throughout the project development process are incorporated into this document.

5.1.1 Issuance of Scoping Letter and Notice of Intent

At the start of the environmental studies for the proposed project, the proposed project was identified as TIP number U-4434. A scoping letter soliciting comments on the proposed project was sent on October 15, 2004, to the following local, state, and federal agencies:

- United States Fish and Wildlife Service
- United States Army Corps of Engineers
- North Carolina State Clearinghouse
- North Carolina Department of Cultural Resources – State Historic Preservation Office
- North Carolina Department of Environment and Natural Resources – Division of Forest Resources
- North Carolina Department of Environment and Natural Resources – Division of Water Quality
- North Carolina Department of Environment and Natural Resources – Division of Environmental Health
- North Carolina Department of Environment and Natural Resources – Natural Heritage Program
- North Carolina Department of Environment and Natural Resources – Division of Coastal Management
- North Carolina Wildlife Resources Commission
- Wilmington Urban Area Metropolitan Planning Organization
- City of Wilmington
- North Carolina Department of Transportation:
    - Auxiliary Services, Department of Public Instruction

- Hydraulics Unit
- Roadside Environmental Department
- Geotechnical Unit
- Location and Surveys Unit
- Right-of-Way Branch
- Traffic Engineering Branch
- Division of Bicycle & Pedestrian Transportation
- Congestion Management
- Director of Aeronautics
- Operations, Chief Engineer
- Rail Planner, Rail Program
- Division 3, Division Engineer

The scoping letter and agency comments received in response to the scoping letter are provided in Appendix F.

In addition to the scoping letter, a Notice of Intent (NOI) was published in the *Federal Register* on January 18, 2005. A copy of the NOI is provided in Appendix I.

5.1.2 Section 404/NEPA Merger Process

A Merger Screening Meeting for the proposed project was held on August 10, 2007. During the meeting, it was determined that the proposed project would not follow the Merger process unless unforeseen impacts were found as the project progressed. The following agencies participated in the screening meeting:

- United States Army Corp of Engineers
- Federal Highway Administration
- North Carolina Department of Environment and Natural Resources, Division of Water Quality
- North Carolina Department of Transportation, Project Development and Environmental Analysis Branch
- NCDOT Roadway Design Unit
- NCDOT Natural Environment Unit
- NCDOT Division 3
- URS Corporation (now AECOM)

The agency members felt that, while the project would likely require an individual permit and meets the threshold for inclusion in the Merger process, the range of alternatives is limited due to the existing terminus of Independence Boulevard, existing development, Maides Park, and the need for interchange spacing along Martin Luther King Jr. Parkway. It was determined by the attendees of the meeting that the impact to the human environment would likely be the major issue in that 80 to 100 relocations were being estimated at that time. With limited alternatives, the group felt that there would be little benefit to include the project in the Merger process. The meeting minutes from the Merger Screening Meeting are in Appendix F.

Review of the environmental documents will be the principal method for agency coordination. In general, agency comments will be accepted through written correspondence on agency letterhead or via email; however, telephone and in-person conversations of importance will be documented as well.

5.1.3 Local Official Meetings

At various times during the study, meetings have been held for the benefit of local elected bodies. These have coincided with regularly scheduled meetings, such as the WMPO Transportation Advisory Committee Board meetings and Wilmington City Council meetings. Summaries of these meetings are included in Table 5-1 and Appendix F.

1.1.2 Agency Coordination

Table 5-1 provides a timeline and summary of agency coordination meetings. Meeting summaries for these meetings are included in Appendix F.

5.2 Public Involvement

This section describes the methods that have been used for public outreach, including newsletters, postcards, and public meetings.

As a result of EO 14148, EO 14154, EO 14173, and the removal of the CEQ's regulations, all federal environmental justice requirements are revoked and no longer applicable to the federal environmental review process. Accordingly, this DEIS does not consider public comments regarding environmental justice.

Three public outreach events have been held for the proposed project. The first open-house style public meeting formerly/previously referred to as citizen informational workshops (CIW), was held on June 13, 2011, at the Rachel Freeman School of Engineering in Wilmington, North Carolina. Another open-house style public meeting was held on July 22, 2019, also at the Rachel Freeman School of Engineering. Renderings of the preliminary designs were presented at the July 2019 meeting to assist the public in visualizing the proposed changes and better understand the associated impacts from each alternative. The third event was also an open-house style public meeting, which took place at the Davis Center in Maides Park in Wilmington on February 26, 2022. This meeting, situated immediately north of the project area, followed a week of door-to-door outreach, and provided various visualizations and brochures to help residents learn how their properties would be affected by the project. Appendix E includes the public involvement activities to date.

5.2.1 Public Announcement Methods

The public was notified of upcoming public involvement opportunities through the use of the methods described in the following sections.

5.2.1.1 Postcards/Flyers/Doorhangers

Postcard No. 1 was mailed to approximately 2,685 recipients on July 10, 2019. The postcard announced the public meeting held on July 22, 2019, at the Rachel Freeman School. Additional information regarding the public meeting is discussed in Section 5.2.2.

Table 5-1: Agency Coordination

Date	Meeting Type	Attendees	Purpose
10/27/2003[a]	Wilmington Metropolitan Planning Organization (WMPO)	City of Wilmington/WMPO: Mark Tinkler, Johnathan David URS: David Griffin, Kate Wolfe	To discuss project scope and prior studies by WMPO and NCDOT Feasibility Study
1/9/2004	Wilmington Housing Authority (WHA)	NCDOT: Allen Pope, Joe Blair City of Wilmington: Mark Tinkler, Dewey Harris, Richard Kirk, Ben Quattlebaum, Emily Swanenger, Hugh Caldwell HEO, Inc.: John Hatton, Chuck Holden URS: David Griffin, Kate Wolfe	To attend Wilmington Housing Authority Meeting and discuss the initial studies for the Independence Boulevard Extension Project.
9/15/2005[a]	WMPO	WMPO: Mike Kozlosky URS: David Griffin, Kate Farrell	To discuss project and request input from the WMPO on the study area and purpose of and need for the project.
6/8/2007	NC State Ports Authority (NCSPA)	NCSPA: Stephanie Ayers, Bill Bennett, Layton Bedsole NCDOT: Wade Kirby URS: David Griffin, Peter Trencansky	To evaluate whether an intermodal link between the State Ports and the Wilmington Airport could be used as part of the Purpose and Need of the project.
8/10/2007	NCDOT and FWHA Coordination	FHWA: Ron Lucas DWQ: David Wainwright USACE: Jennifer Frye NCDOT: Brian Yamamoto, Wade Kirby, Greg Brew, John Merritt, Worth Calfee URS: Peter Trencansky, Jeff Weisner, Duane Verner	To discuss the applicability of the Merger 01 process to the Independence Boulevard Extension project.

Date	Meeting Type	Attendees	Purpose
11/26/2007	WHA	WHA: Richard James, Laura Hines HEO, Inc.: Glenn Floyd Tise-Kiester: Don Tise Cole, Jenest & Stone: Donna Ray Mitchell Daniels Development: Windell Daniels WMPO: Anthony Prinz NCDOT: Wade Kirby, Brian Yamamoto, Allen Pope, Joe Blair URS: Peter Trencansky, Chris Werner	To discuss the Wilmington Housing Authorities ongoing and future plans in the vicinity of the Independence Boulevard Extension.
4/16/2011[a]	NCDOT/WMPO Coordination	WMPO: Mike Kozlosky NCDOT: Ted Devens, Brian Yamamoto, Ron McCollum, Allen Pope URS: Peter Trencansky, Mike Lindgren	To discuss recommended Purpose and Need and to begin discussions on the preliminary evaluation of alternatives for the project.
5/10/2011	NCDOT Coordination	NCDOT: Ted Devens, Ron McCollum, BenJetta Johnson, Chandrakant Sura URS: Peter Trencansky, Mike Littlefield	To discuss moving forward with functional designs for the Independence Boulevard Extension Project.
7/14/2011	NCDOT Coordination	NCDOT: Ron McCullum URS: Peter Trencansky, Mike Littlefield	To discuss the functional design guidelines for the Independence Boulevard Extension Project.
8/10/2011	WHA	WHA: Michael Krausse, Adrian Early, Glenn Floyd NCDOT: Allen Pope, Ted Devens WMPO: Mike Kozlosky URS: Peter Trencansky	To continue coordination of the Independence Boulevard Extension through the Winfield Scott property, owned by the WHA.
8/25/2011	NCDOT Coordination	NCDOT: Brian Yamamoto, Ted Devens, Ron McCollum, Chandrakant Sura, Matt Carlisle URS: Peter Trencansky	To continue discussions on the conceptual design of the project and discuss potential intersection treatments and the typical section for the project.
10/3/2011	NCDOT Coordination	NCDOT: Ted Devens, Ron McCollum, BenJetta Johnson, Chandrakant Sura URS: Peter Trencansky	To continue the ongoing review of the conceptual design plans and associated traffic capacity analysis with the goal of making project team recommendations on which alternatives to carry forward to functional design.

Date	Meeting Type	Attendees	Purpose
10/26/2011	NCDOT Coordination	NCDOT: Ted Devens, Brian Yamamoto, Ron McCollum, Gary Lovering, BenJetta Johnson, Chandrakant Sura URS: Chris Werner, Peter Trencansky	To continue the ongoing review of the conceptual design plans and associated traffic capacity analysis with the goal of making project team recommendations on which alternatives to carry forward to next state in design phase.
12/12/2011	NCDOT/WMPO Coordination	NCDOT: Ted Devens, Brian Yamamoto, Gary Lovering, Anthony West, BenJetta Johnson, Chandrakant Sura, Allen Pope, Jackson Provost, Chad Kimes, Katie Hite FHWA: Ron Lucas WMPO: Mike Kozlosky URS: Mike Littlefield, Peter Trencansky	To present the preliminary recommendations made by the Raleigh-based project team to the WMPO and Division 3 staff to make a final decision on which alternatives to carry forward into Preliminary Design. Additionally, project design issues and next steps in the project were discussed.
12/13/2011	NCDOT Roadway Preliminary Design	NCDOT: Gary Lovering, Anthony West URS: Peter Trencansky, Mike Littlefield	To discuss the Preliminary Design Guidelines for the Independence Boulevard Extension Project and understand the expectations for the Preliminary Design phase of the project.
1/9/2012	NCDOT Coordination Meeting	NCDOT: Ted Devens, Gary Lovering, Anthony West, Bob Mosher NCDOT Rail: Nancy Horne, Andrew Thomas, Richard Mullinax URS: Peter Trencansky, Mike Littlefield	To discuss the incorporation and design of a multi-use path along the Independence Boulevard Extension project.
7/17/2012[a]	City of Wilmington and NCDOT Coordination Meeting	City of Wilmington: Don Bennett, Denys Vielkanowitz WMPO: Mike Kozlosky, Suraiya Rashid NCDOT: Ted Devens, Brian Yamamoto, Gary Lovering, BenJetta Johnson, Anthony Law, Jackson Provost, Patrick Riddle, Katie Hite URS: Peter Trencansky	To brief the Wilmington City staff in advance of the citizens informational workshop that is anticipated to be held in early October 2012.
8/15/2012	NCDOT Coordination Meeting	NCDOT: Ted Devens, Gary Lovering, Fred Barkley URS: Peter Trencansky, Ed Edens, Dena Snead	To review the preliminary design centerline alignments for the three mainline alternatives of the Independence Boulevard Extension project.

Date	Meeting Type	Attendees	Purpose
8/27/2012	Wilmington City Council and NCDOT Coordination	Wilmington Mayor: Bill Saffo, Earl Sheridan City Council: Margaret Haynes, Neil Anderson, Kevin O'Grady, Laura Padgett, Charlie Rivenbark WMPO: Mike Kozlosky NCDOT: Ted Devens, Brian Yamamoto, Gary Lovering, Karen Fussell, Jackson Provost URS: Peter Trencansky	To brief the Wilmington City Council Members in advance of the citizens informational workshop that is anticipated to be held in early October 2012.
1/17/2013	NCDOT and NCSPA Coordination Meeting	NCDOT Strategic Initiatives: Roberto Canales NCDOT: Ted Devens, Gary Lovering, Omar Azizi NCDOT Rail: Jim Harris, Nancy Horne NCSPA: Stephanie Ayers URS: Peter Trencansky	To continue coordination on the railroad aspects of the Independence Boulevard Extension project to determine the design criteria for the railroad crossings that will be included in the preliminary designs.
5/30/2013	NCDOT and WMPO Coordination Meeting	NCDOT: Karen Fussell, Katie Hite, Anthony Law, Jackson Provost, Patrick Riddle, Gary Lovering, Ted Devens, Brian Yamamoto WMPO: Mike Kozlosky URS: Ed Edens, Joanna Rocco	To review with the WMPO and NCDOT Division 3 staff the project status, studies recently completed/currently underway, and upcoming next steps.
9/24/2013	NCDOT Coordination	NCDOT: Dean Argenbright, Ted Devens, Christopher Lee, Gary Lovering, Jay Twisdale, Brian Yamamoto URS: Richard Bird, Jennifer Byle, Leo Davies, Ed Edens, Dennis Hoyle, Burt Matteson, Joanna Rocco, Christopher Werner, Paul Zhang	To discuss the depressed freeway design concept with NCDOT and determine what additional information is needed to better understand construction costs to compare with other project alternatives.
10/31/2013	NCDOT Coordination	NCDOT: Ted Devens, Brian Yamamoto, Gary Lovering, Christopher Lee URS: Ed Edens, Chris Werner	To provide NCDOT with an update on the Depressed Facility Functional Design preparations and to discuss upcoming next steps.

Date	Meeting Type	Attendees	Purpose
3/25/2014	WMPO and NCDOT Coordination Meeting	NCDOT: Ted Devens, Brian Yamamoto, Karen Fussell, Anthony Law, Jackson Provost, Patrick Riddle, Gary Lovering, Christopher Lee, Jamille Robbins, Jay Twisdale FHWA: Ron Lucas WMPO: Mike Kozlosky URS: Chris Werner, Joanna Rocco	To review with the WMPO and NCDOT Division 3 the project status, studies recently completed/currently underway, and upcoming next steps.
4/30/2014	Wilmington City Council and TAC Meeting	NCDOT: Ted Devens URS: Chris Werner, Joanna Rocco	To present the status of the project, respond to questions since last meeting, present visualizations, and present draft information for the proposed depressed facility.
8/4/2014[a]	Wilmington City Council Meeting	NCDOT: Ted Devens URS: Chris Werner, Joanna Rocco	To present a project status update.
6/9/2016	WMPO and NCDOT Coordination	NCDOT: John Conforti WMPO: Mike Kozlosky AECOM: Chris Werner, Joanna Rocco, Celia Foushee	To discuss the project status, schedule, and any new information regarding the project.
3/10/2017	WMPO, NCDOT Division, and NCDOT Coordination	WMPO: Mike Kozlosky NCDOT Division 3: Chad Kimes, Katie Hite, David Leonard, Alan Pytcher NCDOT: John Conforti AECOM: Chris Werner, Joanna Rocco, Celia Foushee	To discuss the project status, schedule, and any new information regarding the project.

Date	Meeting Type	Attendees	Purpose
5/23/2017	NCDOT Scoping Meeting	City of Wilmington: Don Bennett WMPO: Mike Kozlosky USACE: Brad Shaver NCDOT Division 3: Mason Herndon, Katie Hite, Chad Kimes, David Leonard, Carla Schoonmaker, G.M. Taylor, Max Radford, Eric Ray, Lonny Sleeper, Rick Neal, Jessi Leonard, Anthony Law, Kevin Bowen NCDOT Rail Division: James Harris, Meredith McLamb, Neil Perry, Richard Mullinax, Jahmal Pullen NCDOT: Jamille Robbins NCSPA: Stephanie Ayers HDR: Phillip Rogers, Josh Massrock AECOM: Chris Werner, Joanna Rocco, Celia Foushee, Morgan Foster	To present the project to the various subject matter experts on the project and determine a project schedule and tasks.
5/31/2017	FHWA and NCDOT Coordination Meeting	FHWA: Ron Lucas NCDOT: Mason Herndon, Katie Hite, Carla Schoonmaker AECOM: Joanna Rocco, Celia Foushee, Morgan Foster	To meet with FHWA and determine project steps moving forward.
7/12/2017	NCDOT Rail Coordination Meeting	NCDOT: Katie Hite, Michael Bass, David Leonard, Anthony Law, Brian Gackstetter, Kumar Trivedi, Carla Schoonmaker, Jahmal Pullen CSX: Tony Bellamy, Troy Creasy AECOM: Joanna Rocco, Celia Foushee	To discuss the railroad interaction on the proposed Independence Boulevard Extension project.
2/6/2018	NCDOT Coordination Meeting	NCDOT: Chad Kimes, Krista Kimmel, David Leonard, Mason Herndon AECOM: Andrew Bell, Ed Edens, Celia Foushee, Joanna Rocco	To discuss the project status and design changes to the Independence Boulevard Extension Project.

Date	Meeting Type	Attendees	Purpose
6/11/2018	NCDOT Coordination Meeting	WMPO: Mike Kozlosky NCDOT: Chad Kimes, Krista Kimmel, David Leonard, Mason Herndon, Katie Hite, Kevin Bowen AECOM: Ed Edens, Celia Foushee, Joanna Rocco	To discuss the preferred alignment for the Independence Boulevard Project and next steps for public involvement.
12/19/2018	NCDOT Rail Coordination Meeting	CSX: Troy Creasy NCDOT Rail: Brain Gackstetter, Jahmal Pullen NCDOT: Krista Kimmel, Katie Hite WMPO: Mike Kozlosky City of Wilmington: Chase Anderson AECOM: Ed Edens, Tom Hepler, Celia Miars, Joanna Rocco, Dan Scheel, Susan Westberry	To discuss the proposed designs for the Independence Boulevard Extension project at existing rail crossings.
7/31/2019	NCDOT and WMPO Board Meeting	WMPO Board Members NCDOT: Krista Kimmel, Chad Kimes AECOM: Joanna Rocco, Celia Miars, Susan Westberry	To discuss the project status and history and present the project alignment and interchange alternatives to the WMPO Board following the 7/22/2019 Public Meeting.
12/9/2021	FHWA and NCDOT Coordination Meeting	FHWA: Felix Davila, Clarence Coleman NCDOT: Krista Kimmel, Mason Herndon, Jamille Robbins, Simone Robinson AECOM: Susan Westberry, Celia Miars, Ashley Ervin	To discuss outreach activities proposed for communities being impacted by the project.
9/16/2022	NCDOT and WMPO	WMPO: Mike Kozlosky, Abby Lorenzo NCDOT: David Leonard, Katie Hite, Krista Kimmel, Jamille Robinson, Simone Robinson AECOM: Susan Westberry	To update the WMPO on the results of the additional outreach efforts completed in February 2022 and to discuss potential mitigation measures that were requested by residents during the meeting. To request feedback from the WMPO on potential mitigation to incorporate into the project.
10/27/2022	NCDOT and FHWA	FHWA: Felix Davila, Clarence Coleman, Seth Wilcher NCDOT: Krista Kimmel, Mason Herndon, Jamille Robbins, Kyle Champion, Victoria Blackwell AECOM: Susan Westberry, Ashley Ervin	To discuss the EJ Outreach Summary and Potential Mitigation Strategy Packet that was prepared following targeted EJ outreach in February 2022[b]. To move the project forward following the outreach and discuss path forward towards signing the DEIS.

Date	Meeting Type	Attendees	Purpose
1/12/2023	NCDOT and FHWA	FHWA: Felix Davila, Clarence Coleman, Seth Wilcher, Joseph Geigle NCDOT: Krista Kimmel, Mason Herndon AECOM: Susan Westberry, Joanna Rocco, Ed Edens	To discuss the rationale and decision-making process for the current alternatives proposed for the project within the DEIS. To clarify the reason behind the elevated boulevard design.

[a] Meeting minutes unavailable

[b] This packet was prepared and finalized under a prior regulatory regime and does not reflect recent changes in regulatory or Executive Order requirements

5.2.1.2 Newsletters

Newsletter No. 1 was mailed to approximately 1,290 recipients on May 26, 2011. The newsletter announced the first public meeting, formerly referred to as CIW No. 1 held on June 13, 2011. Newsletter No. 2 was mailed to 434 recipients on February 12, 2022. This newsletter provided the dates of the door-to-door outreach (February 22 to 24, 2022) and the open house meeting that took place on February 26, 2022. Newsletter No. 2 was mailed only to those residences with the potential to be impacted or relocated by the proposed project and not the larger study area mailing list used for Newsletter No. 1.

5.2.1.3 Public Meeting Notices

A meeting notice for the CIW No. 1 held on June 13, 2011, was forwarded to the following media sources:

- Star News
- The Challenger Greater Diversity News
- Que Pasa

A second meeting notice for an open-house style public meeting held on July 22, 2019, was forwarded to the following media sources:

- Radio: iheartmedia
- Newspapers:
    - Lumina News
    - State Port Pilot
    - Greater Wilmington Business Journal
    - Brunswick Beacon
    - Greater Diversity News
    - Island Gazette
    - Wilmington Journal
    - Star News

5.2.1.4 News Releases

There have been two news releases regarding the proposed project. The first was sent to approximately 120 entities on June 1, 2011, announcing CIW No. 1 and the second was sent to more than 300 entities on July 2, 2019, announcing the public meeting. Copies of the news releases and the list of recipients are included in Appendix E.

5.2.1.5 Flyers/Doorhangers

Flyers and doorhangers were distributed to residences and businesses within the study area on July 9, 2019. A figure showing the distribution area is included in Appendix E.

5.2.2 Public Outreach

The first public meeting, CIW No. 1, was held on June 13, 2011, at the Rachel Freeman School of Engineering in Wilmington, North Carolina. The workshop was held from 4:00 p.m. to 7:00 p.m. The intent of the workshop was to solicit public input prior to establishing the purpose of and need for the proposed project and developing project designs. The public was provided the opportunity to listen to a short presentation describing the proposed project, the draft Purpose and Need, and maps showing the study area. Approximately 70 residents attended the workshop. Meeting materials and a summary of comments received are included in Appendix E.

Another open house style public meeting was held on July 22, 2019, at the Rachel Freeman School of Engineering in Wilmington, North Carolina. The meeting was held from 5:00 p.m. to 7:00 p.m. The intent of the meeting was to update the public on the project status, inform them of the alternatives that would be under consideration in this DEIS, discuss the project with NCDOT representatives, and receive feedback on the proposed project and its alternatives. Approximately 157 residents attended the meeting. Meeting materials and a summary of comments received are included in Appendix E.

Door-to-door outreach was conducted for residences along streets within the study area from Evans Street and 31st Street between Market Street and Princess Place Drive and from Covil Avenue and Mercer Avenue between Market Street and Randall Parkway. A survey for residents was distributed within the newsletter mailed ahead of the outreach. The purpose of the door-to-door outreach was to collect surveys, help residents take the survey, and/or answer questions residents had about the project. The door-to-door outreach took place from February 22 to February 24, 2022. Approximately 222 residences were visited and conversations were had/feedback was received from approximately 100 of those residences. On February 26, an open house was held from 12:00 p.m. to 3:00 p.m. at the Davis Center in Maides Park in Wilmington, North Carolina. Thirty-four people attended the open house. At the open house, participants were provided visualizations of the project alternatives on both foam boards and as map files on a laptop. Various information was also distributed for participants including the mailed newsletter, relocation assistance brochures, and Title VI forms. Thirty-one formal comments were received during door-to-door surveys, nine were received through the PublicInput.com site, six were received at the open house, and seven via mail for a total of 53 comments.

5.2.3 Public Hearing

A public hearing for the proposed project will be held following approval of this DEIS. The alternatives under consideration will be presented to the public for their comments at the hearing. The preferred alternative for the project will be chosen following the hearing. Public comments will be taken into consideration at the determination of the preferred alternative.

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6 List of Preparers and DEIS Distribution

This chapter lists the study team members, their qualifications, and their roles. This chapter also documents the agencies that received a copy of the DEIS for review and comments.

6.1 List of Preparers

The DEIS was prepared by AECOM Technical Services of North Carolina, consulting engineers, in cooperation with NCDOT and FHWA. The key personnel involved in the preparation of this document are presented in Table 6-1.

Table 6-1: List of Preparers

Name	Position	Credentials
FHWA		
Felix Davila, PE	Preconstruction & Environment Engineer	BS in Civil Engineering with over 30 years of experience at FHWA including 30 years in NEPA studies.
Clarence Coleman, PE	Preconstruction & Environment Director at FHWA	BS in Civil Engineering responsible for federal aid projects in North Carolina. Over 30 years of experience.
Seth Wilcher	Preconstruction & Environment Specialist at FHWA	MA in Historic Preservation. More than 20 years of experience in NEPA, Environmental Protection, and Architectural Historian.
NCDOT		
Mason Herndon	NCDOT Division 3 – Project Development Environmental Engineer	BS in Natural Resources Management and Public Administration with more than 20 years of experience with environmental planning and NEPA/SEPA studies.
Chad Kimes, PE	NCDOT Division 3 – Division Engineer	BS in Civil Engineering with over 30 years of experience with NCDOT including planning, project development, and construction.
Krista Kimmel, PE	NCDOT Division 3 – Project Engineer	BS in Civil Engineering with 18 years of experience in transportation design and project development. BA in Mathematics.
Jamille Robbins	NCDOT Environmental Analysis Unit – Public Involvement, Community Studies, and Visualization Group Leader	BS in Mechanical Engineering with over 20 years of experience with NEPA/SEPA, public engagement, project management and project development.

Name	Position	Credentials
AECOM		
Susan Draper, AICP, PWS	Project Manager/Senior NEPA Planner	MS in Botany, BS in Wildlife Management and Ecology with over 20 years of experience in NEPA and environmental planning.
Ed Edens, PE	Senior Transportation Engineer	BS in Civil Engineering with over 20 years of experience in planning and roadway design.
Ashley Ervin	Transportation Planner	MS in City and Regional Planning with 9 years of experience specializing in public engagement.
Paul Gerlach, AICP	GIS Lead/NEPA Planner	Master of Environmental Management, BS in Biology with 8 years of experience in NEPA and environmental planning.
Chaithra Jagadish	Transportation Engineer	MS in Transportation Engineering, BE in Civil Engineering with 10 years of experience in Traffic Capacity and Safety.
Matt Jorgenson	Senior Archaeologist	MA in Anthropology, BA in Anthropology, and BA in History with over 25 years of Cultural Resources Management experience.
Christian Lanier	Transportation Planner	MA in Sustainability and Development, BS in Environmental Science, BA in Anthropology with 5 years of experience.
Todd McAuliffe, AICP	Planner/GIS	MA in Geography with over 15 years of experience in GIS analysis, transportation, and urban planning.
Art McMillan	Program Manager	BS in Civil Engineering with 38 years of experience in planning and roadway design.
Jessica Kim	Environmental Planner	BA in Environmental Policy and Planning with 11 years of experience in environmental documentation, permit applications, construction monitoring and closeout.
Celia Miars, AICP	Deputy Project Manager/ NEPA Planner	MA in Environmental Studies, BS in Design with 10 years of experience in NEPA and environmental planning.
Joanna Rocco, AICP	Project Manager/Senior NEPA Planner	MS in Environmental Studies, BS in Biology with 18 years of experience in NEPA and environmental planning.
Greg Smith, PE, CPM	Traffic Noise and Project Level Air Quality Group Leader	BA in Geology, BA in Business Management with over 30 years of experience in geotechnical and transportation engineering including 13 years in traffic noise and air quality.

Name	Position	Credentials
Robin Marshall	Senior Editor/Technical Writer	BA in English with more than 30 years of experience in editing, developing, and producing documentation materials.
Kory Wilmot, AICP	Urban Planner/document reviewer	Masters of Public Administration, BA in Urban and Regional Planning with over 18 years of experience in NEPA documentation.

6.2 DEIS Distribution

In order to facilitate review and comment, the following agencies, local officials, and public libraries were provided copies of this document.

6.2.1 Federal Agencies

- Federal Emergency Management Agency
- United States Army Corps of Engineers – Wilmington District
- United States Environmental Protection Agency (Region IV, Environmental Review Branch)
- United States Fish and Wildlife Service
- United States National Oceanic and Atmospheric Administration – Fisheries

6.2.2 State Agencies

- North Carolina Department of Administration – State Clearinghouse
- North Carolina Department of Cultural Resources
- North Carolina Department of Environmental Quality
- North Carolina Division of Coastal Management
- North Carolina Division of Water Resources
- North Carolina Historic Preservation Office
- North Carolina Wildlife Resources Commission

6.2.3 Local Governments and Agencies

- City of Wilmington Parks and Recreation Department
- New Hanover County
- Wilmington Urban Area Metropolitan Planning Organization

6.2.4 Public Libraries

State Library of North Carolina
109 East Jones Street
Raleigh, NC 27601

Wilmington Star-News Library
1003 South 17th Street
Wilmington, NC 28401

New Hanover County Public Library – Main Branch
201 Chestnut Street
Wilmington, NC 28401

William Madison Randall Library
5162 Randall Drive
Wilmington, NC 28403

6.2.5 Website

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APPENDICES