DETAILED STUDY ALTERNATIVES CARRIED FORWARD

NC 54 Corridor Improvements

Durham and Orange Counties

STIP Project U-5774 A-F

North Carolina Department of Transportation

Divisions 5 & 7

MERGER CONCURRENCE POINT NUMBER 2

April 15, 2026

1. Introduction

Lead federal agency: Federal Highway Administration (FHWA)
Primary points of contact for the subject project are:

Regulatory and Project Team Leads	Name
Federal Highway Administration	Seth Wilcher
U.S. Army Corps of Engineers (USACE)	Eric Alsmeyer
North Carolina Department of Water Resources (NCDWR)	Rob Ridings (Division 5) Ryan Conchilla (Division 7)
North Carolina Department of Transportation	Andrew Folz, PE
Three Oaks Engineering – NCDOT GEC	Christy Shumate
AECOM	Celia Miars

The purpose of this meeting is to reach concurrence on conceptual build alternatives that meet the purpose and needs of the project.

1.1 Project Description

The NCDOT proposes to improve the NC 54 corridor from US 15/US 501 in Chapel Hill to I-40 in Durham. The project is approximately three miles long and is identified in the State Transportation Improvement Program (STIP) as Projects No. U-5774A through U-5774F, WBS No. 54037.1.1. The project location is shown on Figure 1.

1.2 Cost Estimate and Merger Plan

The project is included in the Triangle West Transportation Planning Organization's (TWTPO) 2050 Metropolitan Transportation Plan (MTP). The project is included in the current 2026-2035 STIP as project U-5774A – F and is being managed by NCDOT Project Management Unit. Right-of-way acquisition and construction for U-5774D-F are scheduled for 2030 and 2033, respectively. U-5774A-C are not currently funded for preliminary engineering, right-of-way, or construction. The costs for the project as estimated in the current STIP are shown in Table 1. The proposed project schedule is included in **Table 2**. The schedule and cost estimates are draft and subject to change.

Table 1: 2026-2035 STIP U-5774A-F Cost Estimate

Project Breaks	Construction	Right-of-Way	Utilities	Total
Section A	$28,600,000	$4,800,000	$720,000	**$34,120,000**
Section B	$54,100,000	$31,300,000	$7,600,000	**93,000,000**
Section C	$23,001,000	$610,000	$4,400,000	**$28,011,000**
Section D[1]	--	--	--	**--**
Section E[1]	--	--	--	**--**
Section F[1]	$156,100,000	$117,800,000	$5,500,000	**$279,400,000**
TOTALS	**$261,801,000**	**$154,510,000**	**$18,220,000**	**$434,531,000**

Note: Costs are draft and subject to change.

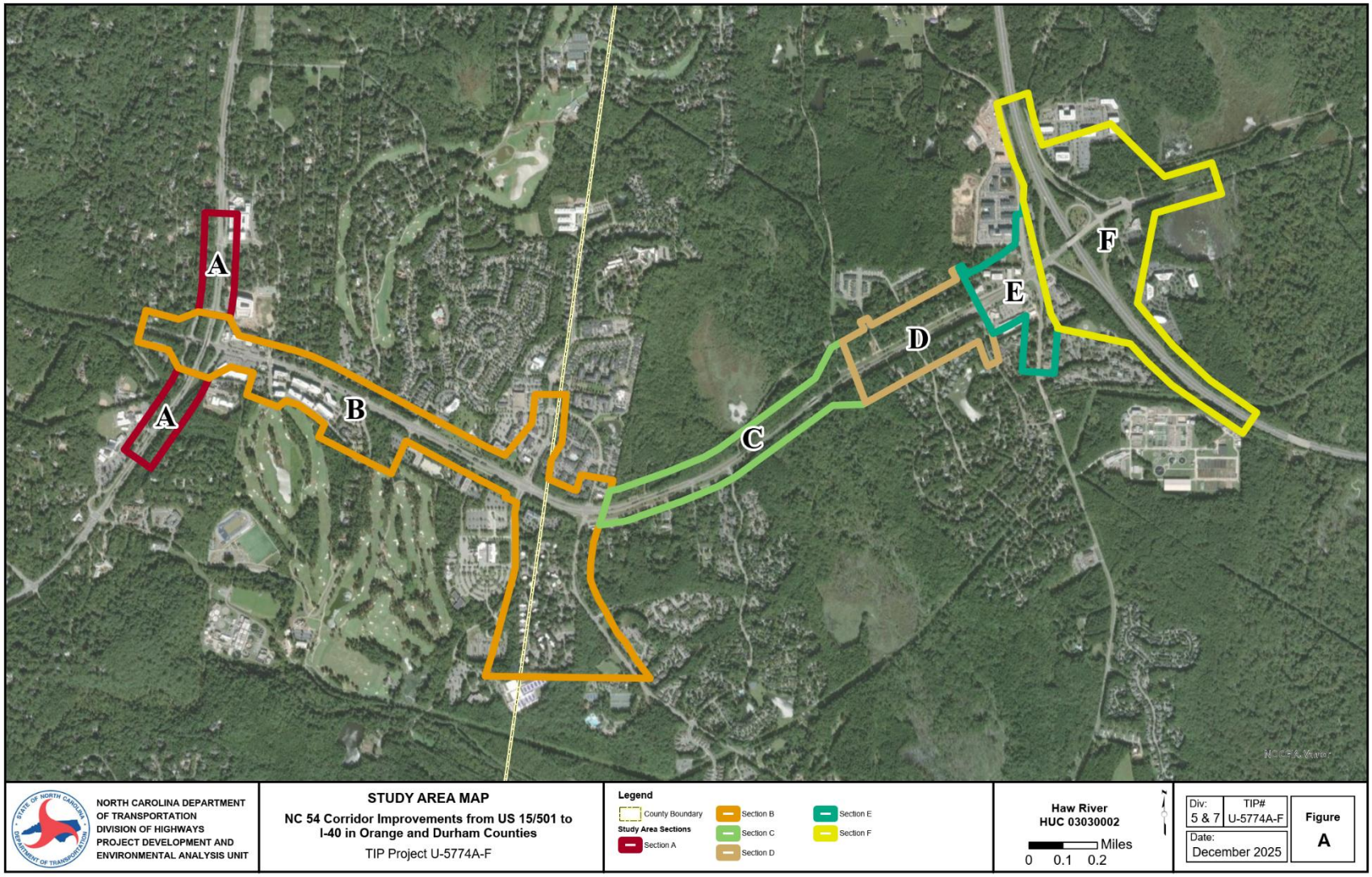
[1] Sections D, E, and F are scoped together as one project.

Table 2: Draft U-5774A-F Project Schedule

Milestone	Format	Anticipated Date
Public Meeting	In-Person Meeting	November 2026
Combined CP 2A, 3, 4A meeting	Virtual Meeting	March 2027
Categorical Exclusion (CE)	Electronic Distribution	February 2028
CP 4B	Virtual Meeting	TBD
CP 4C	Virtual Meeting	TBD
Begin ROW Acquisition		2030
Begin Construction		2033

Note: Schedule is draft and subject to change.

Figure 1: Project Study Area & Section Boundaries



2. Summary of CP 1 Project Purpose and Need

The purpose and need of the project was concurred upon by the Merger Team in June 2017. In February 2025, the project team met with representatives from NCDOT, FHWA, USACE, and NCDEQ to update the Merger Team about the restart of the U-5774 project and discuss the changes in the project since it 2019 pause. Although the limits of the project have been revised, the purpose and need remains the same, based on an updated traffic forecast and traffic analyses, as detailed in the revised Purpose and Need Report (December 2025) for U-5774A-F.

2.1 Identified Needs

As concurred upon in the CP 1 Merger Meeting, the project is needed to address decreased mobility in the NC 54 corridor, increasing congestion due to roadway capacity deficiencies, and the critical crash rate exceeding the state average.

2.2 Proposed Purpose

The purpose of the proposed project is to improve traffic operations along NC 54 between US 15/US 501 and I-40 by reducing congestion, while improving mobility and accessibility for all users of the NC 54 corridor. In addition to addressing the primary needs, the potential exists for the following other desirable outcomes as a result of the proposed action:

- Multimodal Accessibility and Safety: Incorporation of bicycle and pedestrian facilities, as well as transit accommodations, into the U-5774A-F project, as planned by the Triangle West TPO and local governments, has the potential to improve multimodal accessibility and safety throughout the corridor.
- Vehicular Safety: Due to higher-than-average crash rates and critical crash rates along the NC 54 corridor, improvements to the roadway and its intersections offer the potential to reduce the number and severity of vehicle crashes along the roadway.

3. Project Study Area

The proposed Project Study Area developed to address the Purpose and Need of U-5774A-F is shown on Figure 1. Based on traffic patterns, system connectivity, and updated plans, the western limit remains at US 15/501, while the eastern terminus is now set at I-40. The I-40 interchange continues to be a major traffic generator on NC 54, and projected volumes east of I-40 decline significantly, therefore, extending the project beyond that point is no longer warranted.

4. Summary of Alternatives Considered

Alternatives for the Project are being developed and evaluated in a multi-step screening process (Figure 2). The Initial Screening phase considered Alternative Strategies. Alternative Strategies that do not have the potential to meet the purpose and need are not considered reasonable and practicable and therefore are eliminated from further consideration.

In the Second Screening phase, the Alternatives Strategies remaining were further developed into Alternative Concepts. Alternative Concepts were identified and preliminarily evaluated and compared to determine their feasibility.

In the Third Screening phase, the remaining Alternative Concepts will be developed into Detailed Study Alternatives for further evaluation to include lanes, detailed road dimensions, horizontal and vertical roadway design, preliminary construction limits and right-of-way, and determine impact calculations.

Figure 2: Alternatives Screening Process

4.1 Initial Screening Phase

In the initial screening phase, five alternative strategies were evaluated for their effectiveness in meeting the project's defined purpose and need and those strategies that would not meet all elements of the purpose and need were removed from further consideration. The results of this initial screening are summarized in Table 3.

Table 3: Initial Screening of Alternative Strategies

Alternative Strategy	Regional and Local Mobility	Congestion	Vehicular Safety	Multimodal Accessibility and Safety	Decision to Carry Forward
No Build Alternative	◎	○	◎	○	☑*
Transportation Demand Management	○	○	○	◎	✗
Transportation System Management	○	○	◎	○	✗
Mass Transit	●	○	○	●	✗
Build – New Location	●	●	●	○	✗
Build – Upgrade Existing Roadways	●	●	●	●	☑

*Retained for further study as a baseline for comparing other alternatives.

●: Meets all elements of the purpose and need.

◎: Meets some elements of the purpose and need.

○: Meets no elements of the purpose and need.

4.1.1 Alternatives Eliminated

- **Transportation Demand Management Alternative**: does not eliminate the existing traffic congestion or address safety issues
- **Transportation System Management Alternative:** The effectiveness of TSM measures would be overwhelmed by the projected future traffic demand on the corridor. While TSM could address vehicular safety concerns at some locations, it would not improve accessibility or safety for other modes and is not consistent with local plans for the corridor.
- **New Location Alternatives**: would not provide enhanced multimodal accessibility and safety for NC 54, not consistent with local plans, which do not call for new location east-west corridors in this area, and would result in substantial impacts to existing residences and businesses, as well as to protected natural areas.

The No-Build Alternative is the baseline comparative alternative for the design year. The No-Build Alternative assumes that the transportation systems for Orange and Durham Counties would evolve as currently planned in the TWTPO 2050 MTP, but without major improvements to the existing NC 54 corridor from US 15/501 to I-40.

4.2 Second Screening Phase

Alternative Concepts for the Upgrade Existing NC 54 alternative strategy were developed based on a range of factors, including projected traffic demand, human and natural environmental constraints, and local plans. Concepts designs include roadway centerlines, number of lanes, edge of pavement, and spot checks for vertical clearances.

Concepts designs were developed for the US 15/501 and I-40 interchanges and the NC 54 corridor. The concepts at either terminus are interchangeable and could be implemented in various combinations. The draft alternative concept designs are included in Appendix A.

US 15/501 and NC 54 Interchange

At US 15/501 and NC 54, two interchange configurations have been developed. The options are:

- Half partial cloverleaf/half synchronized street interchange
- Dragonfly interchange

The half partial cloverleaf/half synchronized street interchange would maintain the footprint of the existing interchange with minor modifications to the existing ramps. Ramps would be converted to one-way with signalized intersections at all ramp terminals on US 15/501 and NC 54.

The dragonfly interchange looks similar to the existing footprint of the interchange, but has key differences in functionality, operating as a combination of a median U-turn and single-point urban interchange. Ramps would be converted to one-way movements with signalized left-turn movements.

NC 54 Corridor

Along the NC 54 corridor, two build concepts have been developed. The options are:

- RCI continuous corridor
- RCI modernization corridor

In both options, signalized intersections along NC 54 would be modified to RCI intersections. Similar to a synchronized street or superstreet concept, travelers on side streets intersecting a main route are prohibited from crossing the main street or making left turns onto the main street. Side street travelers who want to cross or turn left must first turn right and then make a U-turn to return to their desired route. The RCI continuous corridor option would continue the six-lane typical section which transitions to four lanes east of Barbee Chapel Road on NC 54 until the road returns to the six-lane typical section at Falconbridge Road, creating a continuous six-lane corridor, reducing the bottleneck effect at high volume times. The RCI modernization corridor would only modify the signalized intersections along NC 54 to RCI intersections and maintain the existing typical section along NC 54. For both RCI corridors, a Partial CFI was considered for the NC 54 at Meadowmont Lane due to higher volumes at this intersection.

I-40 and NC 54 Interchange

At I-40, four interchange configurations have been developed. The options are:

- Partial cloverleaf interchange
- Flyover interchange
- Milwaukee B interchange
- One-sided diverging diamond interchange

The partial cloverleaf option includes modification of the existing interchange to improve geometry and add capacity. The existing loop in the northeast quadrant of the interchange would be replaced with a dual-lane loop with a larger radius. A new loop would be added in the southwest quadrant of the interchange to facilitate eastbound I-40 traffic exiting onto NC 54 eastbound, eliminating the need for this traffic to make a left turn onto NC 54 from the existing ramp. The eastbound I-40 to NC 54 ramp would be for westbound NC 54 traffic only. The ramp from NC 54 to eastbound I-40 would be relocated to allow for the new loop, as well as extended to provide additional length for dropping lanes and accelerating traffic.

The flyover interchange option would carry NC 54 eastbound to I-40 westbound traffic over the NC 54 bridge structure, which would then merge with the NC 54 westbound to I-40 westbound traffic. A new loop would be added in the northwest quadrant, eliminating the need for NC 54 westbound traffic to turn left onto the ramp for I-40 east, which includes heavy volumes. The ramp in the southeast quadrant would separate the I-40 westbound traffic existing to NC 54, allowing a signalized movement for left turns and a free-flowing right turn lane.

The Milwaukee B interchange concept includes similar movements to the flyover interchange options, but includes additional bridging to facilitate movements. Free-flowing ramp movements would carry traffic from either direction on I-40 to NC 54.

The one-sided diverging diamond interchange concept would eliminate the need for existing and proposed loops at the interchange as discussed in the previous concepts. The crossover is applied to only one side of the interchange to accommodate the heavy left-turning volumes present in that direction, while the other direction operates like a conventional intersection.

The Second Screening uses the following three evaluation criteria:

Traffic Operations

A Traffic Capacity Analysis is being prepared to evaluate traffic operations for the build alternative concepts. Alternative concepts should have an overall LOS of D or better; individual movements at an intersection may be LOS E or F during one or both peaks but must have a volume to capacity ration of 0.85 or lower. A roadway is considered congested as the volume to capacity ratio approaches 0.85.

Based on the updated Traffic Forecast volumes (October 2024), an eight-lane typical section is no longer under consideration.

Bicycle and Pedestrian Mobility

Multimodal accessibility and safety are part of the identified secondary purpose and need for the project. Therefore, the Second Screening considered bicycle and pedestrian mobility along and across NC 54 for each of the Alternative Concepts,

including presence of sidewalks and/or multiuse paths, number and type of crossings, and other safety considerations. Coordination with NCDOT's Integrated Mobility Division to determine the appropriate bicycle and pedestrian accommodations along the corridor is underway.

Consistency with Local Plans

Consistency with local plans was considered in development of Alternative Concepts. Plans include the NCDOT STIP, TWTPO 2050 MTP, local land use plans, local bicycle and pedestrian plans, and other small area plans. Design details including sidewalks, bike lanes, multi-use paths, and transit signal priority will be developed as the project progresses. These details would remain consistent with local plans.

Table 4 includes a summary of the second screening.

Table 4: Second Screening of Alternative Concepts – Traffic Operations

Alternative Concepts			
US 15/501 Interchange Concepts			
Half partial cloverleaf/half synchronized street interchange	**Continuous RCI** • LOS C or better for all 8 signals **Modernization RCI** • LOS C or better for all 8 signals	• Pedestrian signals at all ramp terminals • Existing sidewalks on NC 54, north and south	• Consistent with STIP, 2050 MTP and local plans.
Dragonfly Interchange	**Continuous RCI** • LOS C or better for all 5 signals **Modernization RCI** • LOS C or better for all 5 signals	• Pedestrian relief on concrete islands • Pedestrian signals at two ramp terminals • Existing sidewalks on NC 54, north and south	• Consistent with STIP, 2050 MTP and local plans.
NC 54 Corridor Concepts			
Continuous RCI Corridor	**Hamilton to Environ Way** • Full Bow-tie: 2 signals LOS B or better and 2 RAB LOS A • Partial Bow-tie: All 3 signals LOS B or better and 1 RAB LOS A • Half RCI: All 3 signals LOS B or better **Finley Golf Course Rd to Littlejohn Rd** • RCI: 13 signals LOS C or better • RCI with no 3 phase signals: 13 signals LOS B or better **George King to Farrington Grade Separation** • RCI: 6 signals LOS B or better • Half RCI: 4 signals LOS C or better	• Z crossing pedestrian signals • MUP currently stops east of Barbee Chapel Road until Falcon Bridge Road	• Partially consistent with 2050 MTP. • Consistent with STIP and local plans.

Alternative Concepts			
Modernization RCI Corridor	**Hamilton to Environ Way** • Full Bow-tie: 2 signals LOS B or better and 2 RAB LOS A • Partial Bow-tie: all 3 signals LOS B or better and 1 RAB LOS A • Half RCI: All 3 signals LOS B or better **Finley Golf Course Rd to Littlejohn Rd** • RCI: 13 signals LOS C or better • RCI with no 3 phase signals: 13 signals LOS D or better • Half CFI at Meadowmont (Marriot Way included for rerouting): 11 signals LOS C or better **George King to Farrington Grade Separation** • RCI: LOS D at Falconbridge in AM and PM, but have V/C over 1.0 for certain movements. Cycle length may lower V/C but could affect corridor performance. • Half RCI: LOS D at Falconbridge in AM but have V/C over 1.0 for certain movements; LOS E at Falconbridge in PM. Requires higher cycle length that would affect corridor performance.	• Z crossing pedestrian signals • MUP currently stops east of Barbee Chapel Road until Falcon Bridge Road	• Consistent with 2050 MTP and local plans. • Partially consistent with STIP.
I-40 Interchange Concepts			
Partial cloverleaf interchange	**Continuous RCI** • 5 signals LSO B or better • Requires 2 lane I-40 WB off loop ramp **Modernization RCI** • 5 signals LSO B or better	Pedestrian signals at signalized ramp terminals.	Consistent with STIP, 2050 MTP and local plans.

Alternative Concepts			
	• Requires 2 lane I-40 WB off loop ramp		
Flyover Interchange	**Continuous RCI** • 3 signals LOS C or better • new I-40 EB on ramp loop and flyover bridge **Modernization RCI** • 3 signals LOS C or better • new I-40 EB on ramp loop and flyover bridge	Pedestrian signals at signalized ramp terminals.	Consistent with STIP, 2050 MTP and local plans.
Milwaukee B Interchange	**Continuous RCI** • 7 signals LOS C or better • additional bridges **Modernization RCI** • 7 signals LOS C or better additional bridges	Pedestrian signals at signalized ramp terminals.	Consistent with STIP, 2050 MTP and local plans.
One-sided DDI	**Continuous RCI** • 3 signals LOS B or better; no loops needed • wider NC 54 bridge **Modernization RCI** • 3 signals LOS B or better; no loops needed • wider NC 54 bridge	North side of NC 54: Pedestrian signals at ramp terminals to a median protected area	Consistent with STIP, 2050 MTP and local plans.

5. Human and Natural Resources

Existing and future land use were considered in the development of alternative concepts and decisions on widening options, intersection configurations, and access control/consolidation. Land use along the NC 54 corridor includes a mix of uses typical of suburban development, including commercial and retail areas, office complexes, and a mixture of residential uses. Information on planned development was also obtained from UNC, the Town of Chapel Hill, and Durham City/County Planning.

The NC 54 corridor crosses Little Creek as shown on Figure 3, which is on property owned by the US government and under the stewardship of the US Army Corps of Engineers, Wilmington District, associated with Jordan Lake. The property is leased to the State of North Carolina and managed by the NC Wildlife Resources Commission as part of their Game Lands program.

Previous coordination with the State Historic Preservation Office (SHPO) (dated 11/17/17) identified three properties eligible for listing on the National Register of Historic Places: Greenwood Historic District, Glen Lennox Commercial and Residential Historic District, and Leigh Farm, shown on Figure 3. Reinitiation of cultural resources investigations will begin upon identification of alternatives to move forward into preliminary design, prior to selection of a preferred alternative.

6. Stakeholder and Public Involvement

NCDOT met with the merger signatories of the Merger Team in February 2025 to discuss the revised project limits and merger plan. The Logical Termini & Independent Utility Memo was finalized in June 2025, documenting the rationale for shortening the project limits and demonstrating that the project maintains independent utility.

NCDOT distributed a Start of Study letter to agencies, local officials, and tribes in November 2025 to reinitiate stakeholder coordination and introduce the revised project limits and met with local stakeholders in January 2026 to provide an update on the project. Comments received emphasized multimodal planning, the need for interagency coordination, environmental sensitivities within the project area, and consistency efforts with the locally adopted plans.

NCDOT previously held public meetings to present Alternative Concepts to local elected officials and the public in July 2018. A public meeting is anticipated in November 2026 to present new detailed study alternatives and obtain input before selecting a Preferred Alternative.

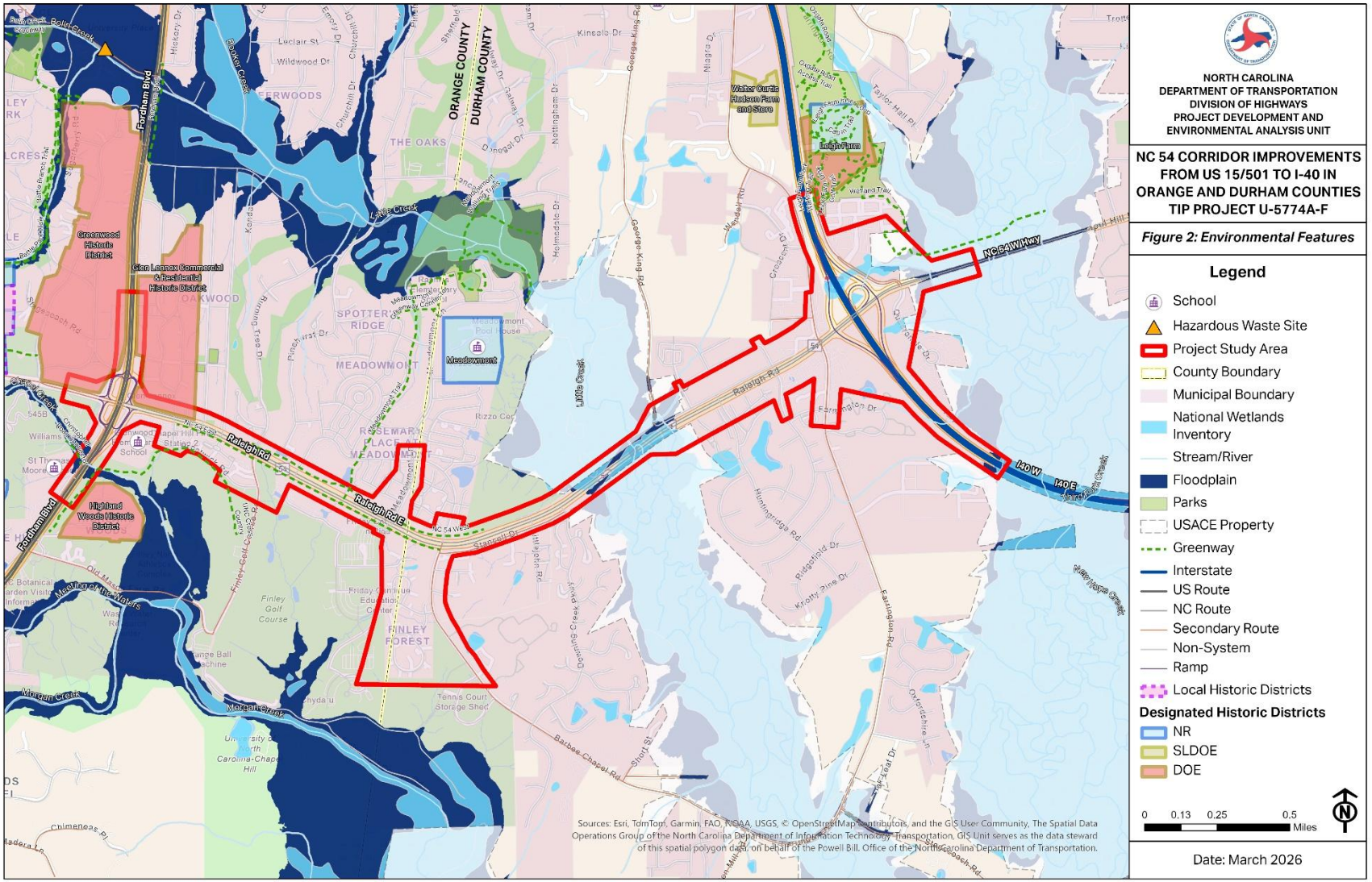
7. Avoidance and Minimization

NCDOT will continue to implement avoidance and minimization strategies throughout the design process by refining the project alignment and design features to reduce potential impacts to environmental, cultural, and community resources to the extent practicable.

8. Merger Plan Review/Next Steps

As noted in the Merger Plan for the project, NCDOT proposes that the next Merger Meeting will be a combined CP 2A (Bridging Decisions and Alignment Review), CP 3 (Preferred Alternative Selection), and CP 4A (Avoidance and Minimization). It is anticipated this will be held in early 2027. Merger Team members will be notified of any changes that require a revision of this timetable.

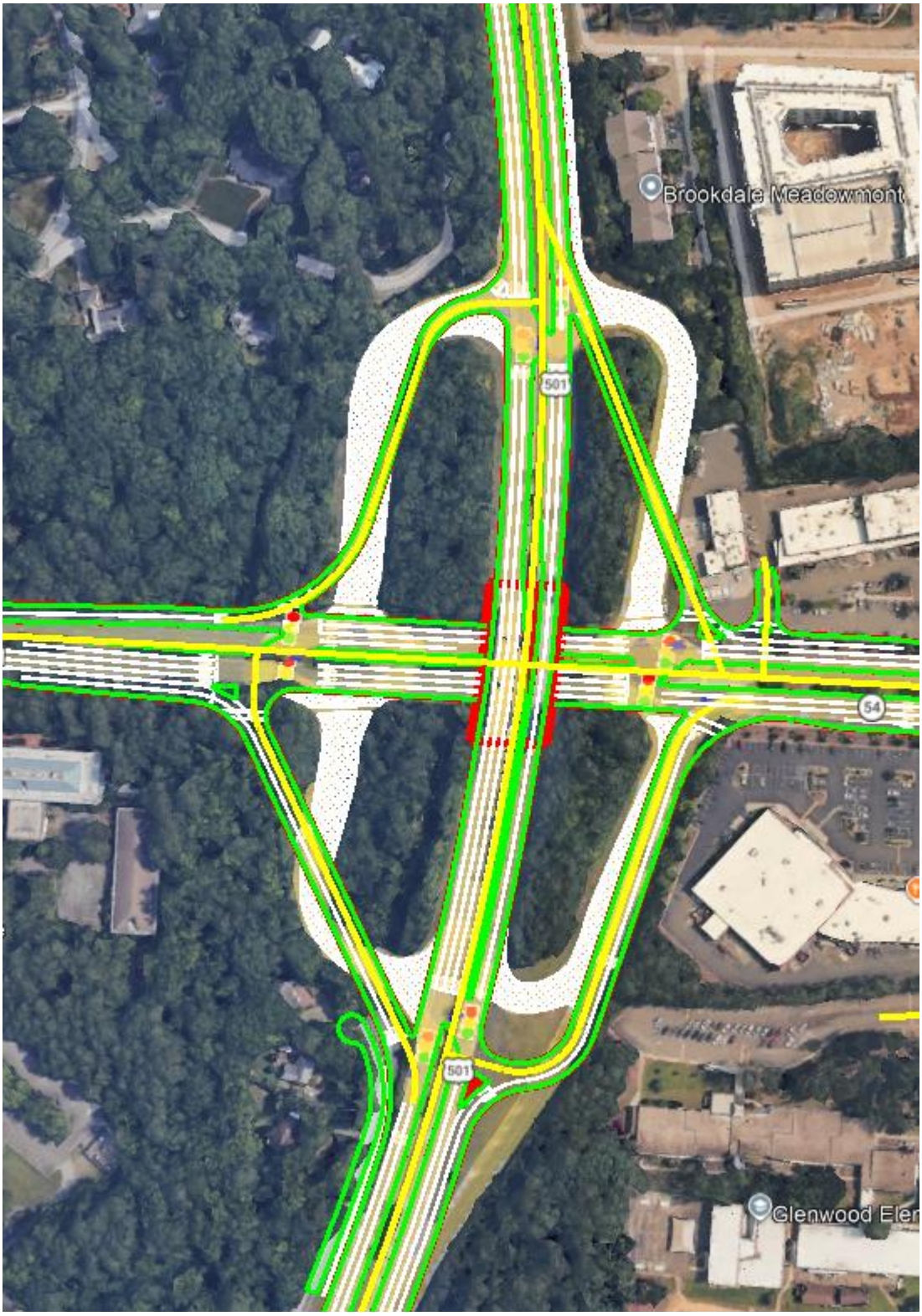
Figure 3: Environmental Features Map



Appendix A: Alternative Concept Design Exhibits

US 15/501 Interchange Alternative Concepts

Half partial cloverleaf/half synchronized street interchange



Dragonfly Interchange

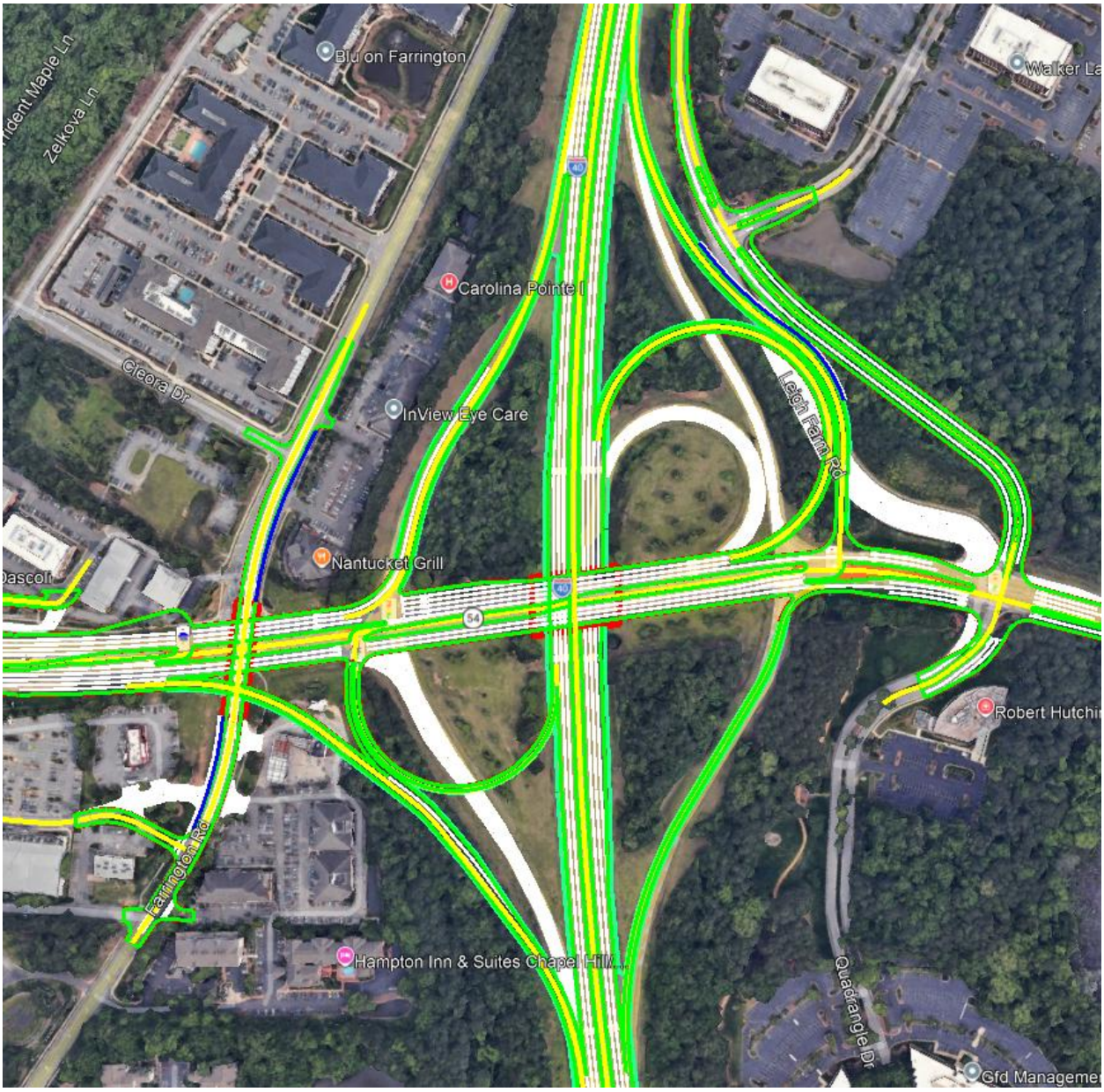
NC 54 Corridor Alternative Concepts

Continuous RCI Corridor

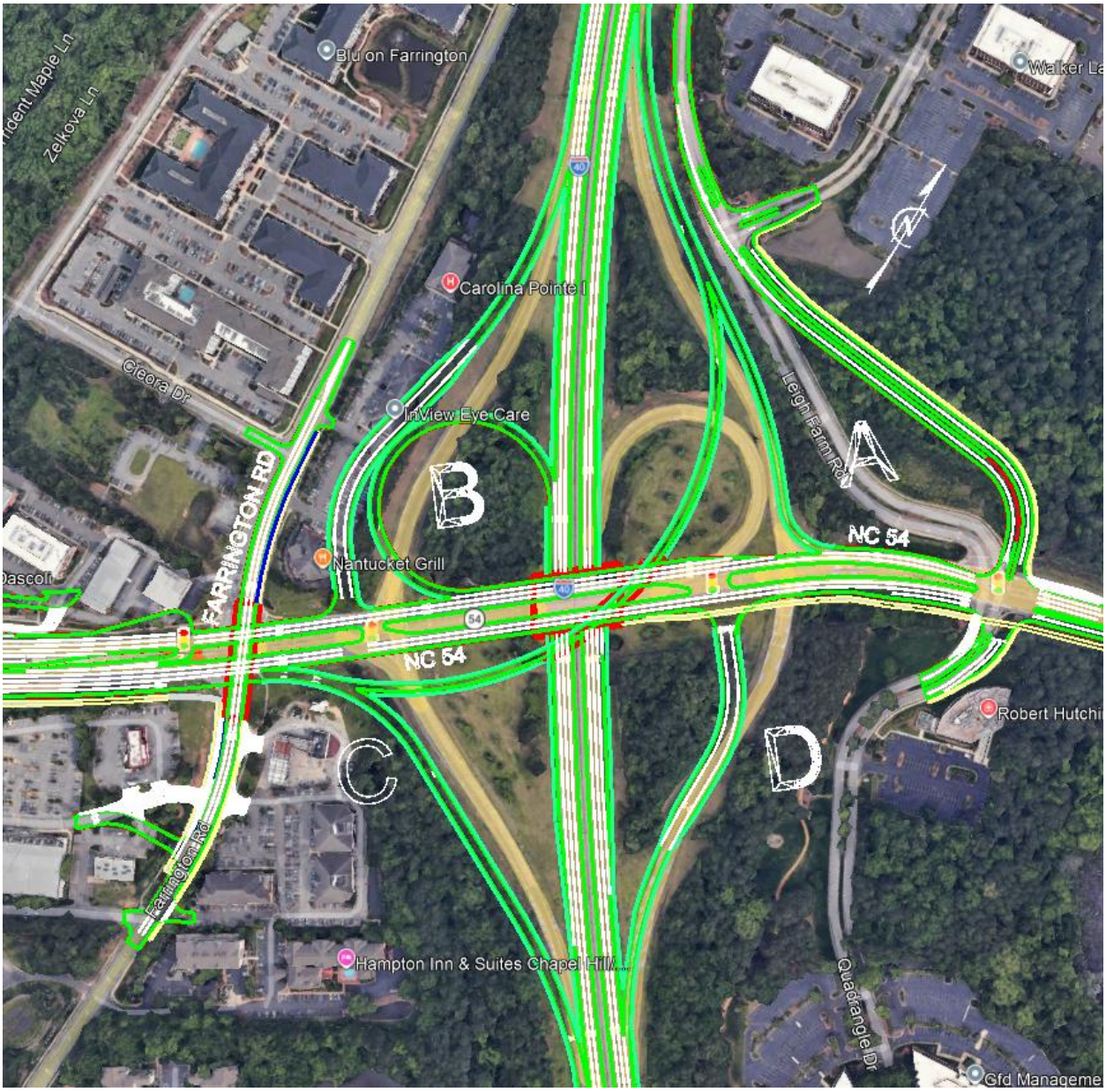
Modernization RCI Corridor

I-40 Interchange Alternative Concepts

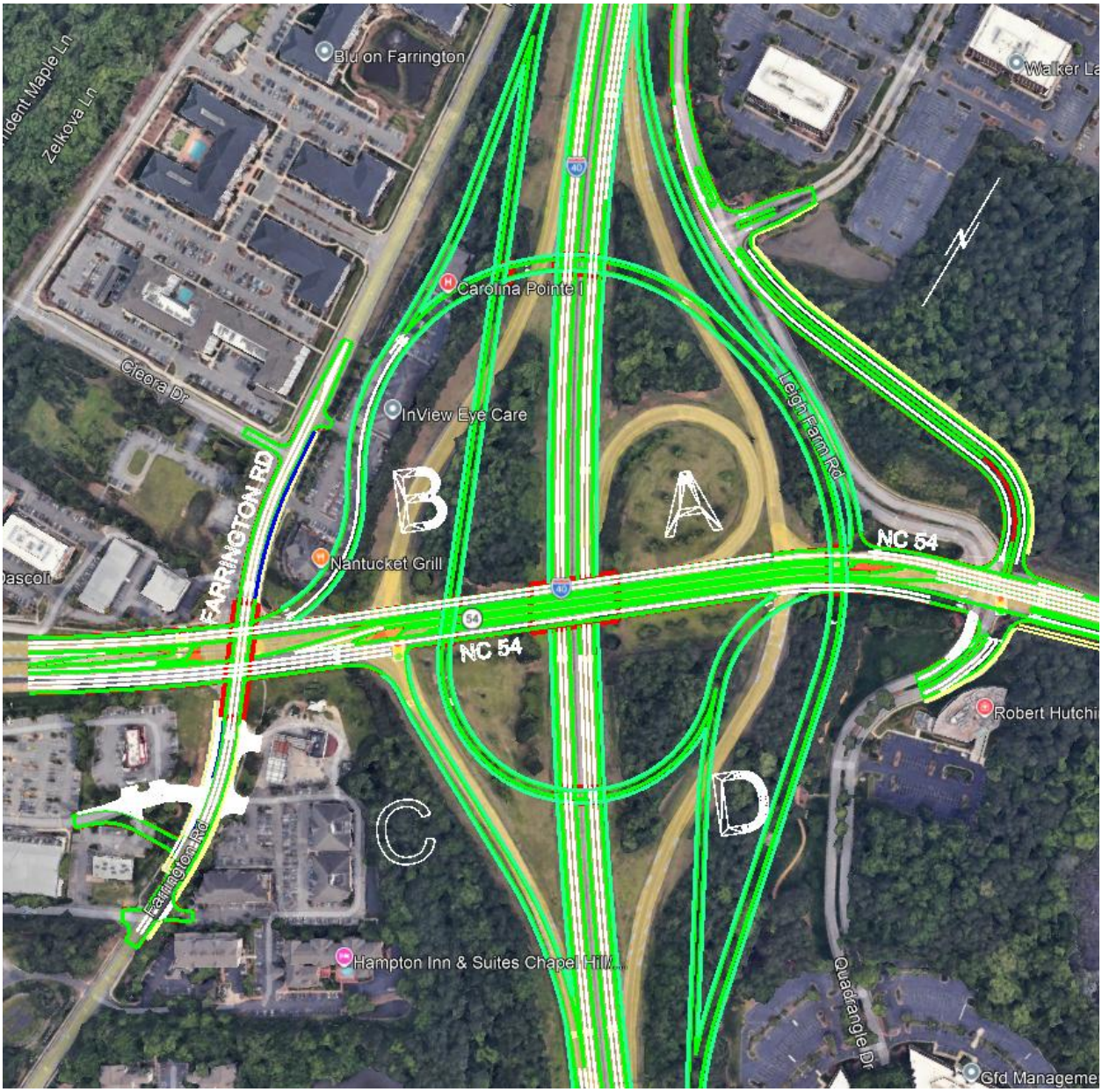
Partial Cloverleaf Interchange



Flyover Interchange



Milwaukee B Interchange



One-sided Diverging Diamond Interchange