I-440 Widening Project

Wake County, NC
STIP Project No. U-2719

Least Environmentally Damaging Practicable Alternative (LEDPA) / Preferred Alternative Identification and Avoidance and Minimization

Section 404 / NEPA Merger Concurrence Points 3 and 2a/4a

Prepared for:

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Meeting - February 14, 2018

Meeting Agenda

1. Introductions and Sign-In
2. Purpose of Meeting
3. Project Overview and Past Concurrence Meetings
4. Review of Major Hydraulic Structures to Reconfirm Concurrence Point 2a
5. Concurrence Point 3
    - Least Environmentally Damaging Practicable Alternative (LEDPA)/Preferred Alternative Discussion
    - Review Concurrence Point 3 Signature Form
6. Concurrence Point 4a
    - Avoidance and Minimization Measures
    - Review Concurrence Point 4A Signature Form
7. Project Schedule

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1. Project Description

The North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), proposes to widen I-440/US 1/64 from south of Walnut Street (SR 1313) to east of Wade Avenue (SR 1728) from four lanes to six lanes in the City of Raleigh, all in Wake County. The project also will reconstruct interchanges, replace structures, and repair pavement conditions. The project is included in NCDOT's adopted 2018-2027 State Transportation Improvement Plan (STIP) as project number U-2719 and is scheduled for right-of-way (ROW) acquisition and construction to begin in fiscal year 2019 and will be let as a design-build contract.

2. Completed Merger Team Concurrence Points

Appendix A includes the signed Concurrence Point 1 form and Concurrence Point 2 form (with final meeting minutes discussing concurrence with CP 2a).

Concurrence Point 1. The Merger Team concurred on the following Purpose and Need statement on August 22nd, 2012:

The purpose of the project is to improve traffic flow and operational efficiency and enhance mobility on this segment of I-440. The overall needs of the project are described below:

- The project section of I-440 consists of four through lanes, forming a "bottleneck," with six through lanes to the north and south. The four through lanes in the project section regularly experience congestion. Traffic volumes are forecasted to increase in the future.
- The roadway and interchanges in this section of I-440 have substandard design elements such as poor sight lines, narrow shoulders and medians, and short acceleration/deceleration lanes.
- Pavement, structures, and interchanges along the project segment are in need of rehabilitation.

Concurrence Point 2 and 2A. Detailed Study Alternatives were developed for each interchange and grade separation as well as the widening of the mainline of I-440. It should be noted that the Detailed Study Alternative(s) at each location can be combined with any of the Detailed Study Alternatives at the other locations to comprise end-to-end alternatives for the corridor. This is explained in Section 2.1.2 of the Environmental Assessment (EA).

The Concurrence Point 2 meeting was held on February 18, 2015 and the Concurrence Point 2 form was signed on March 12, 2015. **Table 1** shows the Detailed Study Alternatives concurred on by the NEPA/404 Merger Team and the revisions to Detailed Study Alternatives that occurred after the meeting but prior to publication of the Environmental Assessment (EA). Changes to Detailed Study Alternatives occurred at the I-40 interchange, the Jones Franklin Road interchange, and the Ligon Street grade separation, as summarized below. These changes are documented in Section 2.1 of the EA.

Table 1. Detailed Study Alternatives

Location	Detailed Study Alternatives on Concurrence Point 2 Form	Detailed Study Alternatives as Documented in EA Chapter 2
Mainline	Best Fit Alignment	Incorporated into all other locations as applicable and not addressed separately
I-40 Interchange	Widen I-440 Only	No change
	Southwest Quadrant Flyover	Eliminated from consideration
Jones Franklin Road Interchange	Braided Partial Clover	Changed to the Upgrade Existing Partial Clover Alternative
Athens Drive Grade Separation	Replace Bridge in Place	No change
	Replace Bridge to North	No change
Melbourne Road Interchange	Replace Bridge in Place	No change
	Replace Bridge to North	No change
Western Boulevard Interchange	Double Crossover Diamond	No change
Ligon Street Grade Separation	Traffic Culvert	No change
	Two-Lane Bridge	Expanded to study two bridge alignments: Build Bridge to North Alternative and Build Bridge to South Alternative
Hillsborough Street and Wade Avenue Interchange Area	One Flyover	No change
	Two Flyovers	No change
	Slight Detour	No change

The Southwest Quadrant Flyover Alternative for the I-40 interchange was eliminated from further study during preliminary design, and just the Widen I-440 Only Alternative was carried forward. Projects on I-40 in this area (I-5701 and I-5703) are now programmed by NCDOT to begin construction in 2022. If the Southwest Quadrant Flyover were to be constructed, it could be in place before 2022 and might have to be torn out to make way for these pending I-40 projects. In addition, the footprint of this alternative increased in preliminary design which caused greater impacts to Centerview Office Park.

The Braided Partial Clover Alternative for the Jones Franklin Road interchange was eliminated and replaced by the Upgrade Existing Partial Clover Alternative during preliminary design. Compared to the Braided Partial Clover Alternative, the Upgrade Existing Partial Clover Alternative would provide more flexibility for the separate projects programmed for I-40 described above and would have less impacts to the office parks and electric power towers in the southeast quadrant. Impacts to jurisdictional resources would be similar.

The two-lane bridge concept for the Ligon Street grade separation was expanded to study two different alignments for the bridge over I-440 due to proximity of the Oak Grove Cemetery (historic) and NC State University research facilities.

At the Concurrence Point 2 meeting, the Merger Team agreed that issues related to Concurrence Point 2a (bridging decisions) were covered and all attendees concurred with Concurrence Point 2a, as documented in the attached meeting minutes. Since the project is a widening project, the project proposes to extend existing culverts.

3. Environmental Assessment – June 2017

The EA for STIP Project U-2719 was approved on June 26, 2017. It was distributed for agency and public comment and posted on the project website at www.ncdot.gov/projects/i-440improvements. The Public Hearing was held on August 8, 2017 and the public comment period closed on September 8, 2017. Comments from environmental resource and regulatory agencies were collected through the State Clearinghouse and through correspondence with individual agencies, as discussed in **Section 4** below.

4. Public Involvement and Agency Coordination after the EA

Public involvement and agency coordination that occurred prior to publication of the EA is summarized in Chapter 4 of the EA. Public involvement after publication of the EA included a Stakeholder Advisory Committee Meeting, the Public Hearing, and a number of small group meetings, including meetings with Meredith College, NC State University, University Club, and the Method neighborhood.

Agency coordination after the EA included additional effects determination meetings with the State Historic Preservation Office regarding Meredith College.

These activities are summarized below.

4.1. Stakeholder Advisory Committee Meeting

The Stakeholder Advisory Committee is comprised of agencies and study area groups, as listed on page 4-11 of the EA. The committee was formed at the beginning of the study and met three times. The third time was on August 4, 2017, to discuss the EA and the Detailed Study Alternative preliminary designs. Concerns and questions discussed at the meeting are summarized below:

- Residential impacts at the Jones Franklin Road interchange
    - The widening of Jones Franklin Road extends past Ft Sumter Road to a section where closely spaced homes are near the existing Jones Franklin Road right of way. The residential relocations are being assumed due to temporary construction easements, which may be able to be reduced during final design.
- Impacts to the Waters Edge Office Park and pond at the Jones Franklin Road interchange
    - The location of the off-ramp from westbound I-440 to Jones Franklin Road is affected by the loop on-ramp in the same quadrant. This loop's radius was upgraded to current guidelines, so it is farther down Jones Franklin Road away from I-440 than the current loop ramp. In addition, there is the need to line up Ft Sumter Road with the ramps. It is possible that final design will be able to reduce impacts in this quadrant to the office park and the pond.
- Plans for the culverts that carry Walnut Creek under I-440 at Jones Franklin Road
    - The triple box culverts that carry Walnut Creek under I-440 to Lake Johnson Park will remain in place and will be cleaned out. In this area, there is also a culvert that connects the Capital Center Office Park runoff to the Walnut Creek triple box culvert at a junction under the existing interchange. That junction will be sealed off, and a new culvert will be constructed to take runoff from the Capital Center Office Park under Jones Franklin Road to an outfall at a location directly adjacent to the existing triple box culvert.

- Coordinating closures of cross streets during construction to maintain connectivity
    - Closures of the bridges over I-440 at Athens Drive and Melbourne Road would be coordinated to avoid simultaneous closures.
- Will traffic calming measures be installed on Huntington Street and Kaplan Drive as part of the project?
    - These measures are not included in the project, they would be separate projects for the City of Raleigh.
- Will the Double Crossover Diamond Alternative at Western Boulevard accommodate potential bus rapid transit?
    - This alternative's preliminary design does not include a separate BRT lane. However, this type of interchange would not preclude a separate lane or a queue jump potentially being included in final design.
- Could the culvert at Ligon Street remain open for pedestrians/bicyclists if a bridge alternative is selected?
    - The culvert would likely be filled since the bridge options would provide access across I-440, as keeping the culvert would be an extra maintenance responsibility. The fill slopes for the Build Bridge to North Alternative also would likely be in the way of keeping the culvert open under this alternative.
- Concerns about right of way impacts to Meredith College and NC State University/University Club at the Hillsborough Street and Wade Avenue interchange area
    - The preliminary designs show a design footprint that does not include minimization efforts such as retaining walls or reduced angles for the braided ramp crossings. At this level of design, when data on final survey, geotechnical conditions, and final drainage plans are not available, it is not prudent for NCDOT to show designs with full implementation of these types of minimization measures. (Note: measures to reduce right of way in this area were examined, as discussed in **Section 5.**)

4.2. Coordination with the NC State Historic Preservation Office

In a letter dated August 2, 2017, the NC State Historic Preservation Office (NC HPO) agreed to an expanded boundary for the portion of Meredith College determined eligible for the National Register of Historic Places. This was a result of a request from Meredith College to consider additional information they provided to the NC HPO for consideration. The previous boundary was shown in the EA, and the new boundary was shown on the Public Hearing Maps.

On August 22, 2017, the NC HPO reviewed the preliminary designs presented in the EA in relation to the expanded boundary and determined that the proposed Detailed Study Alternatives would have No Effect (One Flyover) or No Adverse Effect (Slight Detour and Two Flyovers) on the historic portion of Meredith College. As a condition of the determination of No Adverse Effect for the alternatives on the historic area of Meredith College, the NC HPO requires that NCDOT prepare and install a landscape plan along the western side of Meredith College campus in consultation with Meredith College. This also will help mitigate changes in the visual landscape caused by the project.

4.3. Public Hearing and Comments Received

NCDOT hosted an open house (4:00-6:30 pm) and a Public Hearing (7:00 pm) at the McKimmon Center (1101 Gorman Street, Raleigh) on August 8, 2017. A total of approximately 382 citizens attended the open house/hearing. The public comment period closed on September 8, 2017. NCDOT collected the following number of comments during the comment period:

- A total of 36 people provided formal verbal comments during the Public Hearing.
- A total of 51 comments were submitted on comment forms at the Public Hearing or later mailed to NCDOT.
- There were 308 emails and letters submitted.
- There were 23 letters from agencies and organizations submitted.
- A total of 2,559 comments were submitted via the online comment forum.

The Public Hearing also served as the public meeting for the US Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act. The USACE issued a Public Notice for the EA and Hearing on July 13, 2017, with a comment deadline of August 14, 2017.

Comments received under the Section 404 Public Notice were forwarded to NCDOT. All comments received under this notice are included in the tallies noted above. None of the comments were substantive. Commenters responding to the USACE notice are listed below.

- Pace Wilber, National Marine Fisheries Service – letter dated 7/26/17 (Document A-013)
- Gary Jordan, US Fish and Wildlife Service – letter dated 7/20/17 (Document A-014)
- David Aldridge – email dated 9/3/17 (Document EL-159)
- Phyllis Danskin – two emails dated 7/23/17 (Document EL-308)
- Karen Juntilla – comment form (Document C-043)
- Sam Miller – email dated 9/6/17 (Document EL-162)

The Post-Hearing meeting was held on October 31, 2017, to discuss all the comments received and draft responses.

Summary of agency comments received. **Table 2** summarizes the agency comments received. Responses to these comments are provided in **Appendix B**.

Table 2. Summary of Agency Comments

Doc #	Date	Agency	Summary of Comments
A-001	8/14/2017	State Environmental Review Clearinghouse	• Forward any further environmental documents to this office.
A-002	8/10/2017	NC Department of Environmental Quality (NCDEQ)	• Continue to work with their agencies during the NEPA/404 Merger process.
A-003	7/24/2017	NC Wildlife Resources Commission (NCWRC)	• No concerns at this time.

Table 2. Summary of Agency Comments

Doc #	Date	Agency	Summary of Comments
A-004	7/21/2017	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	• NCDWR will continue to work with the team in the NEPA/404 Merger Process. • NCDWR recommends highly protective sediment and erosion control BMPs. • A 401 Water Quality Certification will be required. • Impacts to streams may require mitigation, and the NC Division of Mitigation Services is available to assist. • An analysis of secondary and cumulative impacts from the project is required. • Bridges are preferred over culverts at stream crossings. • Additional recommendations for reducing or avoiding impacts.
A-005	7/21/2017	NC Division of Waste Management (NCDWM) Hazardous Waste Section	• Any hazardous waste generated from the project must be managed in accordance with the NC Hazardous Waste Rules.
A-006	7/24/2017	NC DWM Inactive Hazardous Sites Branch - Central Unit	• Five inactive hazardous sites identified within one mile of project.
A-007	7/17/2017	NC DWM Solid Waste Section	• Recommend minimizing waste generation and maximizing recycling of materials.
A-008	8/4/2017	NC DEQ Raleigh Regional Office	• Any open burning must comply with 15A NCAC 2D.1900. • The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. • Compliance with Neuse River Riparian Buffer Rules is required. • Any well abandonment must comply with Title 15A subchapter 2C.0100. • Plans and specifications for construction, expansion, or alteration of a public water system must be approved by the NCDWR Public Water Supply Section prior to award of a contract or start of construction.
A-009	7/26/2017	NC Department of Transportation (NCDOT) Transportation Planning Branch	• No comment.
A-010	7/19/2017	NC Natural Heritage Program (NHP)	• No comment.
A-011	7/24/2017	NC Department of Administration (NCDOA) - Commission of Indian Affairs	• No comment.
A-012	7/17/2017	NCDEQ Division of Emergency Management - Floodplain Management Program	• No comment.
A-013	7/26/2017	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS)	• No comment.

Table 2. Summary of Agency Comments

Doc #	Date	Agency	Summary of Comments
A-014	7/20/2017	US Fish and Wildlife Service (USFWS)	• No comment.
A-023	9/12/2017	Capital Area Metropolitan Planning Organization (CAMPO)	• Supports widening of I-440. • Try to lessen impacts on adjacent properties. • Supports retaining the Hillsborough St interchange at I-440.

Summary of public and organization comments received. Based on comments received and discussions with hearing participants, people recognize that there are transportation needs along the corridor and there is general support for improvements to the corridor. However, many participants indicated that although they support the widening, they have apprehension regarding impacts, especially to the University Club and Meredith College. Bicycle and pedestrian accommodations and noise walls were also mentioned frequently in comments about many of the locations.

Due to the large number of comments received, a list of the most common comments for each interchange/grade separation area was developed with responses. These are included as **Appendix C**.

Jones Franklin Road interchange. Input suggests general support for improvements to the Jones Franklin Road interchange, with concerns related to medians on Jones Franklin Road and impacts to residences and the Learn with the Best school for students with special needs. There were also concerns about stormwater runoff, stream buffers, and flooding.

Athens Drive grade separation. For the Athens Drive grade separation, the Replace Bridge in Place Alternative received the most support. Commenters cited less impacts to residences and lower costs as reasons for their preference.

Bicycle and pedestrian accommodations and noise walls were also mentioned frequently in comments. Many commenters also were concerned about having multiple bridge crossings closed along the corridor at the same time during construction, particularly Athens Drive and Melbourne Road.

Melbourne Road interchange. The Replace Bridge in Place Alternative received the most support. Commenters cited less impacts to residences and costs as reasons for their preference.

Bicycle and pedestrian accommodations and noise walls were also mentioned frequently in comments. Many commenters also were concerned about having multiple bridge crossings closed along the corridor at the same time during construction, particularly Athens Drive and Melbourne Road.

At Melbourne Road, there was both support for and opposition to an idea posed in the on-line comments about eliminating the interchange ramps altogether.

Many citizens also requested that the Deboy Street connection to the westbound I-440 off-ramp at Melbourne Road remain connected. Concerns cited include increased traffic on Huntington Road, inconvenience of a longer route, and GoRaleigh buses on Route 11L using Huntington Road.

There were a number of comments requesting that Melbourne Road not be widened and that traffic signals were not necessary. (Note: traffic signals at the Melbourne Road ramp termini were mistakenly shown on the Public Hearing Maps.)

Western Boulevard interchange. At Western Boulevard, most commenters expressed support for the proposed Double Crossover Diamond, with some concerned about navigating this design. The need for bicycle and pedestrian accommodations were frequently cited. There were also comments regarding accommodating future planned bus rapid transit through the interchange area along Western Boulevard.

Ligon Street grade separation. At Ligon Street, preferences were generally evenly split between the three alternatives. Commenters cited impacts to residences and costs as reasons for their preferences. Safe bicycle and pedestrian access was cited as a reason to prefer the bridge alternatives. There were concerns about potential impacts to Oak Grove Cemetery, Berry O'Kelly School Historic District, and the Method community. Other concerns included noise impacts and increased traffic on Ligon Street with the bridge alternatives.

Hillsborough Street and Wade Avenue interchange area. While many concerns were expressed regarding the Hillsborough-Wade alternatives, the Slight Detour Alternative received slightly more support in the comment forms, emails/letters, and transcript. The majority of on-line forum participants did not like any of the Hillsborough-Wade alternatives, but when asked if they had to choose one, 69 percent chose the Slight Detour Alternative. The main reason cited overall was that the Slight Detour Alternative had the smallest footprint.

Numerous comments were made in opposition to the Hillsborough-Wade proposed interchange designs regarding their potential to impact the University Club and Meredith College. Meredith College advocates expressed concerns about losing multiple acres of their campus and impacts to the commuter parking lot and an athletic field. University Club advocates expressed concerns about losing property that would displace a portion of the Club's amenities. A common comment made from both University Club and Meredith College advocates was the recommendation to eliminate the Hillsborough Street interchange altogether to minimize impacts to each respective entity. Concerns were also raised about compensation for right of way losses, lighting, the Reedy Creek Greenway, visual impacts, noise, and air quality. There were several detailed suggestions for changes to the designs of the interchanges.

Many on-line commenters identified themselves as members of the JC Raulston Arboretum who collectively requested that Beryl Street remain open during construction to maintain access to the arboretum.

Other comments received outside the public comment period. The City of Raleigh Council discussed the I-440 project in their council meeting on September 5, 2017. They unanimously declared support for the Athens Drive Replace Bridge in Place Alternative, the Melbourne Road Replace Bridge in Place Alternative and the Ligon Street Build Bridge to North Alternative. They also wanted the Athens Drive and Melbourne Road bridges to not be closed simultaneously during construction.

City of Raleigh staff have also requested in emails and conversations that, to retain community context, the Melbourne Road bridge should remain a two-lane bridge instead of being widened to three lanes to accommodate a left-turn lane. NCDOT has agreed to this change which will be implemented in final design.

A letter dated November 1, 2017, was received from Scott Douglass, Vice Chancellor for NC State University (NCSU). NCSU stated they did not support the Extend Existing Traffic Culvert nor the Build Bridge to South Alternative for the Ligon Street grade separation. NCSU notes the current culvert poses

a safety risk for faculty, staff, and students traveling between the university's main campus and its facilities on Ligon Street west of I-440. They also note they have a strong interest in enhancing bicycle and pedestrian safety along Hillsborough Street and support creative treatments of the Hillsborough Street interchange to highlight both the City's investment in Hillsborough Street and the University's extensive presence in the corridor.

4.4. Other Meetings

NCDOT organized two meetings with residents of the Method community (10/19/17 and 11/11/17). This minority community is located along Method Road near the Method Community Park. Two historic resources determined eligible for the National Register of Historic Places are located in this area: Oak Grove Cemetery and Berry O'Kelly School Historic District. As a condition of a No Adverse Effect determination from NC HPO for the Ligon Street Build Bridge to North Alternative, the NC HPO requested enhanced aesthetic treatments be included in consultation with the Method community and the City of Raleigh. As a condition of a No Adverse Effect Determination for the Berry O'Kelly School Historic District, the NC HPO requested that aesthetic treatments and/or a public art project for the community side of the preliminarily recommended noise wall be considered with input from the Method community and the City of Raleigh.

At the request of Meredith College, NCDOT coordinated with the college to hold an open house for the project on Meredith's campus on September 5, 2017. Meredith College requested this open house for students since the College was not in session at the time of the Public Hearing (8/8/17). The same maps and materials presented at the Public Hearing were shown at this open house.

NCDOT also attended meetings with the Blue Ridge Corridor Alliance (8/10/17 and 10/12/17) and the Hillsborough Street Community Service Corporation (9/21/17) at their request to provide project status updates and answer questions.

5. Reconfirm Concurrence Point 2a

At the Concurrence Point 2 meeting, the Merger Team agreed that issues related to Concurrence Point 2a (bridging decisions) were covered and all attendees concurred with Concurrence Point 2a, as documented in the attached meeting minutes. **Exhibit 1** shows the locations of the proposed major culverts and culvert extensions. These apply to all Detailed Study Alternatives, except as noted. Details regarding jurisdictional resources in relation to the preliminary designs are shown in **Figures 1 through 12** (located after the body of this report) and listed in **Table 3**.

Since this project is a widening project, it mainly proposes to extend or replace existing culverts, with one new proposed major culvert location. The new culvert (Culvert 1a on **Exhibit 1**) was not known to be required until the preliminary designs were completed after the CP 2 meeting. Two stream relocations are proposed to realign streams with the replaced culvert inlets at Culvert 1b and Culvert 7a. The first is along **Stream SW**, which will be realigned to a relocated culvert (Culvert 1b) under Jones Franklin Road (**Figure 3**). The second, **Stream SJ,** will be realigned to flow into the new inlet of the culvert under Wade Avenue (Culvert 7a and 7b).

Additional details about the culverts and impacts to jurisdictional resources are included in **Section 6**.

Exhibit 1. Recommended Major Culverts

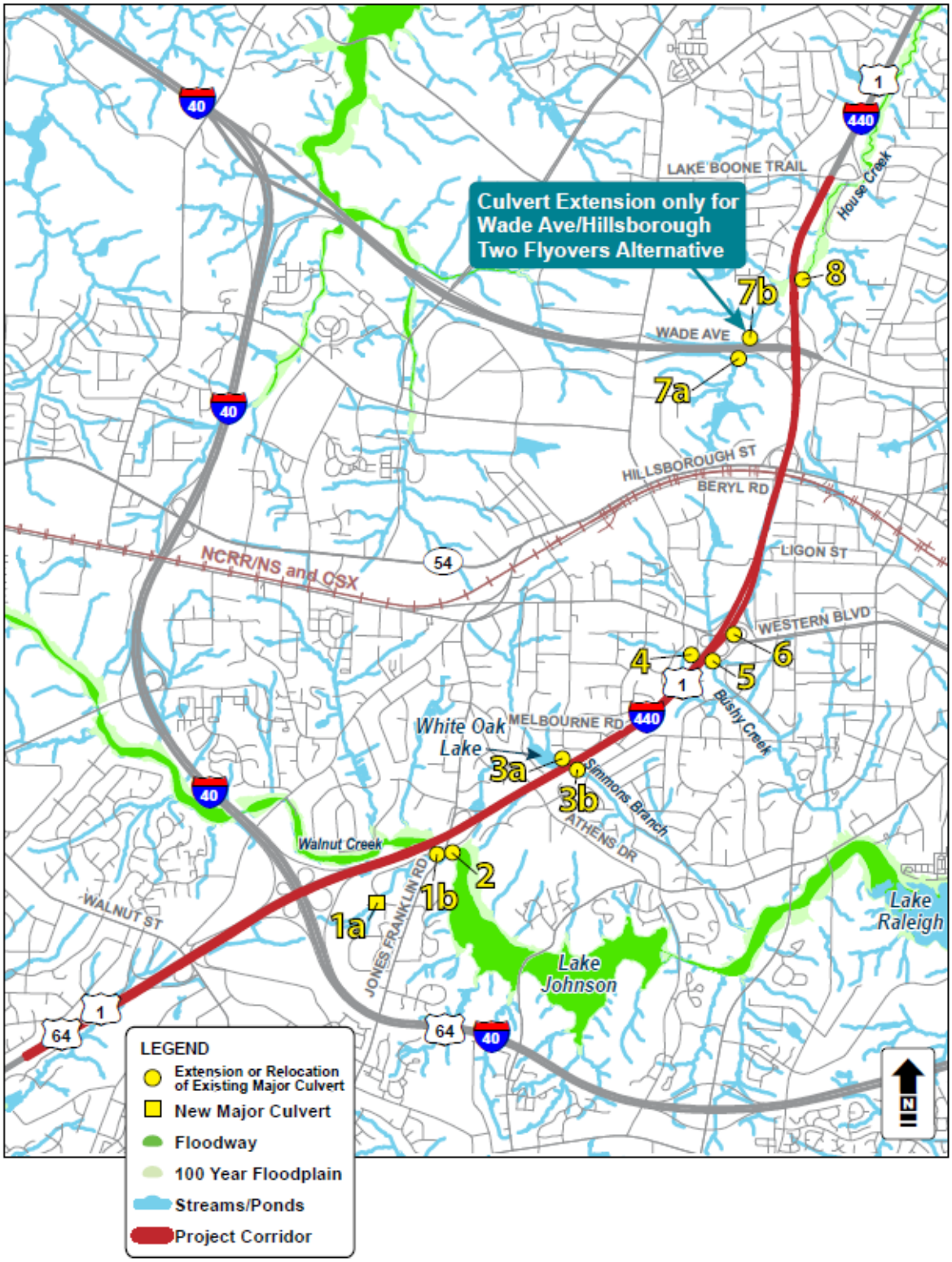


Table 3. U-2719 Recommended Major Hydraulic Structures (as shown on Exhibit 1)

Site	Roadway Crossing	Drainage Area	Flood Study	Stream	Stream Class	Existing Structure Size	Existing Upstream Structure Size	Existing Downstream Structure Size	Recommended Structure Size
1a	Capital Center Dr/ Denise Dr Ext	350 Acres	None	Stream SW – UT to Walnut Creek – Perennial	C; NSW	None	78" CMP	1@ 7' X 5' RCBC	**NEW** 1 @ 11' X 9' RCBC
1b	Capital Center Dr	400 Acres	None	Stream SW – UT to Walnut Creek – Perennial	C; NSW	1 @ 7' X 5' RCBC	78" CMP	Confluence w/ Walnut Creek	**REPLACEMENT** 1 @ 10' X 10' RCBC
2	I-440 & Jones Franklin Rd	4.6 Sq. Miles	Detailed	Stream SX – Walnut Creek – Perennial	C; NSW	3 @ 9' X 10' RCBC	3 @ 9' X 9' RCBC	40' Bridge (910318) (0.75 miles downstream)	Retain existing 3 @ 9' X 10' RCBC
3a & 3b	I-440 at White Oak Lake	351 Acres	None	Stream ST – Simmons Branch – Perennial	C; NSW	1@ 8' X 7' RCBC	3 @ 8' X 4' RCBC W/Beveled HW	2@ 7' X 7' RCBC	Retain and extend existing 1 @ 8' X 7' RCBC on both sides of I-440
4	I-440 at Western Blvd	126 Acres	None	Stream SS – UT to Brushy Creek – Perennial	C; NSW	1 @ 51" Steel Pipe with 66" Tapered Inlet	66" RCP	1 @ 18' X 6' RCBC	**REPLACEMENT** 1 @ 8' X 9' RCBC
5	Western Blvd and I-440	266 Acres	None	Stream SR – Brushy Creek – Perennial	C; NSW	1 @ 8' X 5' RCBC	96" CSP	1 @ 18' X 6' RCBC	**REPLACEMENT** 2 @ 9' X 10' RCBC
6	Western Blvd	100 Acres	None	Stream SO – UT to Brushy Creek – Perennial	C; NSW	1 @ 96" CSP	None	1@ 18' X 6' RCBC	**REPLACEMENT** 1 @ 8' X 9' RCBC
7a & 7b	Wade Ave west of I-440	239 Acres	None	Stream SC – House Creek – Perennial	C; NSW	1 @ 8' X 7' RCBC	None	1 @ 8' X 8' RCBC	Retain and extend existing 1 @ 8' X 7' RCBC on EB side for all DSAs and on WB side for Two Flyovers only
8	I-440 between Wade Ave and Lake Boone Trl	515 Acres	Detailed	Stream SC – House Creek – Perennial	C; NSW	1 @ 8' X 8' RCBC	1 @ 8' X 7' RCBC	2 @ 16' X 10.7' CMPA (590498) (1.2 miles downstream)	Retain and extend existing 1 @ 8' X 8' RCBC

6. Concurrence Point 3

Each of the Detailed Study Alternatives for an interchange or grade separation can be combined with any of the others to create the improvements for the entire corridor. There are 36 different possible combinations of the Detailed Study Alternative to get from the beginning of the project south of Walnut Street to the end of the project near Lake Boone Trail. There are no gaps between the preliminary designs for each location. Therefore, each interchange/grade separation is addressed separately in this section.

The following is provided for each location:

- Description of the Detailed Study Alternatives and any updates to the preliminary designs of the alternatives since the EA
- Impact comparison
- Jurisdictional resource impact comparison (impacts calculated based upon a 25-foot buffer from estimated construction limits)
- NCDOT's recommended Least Environmentally Damaging Practicable Alternative (LEDPA)

6.1. I-40 Interchange and South

Alternatives description. There is one Detailed Study Alternative in this area: Widen I-440 Only Alternative. The preliminary design did not change since the EA, and it is shown in **Figures 1 and 2**. Improvements in this area consist of widening I-440, and this can be done entirely within the existing right of way.

Impact comparison. The improvements will connect the I-440 project to the existing six-lane section of US 1/64, thus eliminating the bottleneck eastbound in this location. There would be no impacts to surrounding resources. The existing noise walls south of Walnut Street along both sides of I-440 would not be impacted by the project.

Jurisdictional resource impact comparison. There would be no impacts to jurisdictional resources in this area.

NCDOT's recommended LEDPA. NCDOT recommends the Widen I-440 Only Alternative as the LEDPA for this location. No comments were received for this project area, and there are no impacts extending outside the existing right of way.

6.2. Jones Franklin Road Interchange

Alternatives description. There is one Detailed Study Alternative in this area: Upgrade Existing Partial Clover Alternative. The preliminary design did not change since the EA, and it is shown in **Figures 3 and 4.**

Both I-440 and Jones Franklin Road would be widened. Traffic flow on Jones Franklin Road would be improved by widening Jones Franklin Road to four lanes and realigning Ft Sumter Road across from the interchange ramps. This alternative also would close the Capital Center Drive office park entrance at Jones Franklin Road (too close to the interchange) and relocate the entrance to a new Capital Center Drive/Denise Drive extension with a traffic signal at its intersection with Jones Franklin Road. The

widened Jones Franklin Road segment would improve mobility with new sidewalks and bicycle lanes, and the bridge over I-440 would be wide enough to accommodate a future greenway planned by the City of Raleigh.

Impact comparison. The following **Table 4** lists the impacts from the preliminary design of the Upgrade Existing Partial Clover Alternative for the Jones Franklin Road interchange.

Table 4. Impact Summary – Jones Franklin Road Interchange

Resource	Upgrade Existing Partial Clover
JURISDICTIONAL RESOURCES IMPACTS	
Lakes/Ponds (sq ft) (Perm & Temp)	38,333
Wetlands (acres) (Perm & Temp)	0.02
Intermittent Streams	
Permanent Impacts (linear ft)	0
Temporary Impacts (linear ft)	165
Perennial Streams	
Permanent Impacts (linear ft)	367
Temporary Impacts (linear ft)	66
Neuse River Riparian Buffer (Zone 1 + Zone 2)	
Zone 1 Impacts (sq ft) (acres)	101,763 (2.34)
Zone 2 Impacts (sq ft) (acres)	43,679 (1.00)
WATER RESOURCES IMPACTS	
Floodplains and Floodways Crossings	Walnut Creek
# of Major Culverts/Pipes (>72" diameter)	2
PROTECTED SPECIES IMPACTS	
Michaux's Sumac	No Effect
Red-cockaded woodpecker	No Effect
Northern long-eared bat (Div 5 projects are covered under a programmatic biological opinion)	May Effect/Likely to Adversely Effect
Bald eagle	No impact
SOCIAL RESOURCES IMPACTS	
Residential Relocations	23
Business Relocations	7
Public Parks and Greenways	Lake Johnson minor impact; Future Walnut Ck greenway accommodated
Other (i.e. private recreational facilities, educational institutions, shopping centers)	Learn with the Best Private School displaced
CULTURAL RESOURCES IMPACTS	
Section 4(f) Resources with anticipated *de minimis* Impact	Lake Johnson Park
PHYSICAL RESOURCES IMPACTS	
Utility Relocation/Replacement	Electric, Telephone, Gas, Water, Sewer

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet.*

Jurisdictional resource impact comparison. **Table 5** lists the impacts to jurisdictional resources.

Table 5. Jurisdictional Resource Impacts – Jones Franklin Road Interchange

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
Upgrade Existing Partial Clover Alternative							
SW	Perennial	At Denise Dr extension	183 lf	66 (DE)	16,617	8,232	24,849
SW	Perennial	Near EB off-ramp[4]	184 lf	0	5,793	3,939	9,732
SX	Perennial (Walnut Ck)	Where culvert outfalls in Lake Johnson Park	0	165 lf (DE)	14,352	10,657	25,009
SAA	Perennial	WB side of I-440 west of Jones Franklin Rd	0	0	185	1,591	1,776
SAK	Intermittent	WB side of I-440 west of Jones Franklin Rd	0	0	33	1,398	1,431
WL	Wetland	Lake Johnson Park	0.02 ac	0	--	--	--
OWD	Open Water	Unnamed pond near WB I-440 off-ramp	28,532 sq ft	9,801 lf (CE)	64,783	17,862	82,645

1. Unless noted, all streams are UTs to Walnut Creek.
2. All impacts are based upon the estimated construction limits plus 25 ft.
3. CE – temporary impact from construction easement; DE – temporary impact from permanent drainage easement
4. Existing stream SW to be relocated to new culvert under Jones Franklin Rd. Permanent impacts include the relocated length.

There is an existing triple box culvert that carries Walnut Creek under I-440. The existing triple box culvert would remain and the silt removed from the boxes. A retaining wall is proposed at the upstream side to avoid impacts to Walnut Creek, its floodway/floodplain, and an adjacent wetland (Wetland WK). A retaining wall also is proposed on the Lake Johnson Park side to minimize impacts and avoid encroachment onto the park. A permanent drainage easement (approximately 0.25 acres) at the Walnut Creek triple box culvert outfall in Lake Johnson Park would be required.

A single box culvert carrying Stream SW from the Capital Center Office Park connects underground to the Walnut Creek triple box culvert. The preliminary hydraulics analysis recommends that this single box culvert be removed and replaced with a box culvert to carry this unnamed stream under Jones Franklin Road to outlet directly into Walnut Creek. Farther upstream, the extension of Capital Center Drive/Denise Drive to Jones Franklin Road would cross Stream SW on a new culvert.

NCDOT's recommended LEDPA. NCDOT recommends the Upgrade Existing Partial Clover Alternative as the LEDPA for the Jones Franklin Road interchange. On balance, the benefits of this alternative outweigh the impacts.

6.3. Athens Drive Grade Separation

Alternatives description. There are two Detailed Study Alternatives in this area, Replace Bridge in Place and Replace Bridge to North. The preliminary designs have not changed since the EA, and they are shown in **Figures 5a and 5b**. Athens Drive would remain a two-lane roadway through the project area. Sidewalks and bicycle lanes would be constructed on Athens Drive in the project area under either alternative. Under the Replace Bridge in Place Alternative, the bridge would be closed for approximately 9-12 months, and will require an offsite detour. Under the Build Bridge to North Alternative, the bridge would remain open during construction, with only brief closures.

Impact comparison. The following **Table 6** lists the impacts from the preliminary designs of the Build Bridge in Place Alternative and the Build Bridge to North Alternative for the Athens Drive grade separation.

Table 6. Impact Summary – Athens Drive Grade Separation

Resource	Replace Bridge in Place Alternative	Replace Bridge to North Alternative
JURISDICTIONAL RESOURCES IMPACTS		
No impacts	0	0
WATER RESOURCES IMPACTS		
No impacts	0	0
PROTECTED SPECIES IMPACTS		
Michaux's Sumac	No Effect	No Effect
Red-cockaded woodpecker	No Effect	No Effect
Northern long-eared bat (Div 5 projects are covered under a programmatic biological opinion)	May Effect/Likely to Adversely Effect	May Effect/Likely to Adversely Effect
Bald eagle	No impact	No impact
SOCIAL RESOURCES IMPACTS		
Residential Relocations	0	5
CULTURAL RESOURCES IMPACTS		
No impacts	0	0
PHYSICAL RESOURCES IMPACTS		
Utility Relocation/Replacement	Electric, Telephone, Gas, Sewer	Electric, Telephone, Gas, Sewer

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet.*

Jurisdictional resource impact comparison. There would be no impacts to jurisdictional resources in this area under either Athens Drive grade separation alternative.

NCDOT's recommended LEDPA. NCDOT recommends the Replace Bridge in Place Alternative as the LEDPA for the Athens Drive grade separation. This alternative is preferred by the City of Raleigh, has fewer residential relocations, and is less expensive than the Replace Bridge to North Alternative.

6.4. Melbourne Road Interchange

Alternatives description. There are two Detailed Study Alternatives in this area, Replace Bridge in Place and Replace Bridge to North. The preliminary designs have not changed since the EA and they are shown in **Figures 5a and 5b**. Sidewalks and bicycle lanes would be constructed on Melbourne Road in the project area under either alternative. Under the Replace Bridge in Place Alternative, the bridge would be closed for approximately 9-12 months, and will require an offsite detour. Under the Build Bridge to North Alternative, the bridge would remain open during construction, with only brief closures.

As discussed in **Section 4.3**, the City of Raleigh has requested that the proposed bridge typical section remain two lanes instead of being widened to three lanes to accommodate a left-turn lane. NCDOT has agreed to this change, which will be implemented in final design. Traffic operations for the reduced bridge design will be included in the FONSI. Draft analysis indicates the reduced bridge with no left-turn lane accommodations will operate adequately in 2040, with a traffic signal potentially warranted sometime before 2040 at the Melbourne Road intersection at Kaplan Drive. Reducing the bridge width will reduce costs. There would be little to no change in other impacts.

Impact comparison. The following **Table 7** lists the impacts from the preliminary designs of the Build Bridge in Place Alternative and the Build Bridge to North Alternative for the Melbourne Road interchange.

Table 7. Impact Summary – Melbourne Road Interchange

Resource	Replace Bridge in Place	Replace Bridge to North
JURISDICTIONAL RESOURCES IMPACTS		
Lakes/Ponds (sq ft) (Perm & Temp)	3,311	3,311
Wetlands (acres) (Perm & Temp)	0.07	0.07
Intermittent Streams		
Permanent Impacts (linear ft)	305	305
Temporary Impacts (linear ft)	0	0
Perennial Streams		
Permanent Impacts (linear ft)	113	113
Temporary Impacts (linear ft)	137	137
Neuse River Riparian Buffer (Zone 1 + Zone 2)		
Zone 1 Impacts (sq ft)	47,922	47,922
Zone 2 Impacts (sq ft)	25,774	25,774
WATER RESOURCES IMPACTS		
Floodplains and Floodways Crossings	0	0
# of Major Culverts/Pipes (>72" diameter)	1	1
PROTECTED SPECIES IMPACTS		
Michaux's Sumac	No Effect	No Effect
Red-cockaded woodpecker	No Effect	No Effect
Northern long-eared bat (Div 5 projects are covered under a programmatic biological opinion)	May Effect/Likely to Adversely Effect	May Effect/Likely to Adversely Effect
Bald eagle	No impact	No impact
SOCIAL RESOURCES IMPACTS		
Residential Relocations	3	6
Public Parks and Greenways	Kaplan Park minor impact	Kaplan Park minor impact
CULTURAL RESOURCES IMPACTS		
# of Historic Resources in Area	0	0
Section 4(f) Resources with anticipated *de minimis* Impact	Kaplan Park	Kaplan Park
Section 6(f)(3) Resource Impacts	0	0
PHYSICAL RESOURCES IMPACTS		
Utility Relocation/Replacement	Electric, Gas, Water	Electric, Gas, Water

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet*

Jurisdictional resource impact comparison. **Table 8** lists the impacts to jurisdictional resources, which are the same for the Build Bridge in Place Alternative and the Build Bridge to North Alternative.

Table 8. Jurisdictional Resource Impacts – Melbourne Road Interchange

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
Build Bridge in Place Alternative or the Build Bridge to North Alternative							
ST	Perennial (Simmons Branch)	Near White Oak Lake, crossing under I-440	113 lf	137 lf (DE)	37,304	19,224	56,528
SU	Intermittent	Near White Oak Lake on WB I-440 side	54 lf	0	See note 5	See note 5	See note 5
SV	Intermittent	Near White Oak Lake on EB I-440 side	251 lf	0	See note 6	See note 6	See note 6
WF	Wetland	Near White Oak Lake on WB I-440 side	0.06 ac	0	--	--	--
WI	Wetland	Near White Oak Lake on WB I-440 side	0.003 ac	0	--	--	--
WJ	Wetland	Near White Oak Lake on WB I-440 side	0.001 ac	0	--	--	--
WH	Wetland	Near White Oak Lake on EB I-440 side	0	0.006 ac (DE)	--	--	--
OWC	Open Water (White Oak Lake)	Pond on WB I-440 side between Melbourne Rd and Athens Dr	3,311 sq ft[4]	0	10,618	6,550	17,168

1. Unless noted, all streams are UTs to Simmons Branch.
2. All impacts are based upon the estimated construction limits plus 25 ft.
3. CE – temporary impact from construction easement; DE – temporary impact from permanent drainage easement
4. A separate City of Raleigh project will be relocating/reconstructing the White Oak Lake dam outside the proposed right of way
5. Riparian Buffer Rules do not apply to Stream SU since stream not on USGS topo map or USDA Soils Survey.
6. The buffers for Stream SV combined with those for Stream ST (both sides of I-440) to avoid overlapping impacts.

NCDOT's recommended LEDPA. NCDOT recommends the Replace Bridge in Place Alternative as the LEDPA for the Melbourne Road interchange. This alternative is preferred by the City of Raleigh, has fewer residential relocations, and is less expensive than the Replace Bridge to North Alternative.

6.5. Western Boulevard Interchange

Alternative description. There is one Detailed Study Alternative for the Western Boulevard Interchange: Double Crossover Diamond Alternative. A double crossover diamond interchange is also known as a diverging diamond interchange. The preliminary design did not change since the EA, and it is shown on **Figure 6.**

This alternative removes the existing flyover ramp from westbound Western Boulevard to westbound I-440 that merges onto I-440 on the left side, which is an undesirable configuration. There would be three through lanes in each direction of Western Boulevard through the interchange area. This alternative also would replace the multi-use path that is currently along the westbound side of Western Boulevard.

Impact comparison. The following **Table 9** lists the impacts from the preliminary design of the Double Crossover Alternative for the Western Boulevard interchange. This alternative has a high estimated construction cost due to challenges associated with installing adequate drainage structures through the interchange area. Some of the existing drainage structures are deep (40+ feet) underground and tunneling methods may be needed.

Table 9. Impact Summary – Western Boulevard Interchange

Resource	Double Crossover Diamond
JURISDICTIONAL RESOURCES IMPACTS	
Lakes/Ponds (sq ft) (Perm & Temp)	0
Wetlands (acres) (Perm & Temp)	0
Intermittent Streams	
Permanent Impacts (linear ft)	0
Temporary Impacts (linear ft)	0
Perennial Streams	
Permanent Impacts (linear ft)	376
Temporary Impacts (linear ft)	125
Neuse River Riparian Buffer (Zone 1 + Zone 2)	
Zone 1 Impacts (sq ft)	47,056
Zone 2 Impacts (sq ft)	28,374
WATER RESOURCES IMPACTS	
Floodplains and Floodways Crossings	0
# of Major Culverts/Pipes (>72" diameter)	3
PROTECTED SPECIES IMPACTS	
Michaux's Sumac	No Effect
Red-cockaded woodpecker	No Effect
Northern long-eared bat (Div 5 projects are covered under a programmatic biological opinion)	May Effect/Likely to Adversely Effect
Bald eagle	No impact
SOCIAL RESOURCES IMPACTS	
Residential Relocations	1
Public Parks and Greenways	Multi-use path replaced
Other (i.e. private recreational facilities, educational institutions, shopping centers)	K-Mart parking lot minor impact
CULTURAL RESOURCES IMPACTS	
No impacts	0
PHYSICAL RESOURCES IMPACTS	
Utility Relocation/Replacement	Electric, Gas, Water, Sewer

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet*

Jurisdictional resource impact comparison. **Table 10** lists the impacts to jurisdictional resources.

Table 10. Jurisdictional Resource Impacts – Western Boulevard Interchange

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
Double Crossover Diamond Alternative							
SS	Perennial	At on-ramp from Western Blvd to WB I-440	67 lf	59 lf (DE)	9,756	6,026	15,782
SR	Perennial (Brushy Creek)	Crosses diagonally from northwest quadrant (K-Mart) to southeast quadrant under the Western Blvd interchange	92 lf	66 lf (DE)	17,980	11,700	29,680
SO	Perennial	In between Western Blvd and Ligon St on EB I-440 side	217 lf	0	19,320	10,648	29,968

1. Unless noted, all streams are UTs to Brushy Creek.
2. All impacts are based upon the estimated construction limits plus 25 ft.
3. CE – temporary impact from construction easement; DE – temporary impact from permanent drainage easement

NCDOT's recommended LEDPA. NCDOT recommends the Double Crossover Diamond Alternative for the Western Boulevard interchange. On balance, the benefits of this alternative outweigh the impacts.

6.6. Ligon Street Grade Separation

Alternatives description. There are three Detailed Study Alternatives in this area, Extend Existing Traffic Culvert, Build Bridge to North, and Build Bridge to South. The preliminary designs did not change since the EA, and they are shown on **Figures 7a through 7c.**

The Extend Existing Traffic Culvert Alternative would lengthen the culvert to accommodate a widened I-440 on top. The culvert was part of the original I-440 construction to retain connections between the historic Oak Grove Cemetery and the Method neighborhood. The culvert would remain a one-lane culvert. Buses are prohibited due to vertical clearance constraints, and there are no sidewalks or pedestrian accommodations through the culvert. A new wider and higher traffic culvert, or a bridge to carry I-440, would not be feasible because traffic flow on I-440 could not be maintained during construction.

The Build Bridge to North Alternative and the Build Bridge to South Alternative would construct a two-lane bridge for Ligon Street over I-440 to replace the existing traffic culvert. NC State University and City of Raleigh are interested in upgrading the Ligon Street crossing to provide improved bus, pedestrian, and bicycle access along this road, and because they have plans to extend Ligon Street to Blue Ridge Road in the future. The initial bridge concept showed the alignment south of the culvert. A second concept was developed during preliminary design on an alignment to the north of the culvert. The bridge would be two-lanes wide and have sidewalks, with an expected posted speed limit of 25 miles per hour.

Impact comparison. The following **Table 11** lists the impacts from the preliminary designs of the Ligon Street grade separation Detailed Study Alternatives.

Table 11. Impact Summary – Ligon Street Grade Separation

Resource	Extend Existing Traffic Culvert	Build Bridge to North	Build Bridge to South
JURISDICTIONAL RESOURCES IMPACTS			
Lakes/Ponds (sq ft) (Perm & Temp)	0	0	0
Wetlands (acres) (Perm & Temp)	0	0	0
Intermittent Streams			
Permanent Impacts (linear ft)	74	123	74
Temporary Impacts (linear ft)	0	0	0
Perennial Streams			
Permanent Impacts (linear ft)	51	51	236
Temporary Impacts (linear ft)	0	0	64
Neuse River Riparian Buffer (Zone 1 + Zone 2)			
Zone 1 Impacts (sq ft)	9,698	14,490	26,246
Zone 2 Impacts (sq ft)	9,395	16,482	19,251
WATER RESOURCES IMPACTS			
Floodplains and Floodways Crossings	0	0	0
# of Major Culverts/Pipes (>72" diameter)	0	0	0
PROTECTED SPECIES IMPACTS			
Michaux's Sumac	No Effect	No Effect	No Effect
Red-cockaded woodpecker	No Effect	No Effect	No Effect
Northern long-eared bat (Div 5 projects are covered under a programmatic biological opinion)	May Effect/Likely to Adversely Effect	May Effect/Likely to Adversely Effect	May Effect/Likely to Adversely Effect
Bald eagle	No impact	No impact	No impact
SOCIAL RESOURCES IMPACTS			
Residential Relocations	0	10	0
Business Relocations	7	7	8
Public Parks and Greenways	0	0	0
Other (i.e. private recreational facilities, educational institutions, shopping centers)	0	0	NCSU research building displaced
CULTURAL RESOURCES IMPACTS			
# of Historic Resources in Area	2		
Historic Resources with "No Effect"	0		
Historic Resources with "No Adverse Effect"	Berry O'Kelly School Historic District	Oak Grove Cemetery & Berry O'Kelly School Historic District	
Historic Resources with "Adverse Effect"	Oak Grove Cemetery – due to proximity	0	
Section 4(f) Resources with anticipated *de minimis* Impact	None - No physical encroachment on historic resources		
PHYSICAL RESOURCES IMPACTS			
Utility Relocation/Replacement	None	Electric, Gas	Electric, Gas
Hazardous Materials Sites Impacted	1 Low risk	1 Low risk	1 Low risk

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet*

The bridge alternatives would improve mobility and accessibility along Ligon Street since the bridge would have sidewalks and would allow for buses to cross I-440 at this location. The Extend Existing Traffic Culvert Alternative would not improve mobility or accessibility since there would be no sidewalk, and buses would be prohibited due to clearance issues.

All three alternatives would have seven business relocations along Brickhaven Drive due to the widening of I-440 in this area. The Build Bridge to South Alternative also would impact the NCSU research building located on Ligon Street on the eastbound I-440 side of the culvert. The Build Bridge to North Alternative would avoid this research facility but would impact 10 units in the Method Townes townhome development. Method Townes is marketed as student housing for NC State University. The Extend Existing Traffic Culvert Alternative would not impact residences or facilities along Ligon Street.

The Build Bridge to South Alternative would have an Adverse Effect on the historic Oak Grove Cemetery due to proximity of the construction limits. None of the alternatives would physically encroach on the Oak Grove Cemetery, however. A retaining wall is proposed along I-440 to avoid direct impacts from the project.

Jurisdictional resource impact comparison. **Table 12** lists the impacts to jurisdictional resources. The Build Bridge to South Alternative would have approximately 85 more linear feet of permanent stream impacts and 64 linear feet more of temporary impacts compared to the other two alternatives due to more impacts to the perennial section of Stream SO.

Table 12. Jurisdictional Resource Impacts – Ligon Street Grade Separation

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
Extend Existing Traffic Culvert							
SO	Perennial	Parallel to EB I-440 south of Ligon St	51 lf	0	9,698	9,395	19,093
SO	Intermittent	Parallel to EB I-440 north of Ligon St	52 lf	0	Incl above	Incl above	Incl above
SN	Intermittent	Flows into Stream SO north of Ligon St	22 lf	0	Incl above	Incl above	Incl above
Build Bridge to North							
SO	Perennial	Parallel to EB I-440 south of Ligon St	51 lf	0	13,211	8,581	21,792
SO	Intermittent	Parallel to EB I-440 north of Ligon St	52 lf	0	1,279	7,901	9,180
SN	Intermittent	Flows into Stream SO north of Ligon St	71 lf	0	Incl w/ SO-Perennial	Incl w/ SO-Perennial	Incl w/ SO-Perennial
Build Bridge to South							
SO	Perennial	Parallel to EB I-440 south of Ligon St	236 lf	64 lf (CE)	16,522[4]	15,729[4]	32,251[4]
SO	Intermittent	Parallel to EB I-440 north of Ligon St	52 lf	0	9,724	3,522	13,246
SP	Perennial	Perpendicular to EB I-440 north of Ligon St	0	0	Incl w/ SO-Perennial	Incl w/ SO-Perennial	Incl w/ SO-Perennial
SN	Intermittent	Flows into Stream SO north of Ligon St	22 lf	0	Incl w/ SO-Intermittent	Incl w/ SO-Intermittent	Incl w/ SO-Intermittent

1. All streams are UTs to Brushy Creek.
2. All impacts are based upon the estimated construction limits plus 25 ft.
3. CE – temporary impact from construction easement; DE – temporary impact from permanent drainage easement
4. Buffer impacts under Stream SO Perennial for Build Bridge to South also include buffer impacts to Stream SP-Perennial, since the buffer areas overlap for these two streams. Combined to avoid double counting impacts.

NCDOT's recommended LEDPA. NCDOT recommends the Build Bridge to North Alternative for the Ligon Street grade separation. Compared to the other alternatives, this alternative provides the most benefits as compared to the impacts. The Build Bridge to South Alternative has the most impacts to jurisdictional resources and an Adverse Effect on the Oak Grove Cemetery historic property, as well as impacting a NCSU research facility.

The Build Bridge to North Alternative would enhance connections between the Oak Grove Cemetery and the Method community since pedestrians and vehicles (including buses) will be accommodated on the bridge, while the Extend Existing Traffic Culvert Alternative would not provide these features. The bridge also would get enhanced aesthetic treatments as a condition of the No Adverse Effect determination from NC HPO that would include input from the community. Jurisdictional resource impacts between the Build Bridge to North Alternative and the Extend Existing Traffic Culvert Alternative are similar, although impacts from the bridge alternative are slightly higher.

During the public comment period, only a few comment forms/emails/letters were received with comments about the Ligon Street grade separation. These were evenly split regarding preferences between the three alternatives. On-line forum comments expressed more support for the culvert alternative, although it was evenly split if the preferences for the two bridge alternatives were added together and compared to the culvert alternative.

NCDOT met with Method community leaders on October 19, 2017, who expressed support for the Build Bridge to North Alternative. With their assistance, a community-wide meeting was advertised and held on November 14, 2017, to discuss the alternatives for the Ligon Street grade separation. Approximately 39 people attended the November meeting. Overall, the attendees were supportive of the Build Bridge to North Alternative.

6.7. Hillsborough Street and Wade Avenue Interchange Area

Alternatives description. There are three Detailed Study Alternatives in this area: One Flyover Alternative, Two Flyovers Alternative, and Slight Detour Alternative. The proximity of the Wade Avenue and Hillsborough Street interchanges to one another required these be evaluated and designed together. The Detailed Study Alternatives also include relocation of the Reedy Creek Greenway to an alignment near its existing location adjacent to I-440 on the Meredith College main campus. A segment of the greenway also would be relocated north of Wade Avenue to reconnect it to the existing greenway and to the greenway spur that runs to Ridge Road.

The preliminary designs for the One Flyover Alternative and the Slight Detour Alternative were revised after the EA as a result of public and stakeholder input, particularly from Meredith College administrators and alumni and University Club administrators and members. These stakeholders were concerned about the amount of right of way proposed for the Detailed Study Alternatives and the impacts these encroachments would have on their facilities. The original preliminary designs shown in the EA for all three alternatives and the revised preliminary designs for the One Flyover Alternative and Slight Detour Alternative are shown in **Figures 8 through 11.**

For Meredith College, concerns include the amount of land needed from the main campus and the associated impacts to the commuter parking lot and intramural athletic field. In addition, they are

concerned about the visual impacts of the proposed flyover ramps and the design and alignment of the Reedy Creek Greenway replacement.

For University Club, concerns included the amount of land needed from their lease area (leased from NC State University) and the associated impacts to amenities such as the parking lot, tennis courts, golf course, and golf practice facility. The golf practice facility is a sublease to the NCSU Athletics Department.

The preliminary designs for the One Flyover Alternative and the Slight Detour Alternative were revised to reduce right of way impacts to University Club and Meredith College's main campus. The Two Flyovers Alternative was not revised because, upon review of the preliminary designs, it was clear that reductions in right of way impacts to Meredith College's main campus would not be as great as with the One Flyover Alternative and the Slight Detour Alternative, so efforts were focused on these latter two alternatives.

Revised design elements include the following:

- Reduced radii for the loop ramps at Hillsborough Street under both the Slight Detour Alternative and the One Flyover Alternative.
- Use of retaining walls under both One Flyover Alternative and Slight Detour Alternative to reduce impacts from the ramps and bring them closer to the I-440 mainline in both directions.
- Reduced angle for the crossing of the eastbound braided ramps in the One Flyover Alternative.
- Elimination of the ramp from eastbound Wade Avenue to westbound I-440 that peels off from the flyover ramp under both the One Flyover Alternative and the Slight Detour Alternative. Under the revised design, this ramp traffic now goes to the traffic signal and turns right. There is a new traffic signal proposed at the intersection of this ramp and the ramp from eastbound I-440 exiting to Hillsborough Street to control the merging actions. This eliminates a braided ramp condition in the westbound direction and allows the ramps to move closer to the mainline.
- Use of retaining walls to reduce impacts from the Reedy Creek Greenway relocation under the One Flyover Alternative and the Slight Detour Alternative.
- Addition of a greenway bridge over Moore Drive north of Wade Avenue that separates greenway traffic from Moore Drive vehicular traffic to address Meredith College's security concerns. The existing configuration includes a greenway bridge over Moore Drive adjacent to Wade Avenue, and this design change would relocate the bridge. This applies to all Detailed Study Alternatives.

One other update in this area is the addition of three delineated streams in the area on the eastbound side of I-440 between Wade Avenue and Lake Boone Trail. These are labeled Stream SAN (perennial), Stream SAO (intermittent), and Stream SAP (intermittent) on **Figures 8 and 9**. Stream SAN, which connects to House Creek near the existing culvert under I-440 was delineated in the original stream surveys conducted in 2013 but mistakenly left off the electronic files. Stream SAO and Stream SAP are not shown as blueline streams in USGS maps and, based on a field visit on January 11, 2018, are intermittent. These streams likely have changed status to jurisdictional since the original 2013 stream surveys.

Impact comparison. The following **Table 13** lists the impacts from the preliminary designs of the Two Flyovers Alternative, One Flyover Alternative, One Flyover Alternative Revised, Slight Detour Alternative, and Slight Detour Alternative Revised.

Table 13. Impact Summary – Hillsborough Street and Wade Avenue Interchange Area

Resource	Two Flyovers	One Flyover	One Flyover Revised	Slight Detour	Slight Detour Revised
JURISDICTIONAL RESOURCES IMPACTS[1]					
Lakes/Ponds (sq ft) (Perm & Temp)	0	0	0	0	0
Wetlands (acres) (Perm & Temp)	0	0.08	0.08	0.07	0.07
Intermittent Streams					
Permanent Impacts (linear ft)	75	413	413	417	417
Temporary Impacts (linear ft)	25	24	24	25	25
Perennial Streams					
Permanent Impacts (linear ft)	628	542	542	544	544
Temporary Impacts (linear ft)	471	384	384	384	384
Neuse River Riparian Buffer (Zone 1 + Zone 2)					
Zone 1 Impacts (sq ft)	69,551	85,482	84,452	86,418	83,568
Zone 2 Impacts (sq ft)	46,713	60,260	57,307	59,454	55,652
WATER RESOURCES IMPACTS					
Floodplains & Floodways Crossings	1	1	1	1	1
# of Major Culverts/Pipes (>72" dia.)	3	2	2	2	2
PROTECTED SPECIES IMPACTS					
Michaux's Sumac	No Effect	No Effect	No Effect	No Effect	No Effect
Red-cockaded woodpecker	No Effect	No Effect	No Effect	No Effect	No Effect
Northern long-eared bat (Div 5 projects are covered under a programmatic biological opinion)	May Effect/ Likely to Adversely Effect	May Effect/ Likely to Adversely Effect	May Effect/ Likely to Adversely Effect	May Effect/ Likely to Adversely Effect	May Effect/ Likely to Adversely Effect
Bald eagle	No impact	No impact	No impact	No impact	No impact
SOCIAL RESOURCES IMPACTS					
Right of Way Area from NCSU/Univ Club (acres)	18.7	18.4	12.7	18.7	12.7
Right of Way Area from Meredith College (main campus + north of Wade Ave) (acres)	13.0 Main 0.0 North 13.0 Total	10.7 Main 6.2 North 16.9 Total	4.5 Main 6.2 North 10.7 Total	8.2 Main 5.9 North 14.1 Total	4.0 Main 6.2 North 10.2 Total
Residential Relocations	0	1	1	1	1
Business Relocations[3]	1	1	1	1	1
Public Parks and Greenways	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway
Other (i.e. private recreational facilities, educational institutions, shopping centers)	Univ Club tennis courts and NCSU Golf Practice Facility	Univ Club tennis courts and NCSU Golf Practice Facility	Univ Club tennis courts and NCSU Golf Practice Facility	Univ Club tennis courts and NCSU Golf Practice Facility	Univ Club tennis courts and NCSU Golf Practice Facility
CULTURAL RESOURCES IMPACTS					
# of Historic Resources in Area	3	3	3	3	3
Historic Resources with "No Effect"	Royal Baking Co Capital City Lumber	Meredith College Royal Baking Co Capital City Lumber	Meredith College Royal Baking Co Capital City Lumber	Royal Baking Co Capital City Lumber	Royal Baking Co Capital City Lumber
Historic Resources with "No Adverse Effect"	Meredith College	0	0	Meredith College	Meredith College
Historic Resources with	0	0	0	0	0

Table 13. Impact Summary – Hillsborough Street and Wade Avenue Interchange Area

Resource	Two Flyovers	One Flyover	One Flyover Revised	Slight Detour	Slight Detour Revised
"Adverse Effect"					
Section 4(f) Resources with anticipated *de minimis* Impact	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway	Museum Park Reedy Ck Gway
PHYSICAL RESOURCES IMPACTS					
Utility Relocation/Replacement	Electric, Telephone, Gas, Water, Sewer	Electric, Telephone, Gas, Water, Sewer	Electric, Telephone, Gas, Water, Sewer	Electric, Telephone, Gas, Water, Sewer	Electric, Telephone, Gas, Water, Sewer
Railroad Crossings	1	1	1	1	1

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet. Impacts assume Reedy Creek Greenway replaced along west side of Meredith College main campus.*
1. Jurisdictional stream impacts include Streams SAN, SAO, and SAP and Wetlands WS and WT
2. Impacts assume the Reedy Creek Greenway is constructed adjacent to I-440 on the main campus of Meredith College
3. It was assumed in the EA that the University Club would be a take in order to account for this possibility.

The impacts reported in **Table 13** assume that the Reedy Creek Greenway would be replaced near its current location along the west side of the Meredith College main campus. Another option discussed with the City of Raleigh and Meredith College is to relocate the greenway to Faircloth Street. This option was explored as a potential way to minimize right of way impacts to the west side of the Meredith College main campus from the non-revised Detailed Study Alternatives. NCDOT has been coordinating with the City of Raleigh and Meredith College on the design of both the Reedy Creek Greenway alternatives with the goals of addressing Meredith College's concerns and receiving a Section 4(f) de minimis determination from the City of Raleigh.

Figure 12 shows the Reedy Creek Greenway Faircloth Street relocation option. This option has two components. The first is the new greenway along Faircloth Street from Wade Avenue to Hillsborough Street. The second component would extend the existing multi-use path along the south side of Wade Avenue westward to the existing greenway culvert under Wade Avenue so that greenway users would not have to cross Wade Avenue and Ridge Road at grade with traffic.

Table 14 compares the impacts to Meredith College's main campus from the Reedy Creek Greenway relocation options.

Table 14. Impact Summary – Reedy Creek Greenway Relocation Alternatives

Resource[1]	Adjacent to One Flyover Revised	Adjacent to Slight Detour Revised	Relocated to Faircloth St
JURISDICTIONAL RESOURCES IMPACTS			
Lakes/Ponds (sq ft) (Perm & Temp)	0	0	0
Wetlands (acres) (Perm & Temp)	0	0	0.13
Intermittent Streams			
Permanent Impacts (linear ft)	0	0	0
Temporary Impacts (linear ft)	0	0	0
Perennial Streams			
Permanent Impacts (linear ft)	0	0	66
Temporary Impacts (linear ft)	0	0	28
Neuse River Riparian Buffer (Zone 1 + Zone 2)			
Zone 1 Impacts (sq ft)	0	0	8,544
Zone 2 Impacts (sq ft)	0	0	9,017
SOCIAL RESOURCES IMPACTS			
Right of way impacts (acres) to Meredith College[2]	2.0 acres permanent easement	0.6 acre permanent easement	0.8 acre permanent easement, 1.8 acres construction easement
PHYSICAL RESOURCES IMPACTS			
Utility Coordination	None	None	electric power easement

**Only features with impacts listed in this summary table. Impacts based on preliminary design estimated construction limits plus 25 feet.*
1. Impact comparison is for impacts on Meredith College main campus and does not include the greenway section north of Wade Avenue, which would be the same under the Faircloth St option and the Adjacent to I-440 options.
2. Right of way impacts from the Faircloth St relocation option include 0.8 acre permanent easement within an existing permanent power easement along Faircloth St. The 1.8 acre construction easement includes 0.3 acre is for the greenway segment south of Wade Ave, 1.3 acres is along Faircloth St within the existing power easement and 0.2 acre outside the power easement.

Jurisdictional resource impact comparison. **Table 15** lists the impacts to jurisdictional resources from the preliminary designs of the Two Flyovers Alternative, One Flyover Alternative Revised, and Slight Detour Alternative Revised. Only the One Flyover Revised Alternative and Slight Detour Revised Alternative are reported in **Table 15** because the One Flyover Alternative and the Slight Detour Alternative would have the same impacts to streams and wetlands compared to their corresponding revised designs, and additional riparian buffer impacts to Pond OWA. Pond OWA is not impacted by the revised designs.

The differences in jurisdictional resources impacts between the alternatives listed in **Table 15** occur in two locations.

At the Wade Avenue interchange, there are differences at the culvert crossing under Wade Avenue just west of I-440. On the NC Museum of Art property on the north side of Wade Avenue, a culvert extension is needed under the Two Flyovers alternative that is not needed under the One Flyover Revised or Slight Detour Revised alternatives. Under the Two Flyovers alternative, the ramp from westbound I-440 to westbound Wade Avenue needs to be shifted outward so that the flyover ramp from eastbound I-440 to westbound Wade Avenue can join with this ramp before joining Wade Avenue, creating a need to extend the House Creek culvert on the north side. This culvert extension would have approximately 85 linear feet of permanent impact and 87 linear feet of temporary impact to Stream SC (House Creek).

Additional, the One Flyover Revised and Slight Detour Revised have impacts to intermittent streams SAO and SAP and wetlands WS and WT on Meredith College property north of Wade Avenue near Moore Drive due to ramps and relocation of the Reedy Creek Greenway and Greenway Spur to make room for the ramps.

Table 15. Jurisdictional Resource Impacts – Hillsborough Street and Wade Avenue Interchange Area

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
Two Flyovers Alternative							
SI	Intermittent	SW quadrant of I-440/ Wade Ave interchange – NCSU	28 lf	0	--	--	Buffer Rules do not apply
SJ	Perennial	SW quadrant of I-440/ Wade Ave interchange – NCSU	194 lf	61 lf (DE)	Combined with SC at NCSU below	Combined with SC at NCSU below	Combined with SC at NCSU below
SK	Intermittent	SW quadrant of I-440/ Wade Ave interchange – NCSU	0	25 lf (DE)	Combined with SC at NCSU below	Combined with SC at NCSU below	Combined with SC at NCSU below
SC	Perennial (House Ck)	SW quadrant of I-440/ Wade Ave interchange – NCSU	177 lf	110 lf (DE)	23,842	18,093	41,935
SC	Perennial (House Ck)	NW quadrant of I-440/ Wade Ave interchange – Museum Park	85 lf	87 lf (DE)	13,474	9,446	22,920
SC	Perennial (House Ck)	WB side of I-440 near Mesa Ct	16 lf	0	2,622	3,227	5,849
SC	Perennial (House Ck)	EB side of I-440 near House Creek Greenway	78 lf	133 lf (DE)	24,135	10,132	34,267
SAN	Perennial	EB side of I-440 near House Creek Greenway	78 lf	80 lf (DE)	Combined w/ SC at I-440 EB	Combined w/ SC at I-440 EB	Combined w/ SC at I-440 EB
SE	Intermittent	EB side of I-440 near Apts on House Creek Trail	47 lf	0	5,478	5,815	11,293
SAO	intermittent	EB side of I-440, north of Wade Ave near Moore Dr	0	0	0	0	0
SAP	Intermittent	EB side of I-440, north of Wade Ave near Moore Dr	0	0	0	0	0
One Flyover Alternative Revised							
SI	Intermittent	SW quadrant of I-440/ Wade Ave interchange – NCSU	28 lf	0	--	--	Buffer Rules do not apply
SJ	Perennial	SW quadrant of I-440/ Wade Ave interchange – NCSU	194 lf	61 lf (DE)	Combined with SC at NCSU below	Combined with SC at NCSU below	Combined with SC at NCSU below
SK	Intermittent	SW quadrant of I-440/ Wade Ave interchange – NCSU	0	24 lf (DE)	Combined with SC at NCSU below	Combined with SC at NCSU below	Combined with SC at NCSU below

Table 15. Jurisdictional Resource Impacts – Hillsborough Street and Wade Avenue Interchange Area

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
SC	Perennial (House Ck)	SW quadrant of I-440/ Wade Ave interchange – NCSU	176 lf	110 lf (DE)	23,842	18,093	41,935
SC	Perennial (House Ck)	NW quadrant of I-440/ Wade Ave interchange – Museum Park	0	0	0	0	0
SC	Perennial (House Ck)	WB side of I-440 near Mesa Ct	16 lf	0	2,622	3,227	5,849
SC	Perennial (House Ck)	EB side of I-440 near House Creek Greenway	78 lf	133 lf (DE)	24,135	10,132	34,268
SAN	Perennial	EB side of I-440 near House Creek Greenway	78 lf	80 lf (DE)	Combined w/ SC at I-440 EB	Combined w/ SC at I-440 EB	Combined w/ SC at I-440 EB
SE	Intermittent	EB side of I-440 near Apts on House Creek Trail	47 lf	0	5,482	5,815	11,297
SAO	intermittent	EB side of I-440, north of Wade Ave near Moore Dr	207 lf	0	18,072	12,676	30,748
SAP	Intermittent	EB side of I-440, north of Wade Ave near Moore Dr	131 lf	0	10,299	7,364	17,663
WS	Wetland	EB side of I-440, north of Wade Ave near Moore Dr	0.05 ac	0	--	--	--
WT	Wetland	EB side of I-440, north of Wade Ave near Moore Dr	0.03 ac	0	--	--	--
Slight Detour Alternative Revised							
SI	Intermittent	SW quadrant of I-440/ Wade Ave interchange – NCSU	28 lf	0	--	--	Buffer Rules do not apply
SJ	Perennial	SW quadrant of I-440/ Wade Ave interchange – NCSU	194 lf	61 lf (DE)	Combined with SC at NCSU below	Combined with SC at NCSU below	Combined with SC at NCSU below
SK	Intermittent	SW quadrant of I-440/ Wade Ave interchange – NCSU	0	25 lf (DE)	Combined with SC at NCSU below	Combined with SC at NCSU below	Combined with SC at NCSU below
SC	Perennial (House Ck)	SW quadrant of I-440/ Wade Ave interchange – NCSU	178 lf	110 lf (DE)	24,061	18,354	42,415
SC	Perennial (House Ck)	NW quadrant of I-440/ Wade Ave interchange – Museum Park	0	0	0	0	0
SC	Perennial (House Ck)	WB side of I-440 near Mesa Ct	16 lf	0	2,622	3,227	5,849
SC	Perennial (House Ck)	EB side of I-440 near House Creek Greenway	78 lf	133 lf (DE)	24,135	10,132	34,268
SAN	Perennial	EB side of I-440 near House Creek Greenway	78 lf	80 lf (DE)	Combined w/ SC at I-440 EB	Combined w/ SC at I-440 EB	Combined w/ SC at I-440 EB
SE	Intermittent	EB side of I-440 near Apts on House Creek Trail	47 lf	0	5,482	5,823	11,305
SAO	intermittent	EB side of I-440, north of Wade Ave near Moore Dr	207 lf	0	17,835	12,312	30,147
SAP	Intermittent	EB side of I-440, north of Wade Ave near Moore Dr	135 lf	0	9,433	5,804	15,237

Table 15. Jurisdictional Resource Impacts – Hillsborough Street and Wade Avenue Interchange Area

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
WS	Wetland	EB side of I-440, north of Wade Ave near Moore Dr	0.04 ac	0	--	--	--
WT	Wetland	EB side of I-440, north of Wade Ave near Moore Dr	0.03 ac	0	--	--	--

1. All unnamed streams are UTs to House Creek.
2. All impacts are based upon the estimated construction limits plus 25 ft.
3. CE – temporary impact from construction easement; DE – temporary impact from permanent drainage easement

Table 16 lists the impacts to jurisdictional resources from the preliminary designs of the Reedy Creek Greenway Faircloth Street option on the main campus of Meredith College. If the greenway is replaced adjacent to the One Flyover Revised Alternative or the Slight Detour Revised Alternative, the new greenway would not impact jurisdictional resources on the main campus of Meredith College.

Table 16. Jurisdictional Resource Impacts – Reedy Creek Greenway Faircloth Street Relocation Option

Map ID	Classification[1]	Location	Permanent Impacts[2]	Temporary Impacts[2,3]	Zone 1 Buffer Impacts[2] (sq ft)	Zone 2 Buffer Impacts[2] (sq ft)	Total Buffer Impacts[2] (sq ft)
SZA	Perennial	Crossing Faircloth St between Wade Ave and Meredith College east entrance	41 lf	18 lf (CE)	4,894	4,805	9,699
SZB	Perennial (SW Prong Beaverdam Ck)	Crossing Faircloth St south of Beaverdam Rd	25 lf	10 lf (CE)	3,650	4,212	7,862
WZA	Wetland	Along Stream SZA	0	0.02 ac (CE)	--	--	--
WZB	Wetland	Along Stream SZB	0.01 ac	0.03 ac (CE)	--	--	--
WZC	Wetland	Along Stream SZB	0.05 ac	0.02 ac (CE)	--	--	--

1. SZA is an UT to Southwest Prong Beaverdam Creek.
2. All impacts are based upon the estimated construction limits plus 25 ft.
3. CE – temporary impact from construction easement; DE – temporary impact from permanent drainage easement

NCDOT's recommended LEDPA. NCDOT recommends either the One Flyover Revised Alternative or the Slight Detour Revised Alternative for the Hillsborough Street and Wade Avenue interchange area. These alternatives would have the least right of way impact to Meredith College and NCSU/University Club property, avoiding or reducing impacts to facilities and features on these properties. Impacts to jurisdictional resources from any of the alternatives are similar, with the One Flyover Revised Alternative and the Slight Detour Revised Alternative having slightly less impact to perennial streams compared to the Two Flyovers Alternative.

For the Reedy Creek Greenway, the NCDOT recommends either the relocation directly adjacent to I-440 or the Faircloth Street relocation option, pending completing coordination with Meredith College and the City of Raleigh. Relocating the greenway adjacent to I-440 would be less expensive and have slightly less jurisdictional impacts compared to the Faircloth Street option. The Faircloth Street option would

have minor impacts to two perennial streams (impacts totaling 66 lf permanent and 28 lf temporary) and three wetlands (impacts totaling 0.06 acre permanent and 0.07 acre temporary).

6.8. Summary of Jurisdictional Resource Impacts and Recommendations for Concurrence Point 3

6.8.1. Summary of Jurisdictional Resource Impacts

The Detailed Study Alternatives (Revised as applicable) for the widening of I-440 and the various interchanges and grade separations along the corridor can be combined to form 36 different combinations. The impacts to jurisdictional resources for end-to-end combinations of Detailed Study Alternatives are discussed below.

Ponds. Impacts to ponds would be the same for any of the end-to-end alternatives, since these impacts occur in two locations where there is only one option currently under consideration. Ponds impacted include the unnamed pond at the westbound I-440 off-ramp to Jones Franklin Road and White Oak Lake. Total pond impacts would be approximately 31,842 square feet (0.73 acre) of permanent impact and 9,801 square feet (0.23 acre) of temporary impact. It should be noted that the City of Raleigh has a project to relocate the White Oak Lake dam outside the U-2719 proposed right of way.

Wetlands. **Table 17** is a summary of wetland impacts for end-to-end Detailed Study Alternatives. The end-to-end Detailed Study Alternatives in **Table 17** are organized around the three options at the Hillsborough Street and Wade Avenue interchange area: One Flyover Revised, Two Flyovers, and Slight Detour Revised.

Total wetland impacts for end-to-end alternatives range from 0.08 acre to 0.16 acre. This assumes the Reedy Creek Greenway is relocated adjacent to I-440 on the Meredith College main campus. If the Reedy Creek Greenway was relocated to Faircloth Street, there would be an additional 0.06 acre of permanent wetland impact and 0.07 acre of temporary wetland impact.

Streams. **Table 18** is a summary of stream impacts for end-to-end Detailed Study Alternatives. A review of the summary table shows that there are three locations where there are differences in stream impacts in alternative options: I-440/Wade Avenue interchange, Ligon Street grade separation, and the Reedy Creek Greenway relocation. These areas are described in their corresponding subsections of **Chapter 6** above.

Riparian Buffers. Table 19 shows the summary of impacts to riparian buffers from the end-to-end Detailed Study Alternatives. It is not known at this preliminary design stage how much of the buffer impacts would be permanent and how much would be temporary and able to be revegetated, although it is expected most will be temporary. These impact details would be determined during final design.

Table 17. Summary of Permanent and Temporary Wetland Impacts by Detailed Study Alternative

Interchange or Grade Separation Location Area (east to west)	Detailed Study Alternative **XX** / *XX* = Permanent Impacts / Temporary Impacts (acres) Preferred Alternative combinations in red text								
Hillsborough St / Wade Ave interchanges	**One Flyover Revised**			**Two Flyovers**			**Slight Detour Revised**		
	0.08 / *0*			**0** / *0*			**0.07** / *0*		
Ligon St grade separation	**Bridge North**	**Bridge South**	**Extend Culvert**	**Bridge North**	**Bridge South**	**Extend Culvert**	**Bridge North**	**Bridge South**	**Extend Culvert**
	0 / *0*	**0** / *0*	**0** / *0*	**0** / *0*	**0** / *0*	**0** / *0*	**0** / *0*	**0** / *0*	**0** / *0*
Western Blvd interchange	**Double Crossover Diamond**			**Double Crossover Diamond**			**Double Crossover Diamond**		
	0 / *0*			**0** / *0*			**0** / *0*		
Melbourne Rd interchange	**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**	
	0.06 / *0.01*	**0.06** / *0.01*		**0.06** / *0.01*	**0.06** / *0.01*		**0.06** / *0.01*	**0.06** / *0.01*	
Athens Dr grade separation	**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**	
	0 / *0*	**0** / *0*		**0** / *0*	**0** / *0*		**0** / *0*	**0** / *0*	
Jones Franklin Rd interchange	**Upgrade Existing Partial Clover**			**Upgrade Existing Partial Clover**			**Upgrade Existing Partial Clover**		
	0.02 / *0*			**0.02** / *0*			**0.02** / *0*		
I-40 interchange and west	**Widen I-440 Only**			**Widen I-440 Only**			**Widen I-440 Only**		
	0 / *0*			**0** / *0*			**0** / *0*		
Reedy Creek Greenway Relocation at Meredith College	**Adjacent to I-440**	**Along Faircloth St**		**Adjacent to I-440**	**Along Faircloth St**		**Adjacent to I-440**	**Along Faircloth St**	
	0 / *0*	**0.06** / *0.07*		**0** / *0*	**0.06** / *0.07*		**0** / *0*	**0.06** / *0.07*	
RANGE OF PERMANENT IMPACTS	**0.16-0.22** **Preferred Alt combos – 0.16-0.22**			**0.08 – 0.14**			**0.15 -0.21** **Preferred Alt combos – 0.15 – 0.21**		
RANGE OF TEMPORARY IMPACTS	*0.01 – 0.08* *Preferred Alt combos – 0.01 – 0.08*			*0.01 – 0.08*			*0.01 – 0.08* *Preferred Alt combos – 0.01 – 0.08*		

Table 18. Summary of Permanent and Temporary Stream Impacts by Detailed Study Alternative

Interchange or Grade Separation Location Area (east to west)	Detailed Study Alternative **XX** / *XX* = Permanent Impacts / Temporary Impacts (linear feet) Perennial and Intermittent streams are included Preferred Alternative combinations in red text								
Hillsborough St / Wade Ave interchanges	**One Flyover Revised**			**Two Flyovers**			**Slight Detour Revised**		
	955 / *408*			**703** / *496*			**961** / *409*		
Ligon St grade separation	**Bridge North**	**Bridge South**	**Extend Culvert**	**Bridge North**	**Bridge South**	**Extend Culvert**	**Bridge North**	**Bridge South**	**Extend Culvert**
	174 / *0*	**310** / *64*	**125** / *0*	**174** / *0*	**310** / *64*	**125** / *0*	**174** / *0*	**310** / *64*	**125** / *0*
Western Blvd interchange	**Double Crossover Diamond**			**Double Crossover Diamond**			**Double Crossover Diamond**		
	376 / *125*			**376** / *125*			**376** / *125*		
Melbourne Rd interchange	**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**	
	418 / *137*	**418** / *137*		**418** / *137*	**418** / *137*		**418** / *137*	**418** / *137*	
Athens Dr grade separation	**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**	
	0 / *0*	**0** / *0*		**0** / *0*	**0** / *0*		**0** / *0*	**0** / *0*	
Jones Franklin Rd interchange	**Upgrade Existing Partial Clover**			**Upgrade Existing Partial Clover**			**Upgrade Existing Partial Clover**		
	367 / *231*			**367** / *231*			**367** / *231*		
I-40 interchange and west	**Widen I-440 Only**			**Widen I-440 Only**			**Widen I-440 Only**		
	0 / *0*			**0** / *0*			**0** / *0*		
Reedy Creek Greenway Relocation at Meredith College	**Adjacent to I-440**	**Along Faircloth St**		**Adjacent to I-440**	**Along Faircloth St**		**Adjacent to I-440**	**Along Faircloth St**	
	0 / *0*	**66** / *28*		**0** / *0*	**66** / *28*		**0** / *0*	**66** / *28*	
RANGE OF PERMANENT IMPACTS	**2,241-2,492** **Preferred Alt combos – 2,290-2,356**			**1,989-2,240**			**2,247-2,498** **Preferred Alt combos – 2,296-2,362**		
RANGE OF TEMPORARY IMPACTS	*901-993* *Preferred Alt combos – 901-929*			*989-1,081*			*902-994* *Preferred Alt combos – 902-930*		

Table 19. Summary of Riparian Buffer Impacts by Detailed Study Alternative

Interchange or Grade Separation Location Area (east to west)	Detailed Study Alternative **XX** / *XX* = Zone 1 Impacts / Zone 2 Impacts (square feet) Perennial and Intermittent streams are included Preferred Alternative combinations in red text								
Hillsborough St / Wade Ave interchanges	**One Flyover Revised**			**Two Flyovers**			**Slight Detour Revised**		
	84,452 / *57,307*			**69,551** / *46,713*			**83,568** / *55,652*		
Ligon St grade separation	**Bridge North**	**Bridge South**	**Extend Culvert**	**Bridge North**	**Bridge South**	**Extend Culvert**	**Bridge North**	**Bridge South**	**Extend Culvert**
	14,490 / *16,482*	**26,246** / *19,251*	**9,698** / *9,395*	**14,490**/ *16,482*	**26,246** / *19,251*	**9,698**/ *9,395*	**14,490**/ *16,482*	**26,246** / *19,251*	**9,698**/ *9,395*
Western Blvd interchange	**Double Crossover Diamond**			**Double Crossover Diamond**			**Double Crossover Diamond**		
	47,056 / *28,374*			**47,056** / *28,374*			**47,056** / *28,374*		
Melbourne Rd interchange	**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**	
	47,922 / *25,774*	**47,922** / *25,774*		**47,922** / *25,774*	**47,922** / *25,774*		**47,922** / *25,774*	**47,922** / *25,774*	
Athens Dr grade separation	**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**		**Bridge in Place**	**Bridge to North**	
	0 / *0*	**0** / *0*		**0** / *0*	**0** / *0*		**0** / *0*	**0** / *0*	
Jones Franklin Rd interchange	**Upgrade Existing Partial Clover**			**Upgrade Existing Partial Clover**			**Upgrade Existing Partial Clover**		
	101,763 / *55,850*			***101,763*** / *55,850*			***101,763*** / *55,850*		
I-40 interchange and west	**Widen I-440 Only**			**Widen I-440 Only**			**Widen I-440 Only**		
	0 / *0*			**0** / *0*			**0** / *0*		
Reedy Creek Greenway Relocation at Meredith College	**Adjacent to I-440**	**Along Faircloth St**		**Adjacent to I-440**	**Along Faircloth St**		**Adjacent to I-440**	**Along Faircloth St**	
	0 / *0*	**8,544** / *9,017*		**779** / *4,738*	**8,544** / *9,017*		**0** / *0*	**8,544** / *9,017*	
RANGE OF ZONE 1 IMPACTS	**290,891 – 315,983** **Preferred Alt combos – 295,683-304,227**			**276,769 – 301,082**			**290,007 – 315,099** **Preferred Alt combos – 294,799-303,343**		
RANGE OF ZONE 2 IMPACTS	*176,700 – 195,573* *Preferred Alt combos – 183,787-192,804*			*170,844 – 184,979*			*175,045 – 194,188* *Preferred Alt combos – 182,132-191,149*		
RANGE OF TOTAL RIPARIAN BUFFER IMPACTS	*467,591 – 511,556* *Preferred Alt combos – 479,470-497,031*			*447,613 – 486,061*			*465,052 – 509,287* *Preferred Alt combos – 476,931-494,492*		

6.8.2. Recommendations for Concurrence Point 3

Based on the information available to date, including the EA and comments on the project from agencies, local governments, other organizations, and citizens, the NCDOT recommends the following Detailed Study Alternatives as the end-to-end Preferred Alternative and Least Environmentally Damaging Practicable Alternative:

- I-40 and South – Widen I-440 Only Alternative
    - No comments were received for this project area and there are no impacts extending outside the existing right of way.

- Jones Franklin Road interchange – Upgrade Existing Partial Clover Alternative
    - Only one Detailed Study Alternative is proposed at this location. On balance, the benefits of this alternative outweigh the impacts.

- Athens Drive grade separation – Replace Bridge in Place Alternative
    - This alternative is preferred by the City of Raleigh, has fewer residential relocations, no jurisdictional resource impacts, and is less expensive than the Replace Bridge to North Alternative.

- Melbourne Road interchange – Replace Bridge in Place Alternative
    - This alternative is preferred by the City of Raleigh, has fewer residential relocations, and is less expensive than the Replace Bridge to North Alternative. It has the same jurisdictional resource impacts as the Replace Bridge to North Alternative.

- Western Boulevard interchange – Double Crossover Diamond Alternative
    - Only one Detailed Study Alternative is proposed at this location. On balance, the benefits of this alternative outweigh the impacts.

- Ligon Street grade separation – Build Bridge to North Alternative
    - Compared to the other alternatives, this alternative provides the most benefits as compared to the impacts and has only slightly higher jurisdictional impacts than the alternative with the fewest jurisdictional resource impacts (Extend Existing Culvert Alternative). The Extend Existing Traffic Culvert Alternative would not provide pedestrian and bicycle accommodations. The Build Bridge to North Alternative would improve pedestrian/bicycle access compared to the culvert alternative. It is also preferred by the City of Raleigh and NCSU and is generally supported by the Method community. The 10 residential relocations associated with the Build Bridge to North Alternative are student rental townhomes and there is adequate replacement housing for these impacts. The Build Bridge to South Alternative is not recommended because it would have an Adverse Effect on the Oak Grove Cemetery and it would impact an NCSU research facility. It also has the most impacts to jurisdictional resources.

- Hillsborough Street/Wade Avenue interchange area – One Flyover Revised Alternative or Slight Detour Revised Alternative with the Reedy Creek Greenway either relocated adjacent to I-440 or along the Faircloth Street Option
    - One Flyover Revised Alternative and Slight Detour Revised Alternative reduce right of way impacts to Meredith College and University Club compared to the Two Flyover Alternative and the original One Flyover Alternative and Slight Detour Alternative. On Meredith College's main campus, the commuter parking lot is avoided and impacts to the athletic field are reduced. The Two Flyovers Alternative could not be revised to have similar right of way impact reductions on Meredith College's main campus. Impacts to jurisdictional resources from any of the alternatives are similar, with the One Flyover Revised Alternative and the Slight Detour Revised Alternative having slightly less impact to perennial streams compared to the Two Flyovers Alternative.
    - For the Reedy Creek Greenway, the NCDOT recommends either the relocation directly adjacent to I-440 or the Faircloth Street relocation option, pending completing coordination with Meredith College and the City of Raleigh. Relocating the greenway adjacent to I-440 would be less expensive and have slightly less jurisdictional impacts compared to the Faircloth Street option. The Faircloth Street option would have minor impacts to two perennial streams (impacts totaling 66 lf permanent and 28 lf temporary) and three wetlands (impacts totaling 0.06 acre permanent and 0.07 acre temporary).

7. Concurrence Point 4a

The I-440 improvement project minimizes impacts to resources as a part of its design. However, it is not feasible for the proposed project to completely avoid impacts to the Waters of the US and still meet the purpose and need of the project. The following avoidance and minimization measures have been incorporated into the proposed project:

Avoidance and minimization measures for jurisdictional resources:

- Included retaining wall along westbound I-440 just west of Jones Franklin Road to avoid encroachment on Walnut Creek and its floodway and Wetland WK.
- Included retaining wall at the Jones Franklin Road interchange and proposed a slight offset in the ramp termini intersections with Jones Franklin Road to avoid encroachment on Lake Johnson Park and Walnut Creek and to minimize impacts to Wetland WL.
- Preliminary alternatives that encroached on Lake Johnson Park, Walnut Creek, and Wetland WL were eliminated from detailed study.

Avoidance and minimization measures for human environment resources:

- Revised designs of the One Flyover and Slight Detour Alternatives included retaining walls to reduce right of way impacts to Meredith College and University Club. On Meredith College's main campus, the commuter parking lot is avoided and impacts to the athletic field are reduced.

- Revised design of the Melbourne Road bridge from three lanes to two lanes at request of City of Raleigh to be more context-sensitive to the surrounding neighborhood. This change will be made during final design.
- Included retaining walls to avoid impacting existing noise walls located on cut slopes along southbound US 1/64 south of Walnut St and along westbound I-440 between Lake Boone Trail and Wade Avenue.
- Included retaining wall along westbound I-440 and the Melbourne Road off ramp to avoid impacting several apartment buildings.
- Included retaining wall along westbound I-440 at the historic Oak Grove Cemetery to avoid encroachment.
- Included retaining walls for the bridge approaches east of I-440 for the Ligon Street bridge alternatives to minimize impacts to adjacent NCSU research facility and Method Townes townhome development.
- Will include down lighting at the Ligon Street bridge alternatives in the final lighting plan to minimize light impact to NCSU greenhouses on both sides of I-440.
- Chose a best-fit alignment for the widening of I-440 that avoids encroaching on Kaplan Park, Method Community Park, the Berry O'Kelly School Historic District, and the historic Oak Grove Cemetery.
- Included a retaining wall at Museum Park to minimize encroachment onto this Section 4(f) resource.

8. Project Schedule

The project will be awarded to a design-build team. Also included in the same contract will be Project U-4437, which is the grade separation of Blue Ridge Road under Hillsborough Street, the railroad tracks, and Beryl Road. The two projects are being let to one design-build team to ensure proper maintenance of traffic is implemented during construction since the projects are near each other.

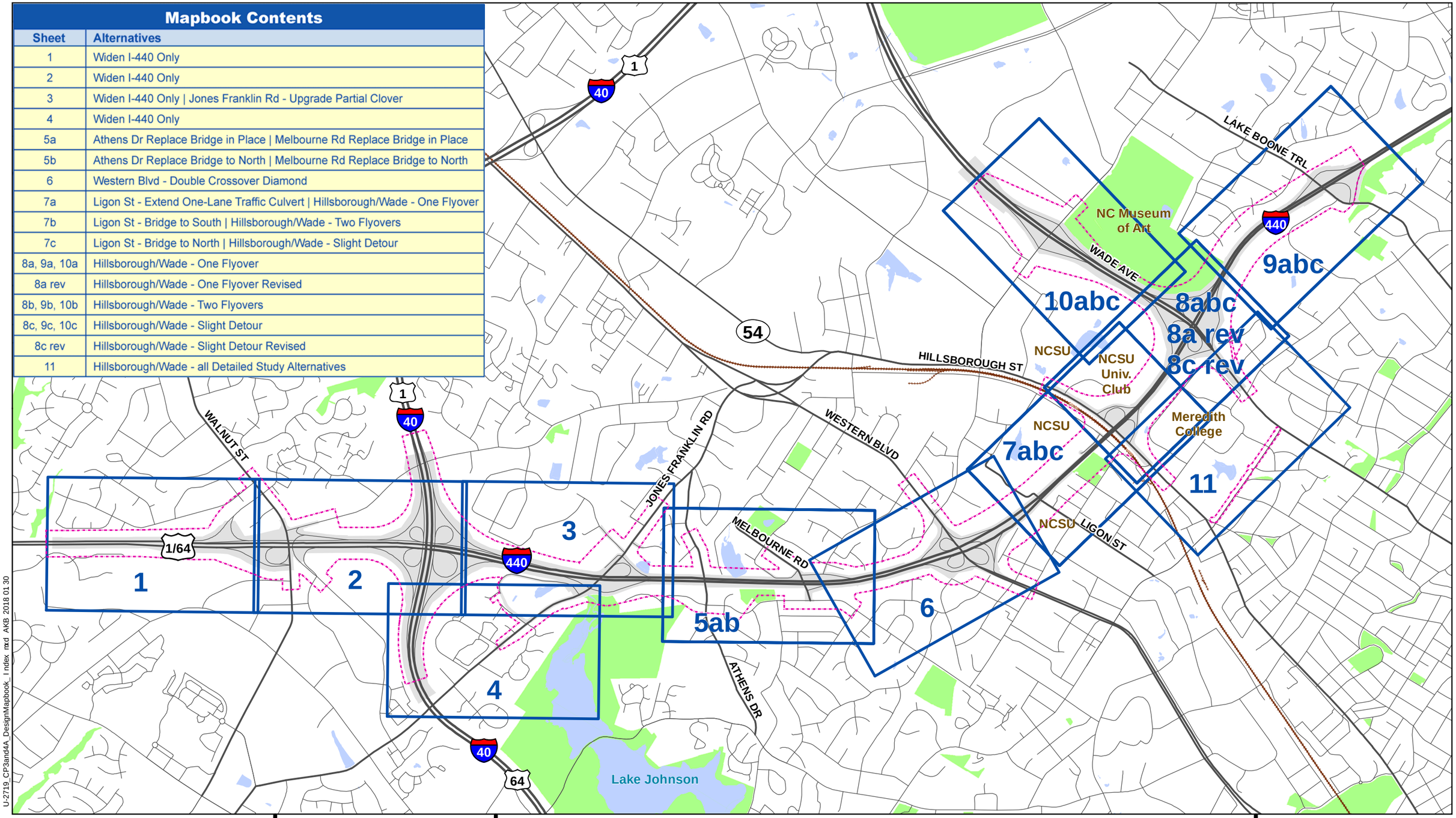
The tentative project schedule is below:

- Finding of No Significant Impact (anticipated) March 2018
- Design-build contract awarded: July 2018
- Begin right of way acquisition and construction: August 2018
- Open to traffic May 2023

FIGURES

Mapbook Contents

Sheet	Alternatives
1	Widen I-440 Only
2	Widen I-440 Only
3	Widen I-440 Only | Jones Franklin Rd - Upgrade Partial Clover
4	Widen I-440 Only
5a	Athens Dr Replace Bridge in Place | Melbourne Rd Replace Bridge in Place
5b	Athens Dr Replace Bridge to North | Melbourne Rd Replace Bridge to North
6	Western Blvd - Double Crossover Diamond
7a	Ligon St - Extend One-Lane Traffic Culvert | Hillsborough/Wade - One Flyover
7b	Ligon St - Bridge to South | Hillsborough/Wade - Two Flyovers
7c	Ligon St - Bridge to North | Hillsborough/Wade - Slight Detour
8a, 9a, 10a	Hillsborough/Wade - One Flyover
8a rev	Hillsborough/Wade - One Flyover Revised
8b, 9b, 10b	Hillsborough/Wade - Two Flyovers
8c, 9c, 10c	Hillsborough/Wade - Slight Detour
8c rev	Hillsborough/Wade - Slight Detour Revised
11	Hillsborough/Wade - all Detailed Study Alternatives



U-2719_CP3and4A_DesignMapbook_Index.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 1,050 2,100 Feet

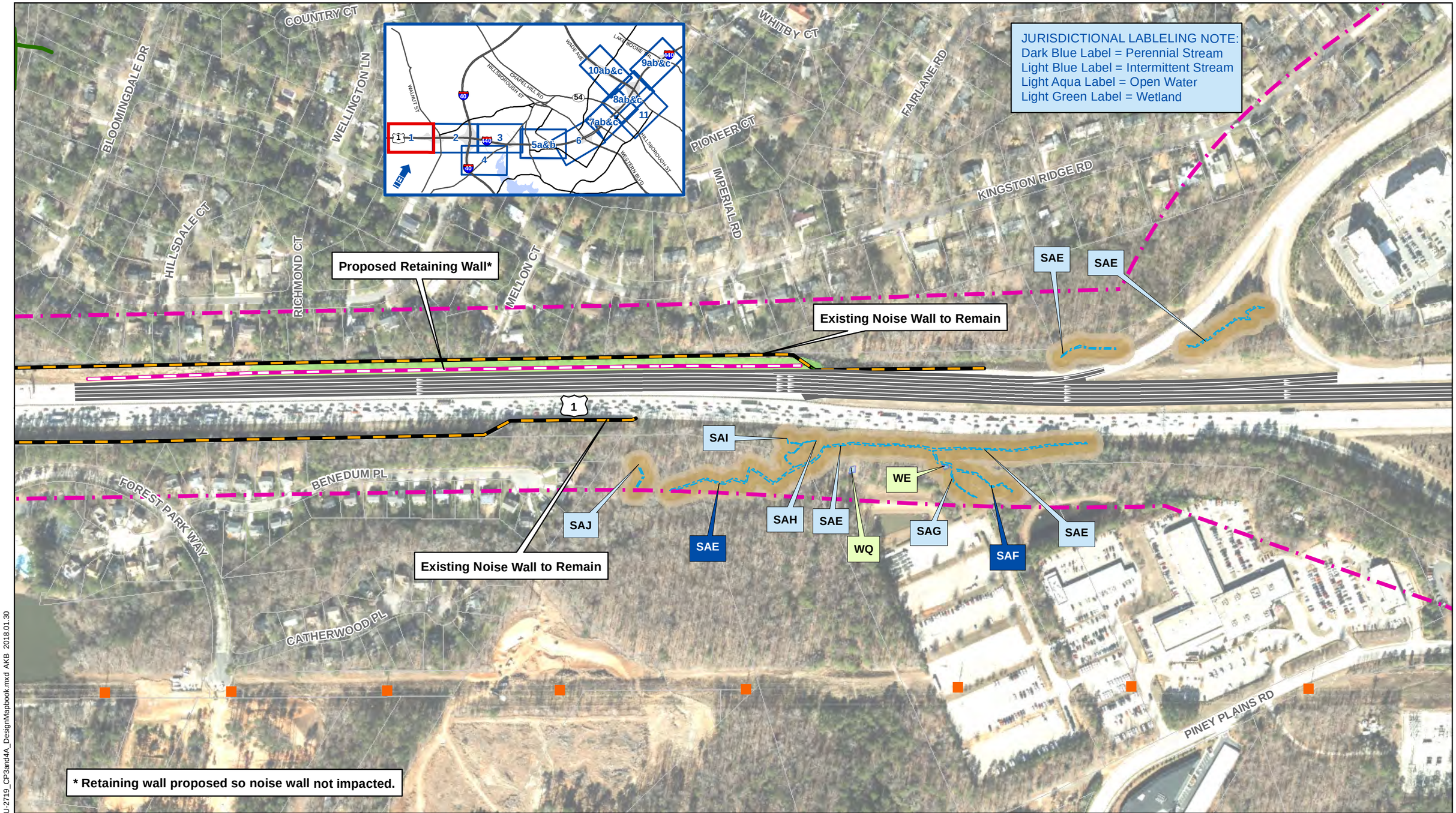
Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

Legend

- Study Area Boundary
- Existing Right of Way
- Streets
- Railroads
- Water
- Parks

JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

MAPBOOK INDEX



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I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

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Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

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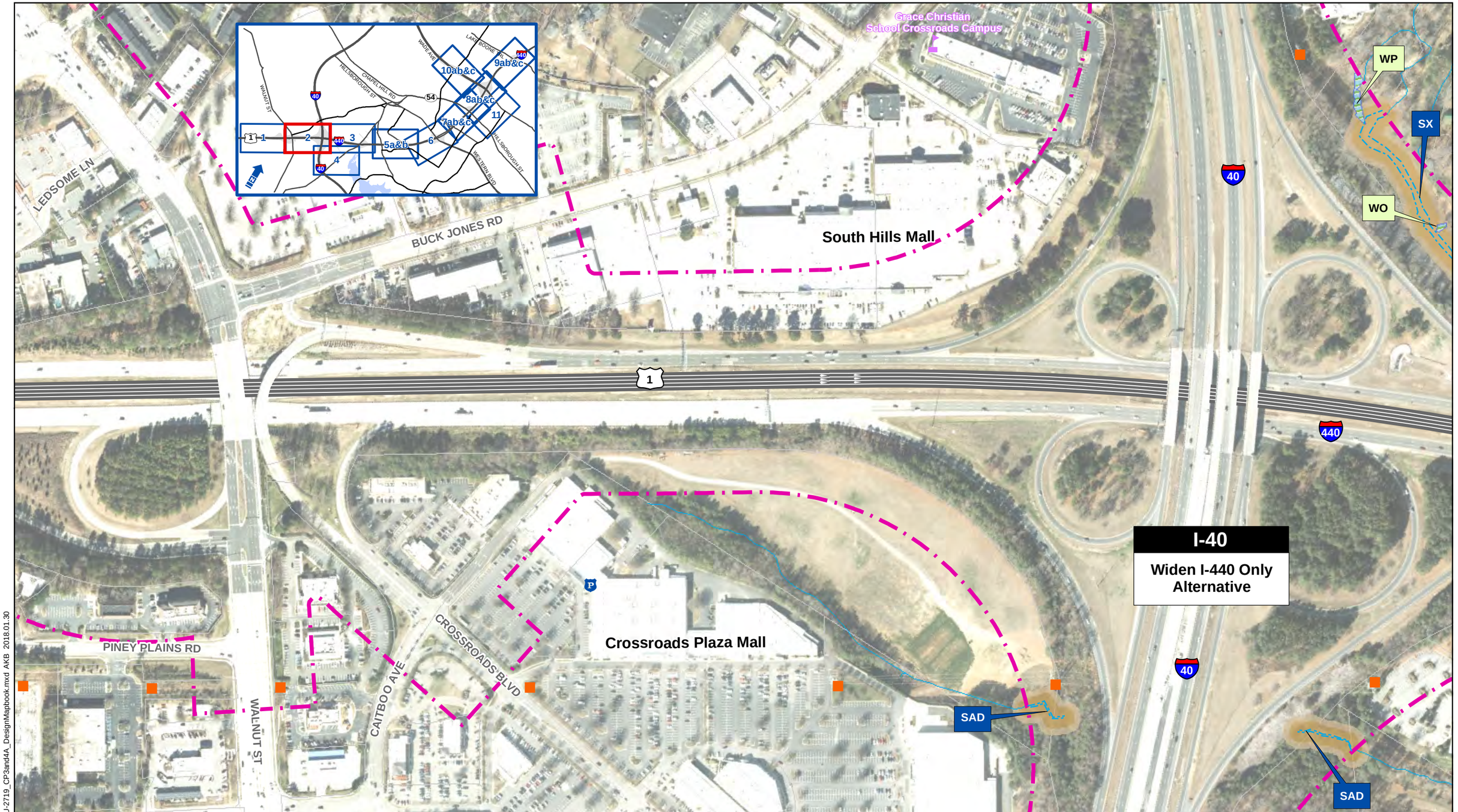
- Stop Lights
- Parks
- Parcels
- Railroads

JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 1



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I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

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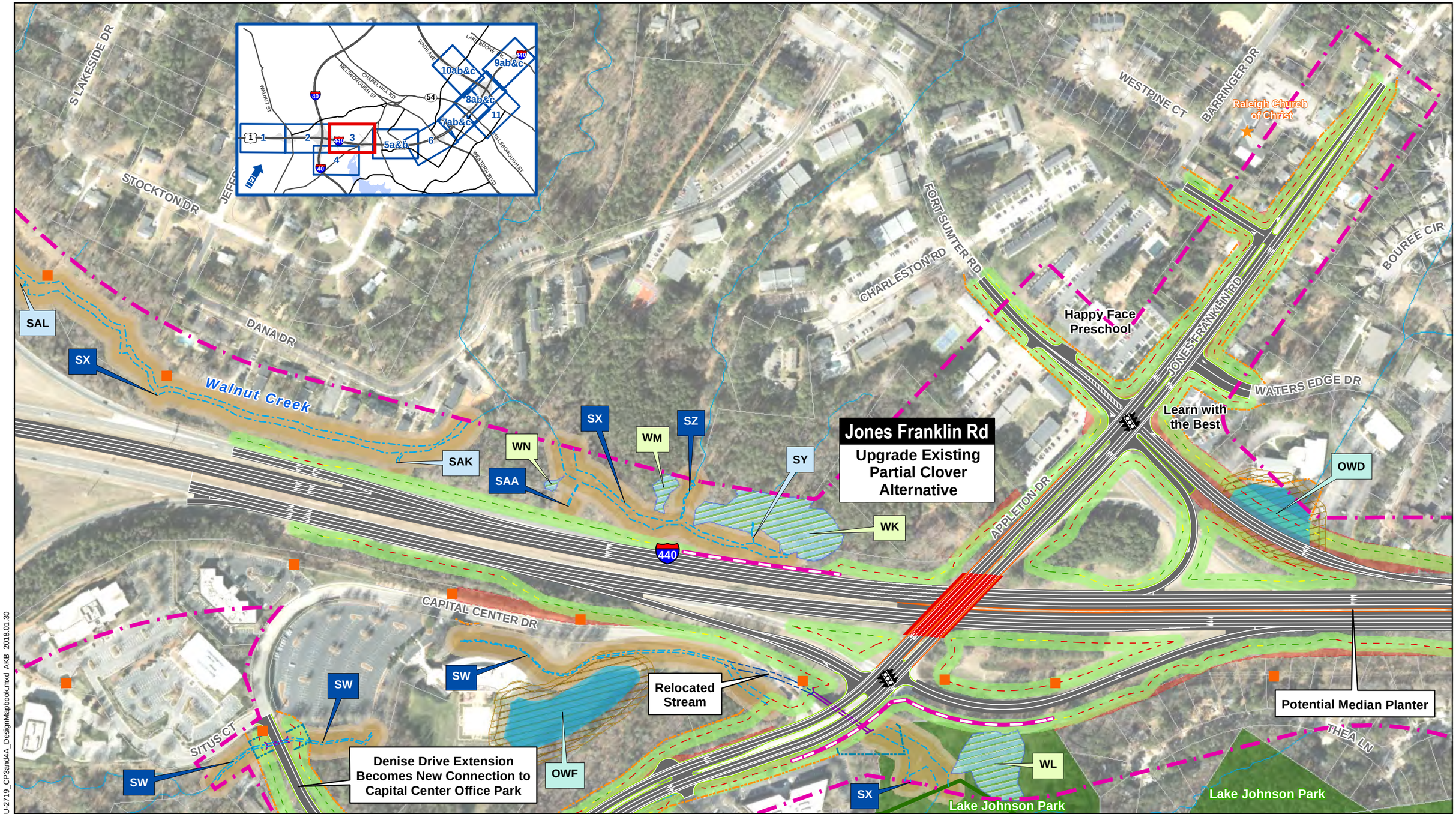
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 2



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I-440 IMPROVEMENTS

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Wake County, North Carolina

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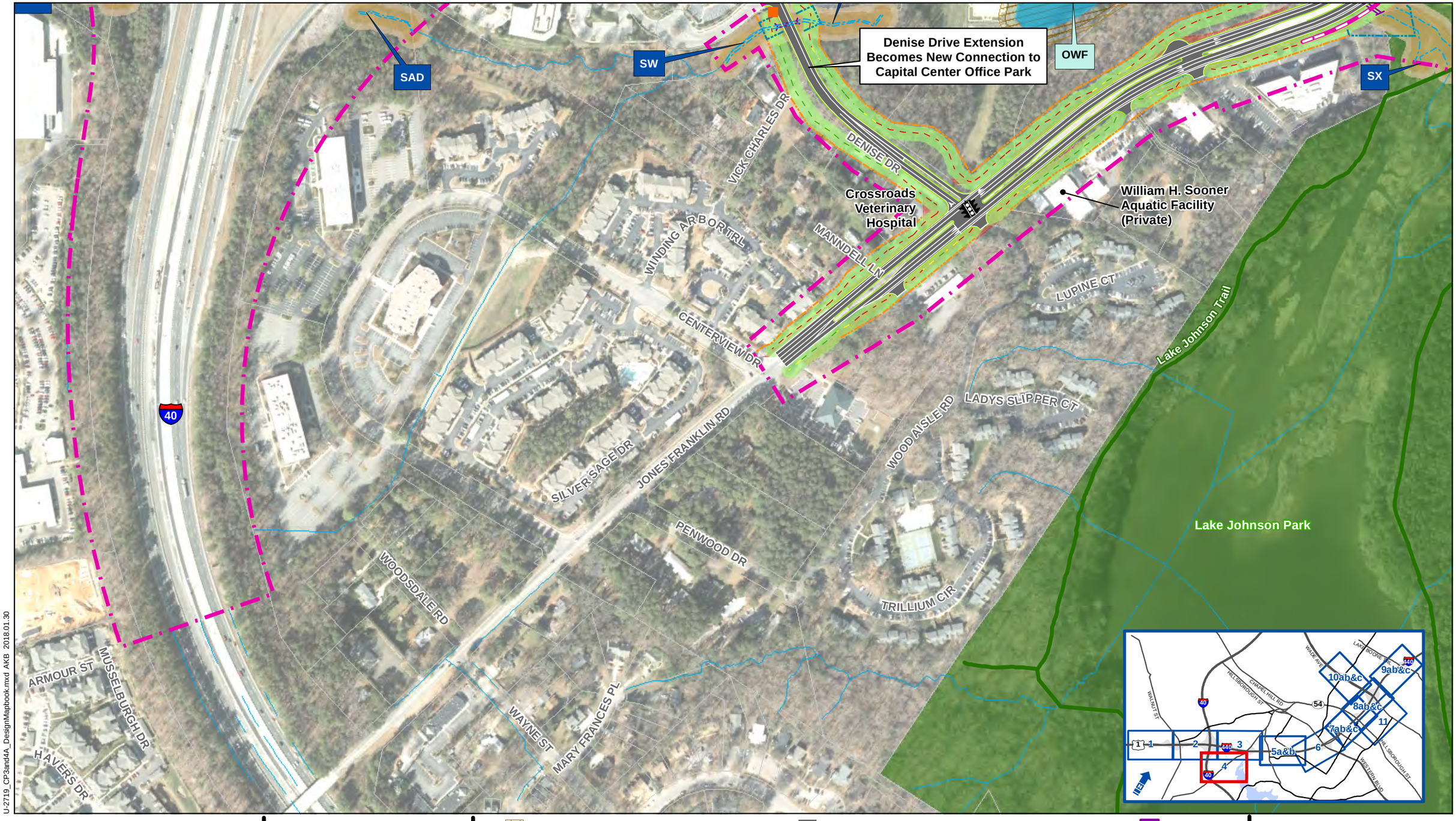
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 3



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I-440 IMPROVEMENTS

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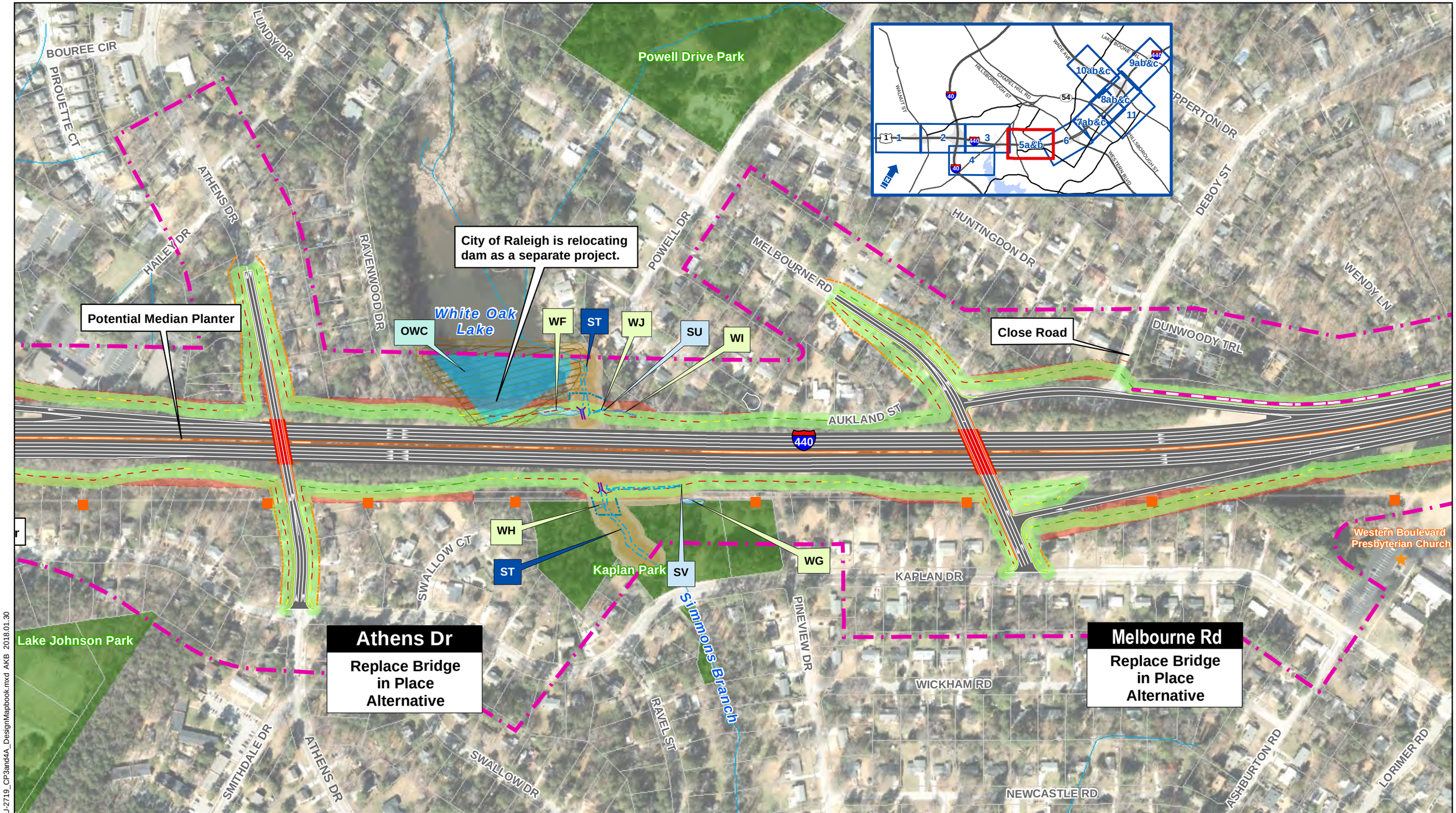
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 4



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I-440 IMPROVEMENTS

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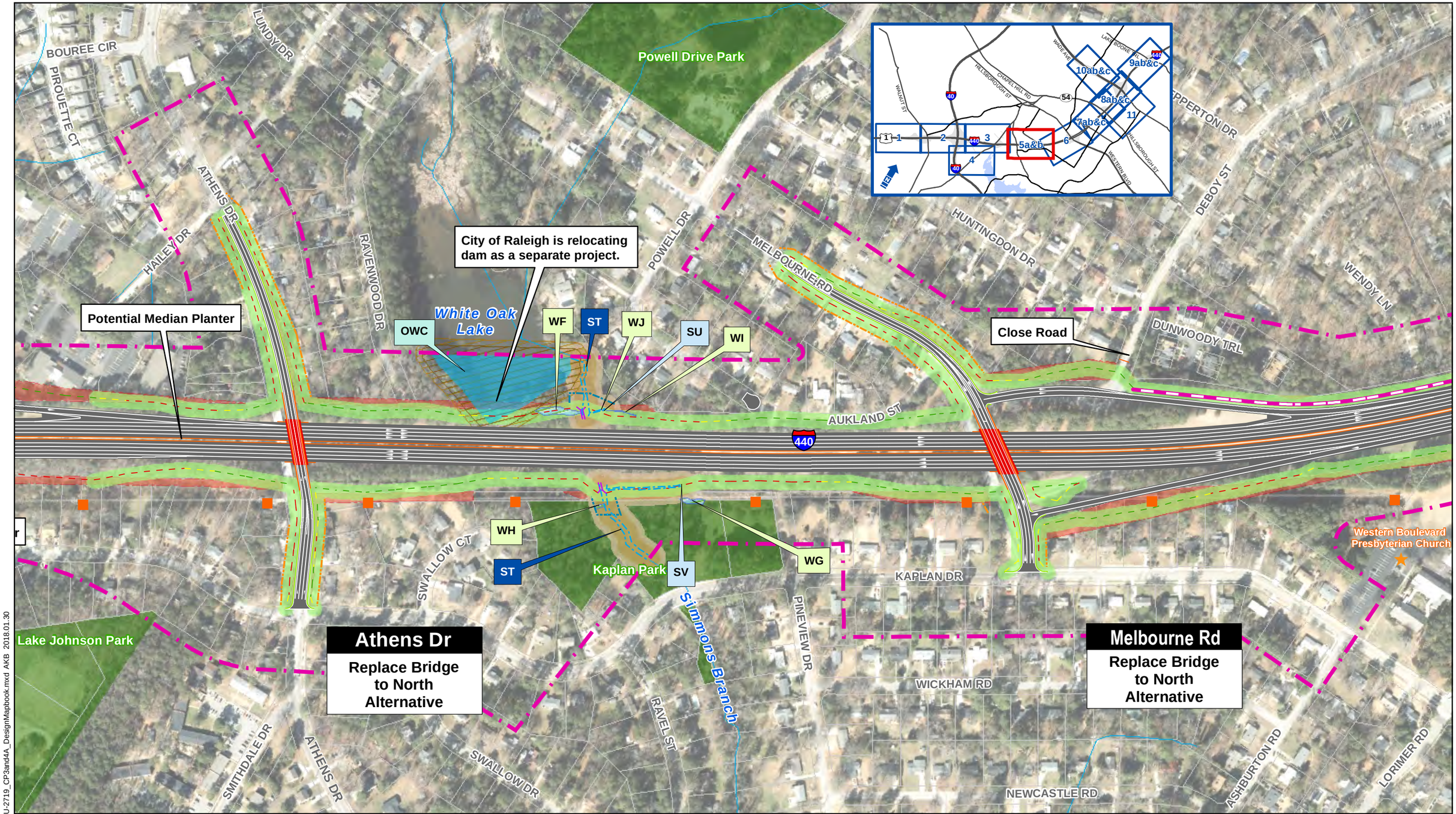
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 5a



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I-440 IMPROVEMENTS

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JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 5b

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I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

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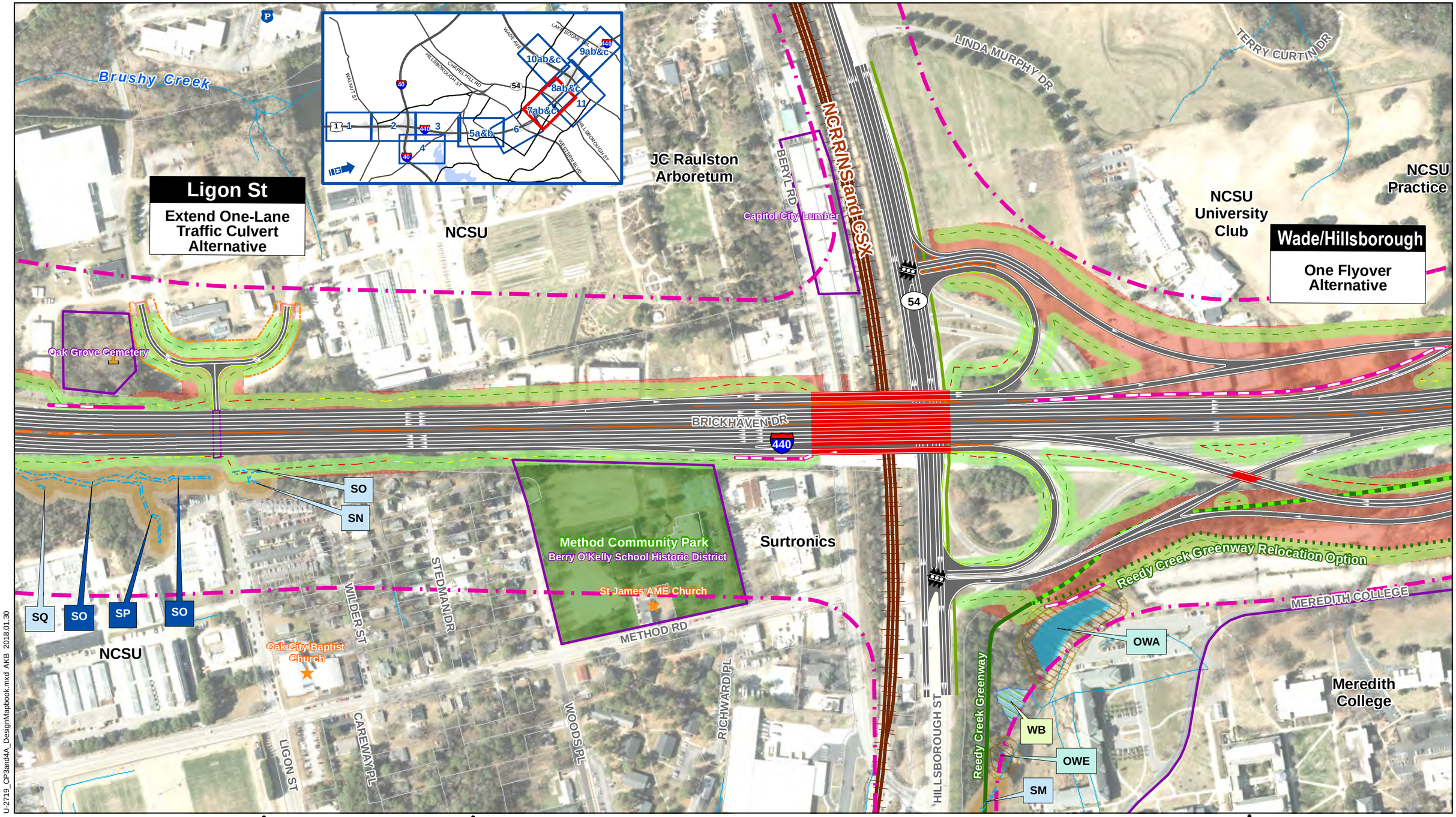
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 6



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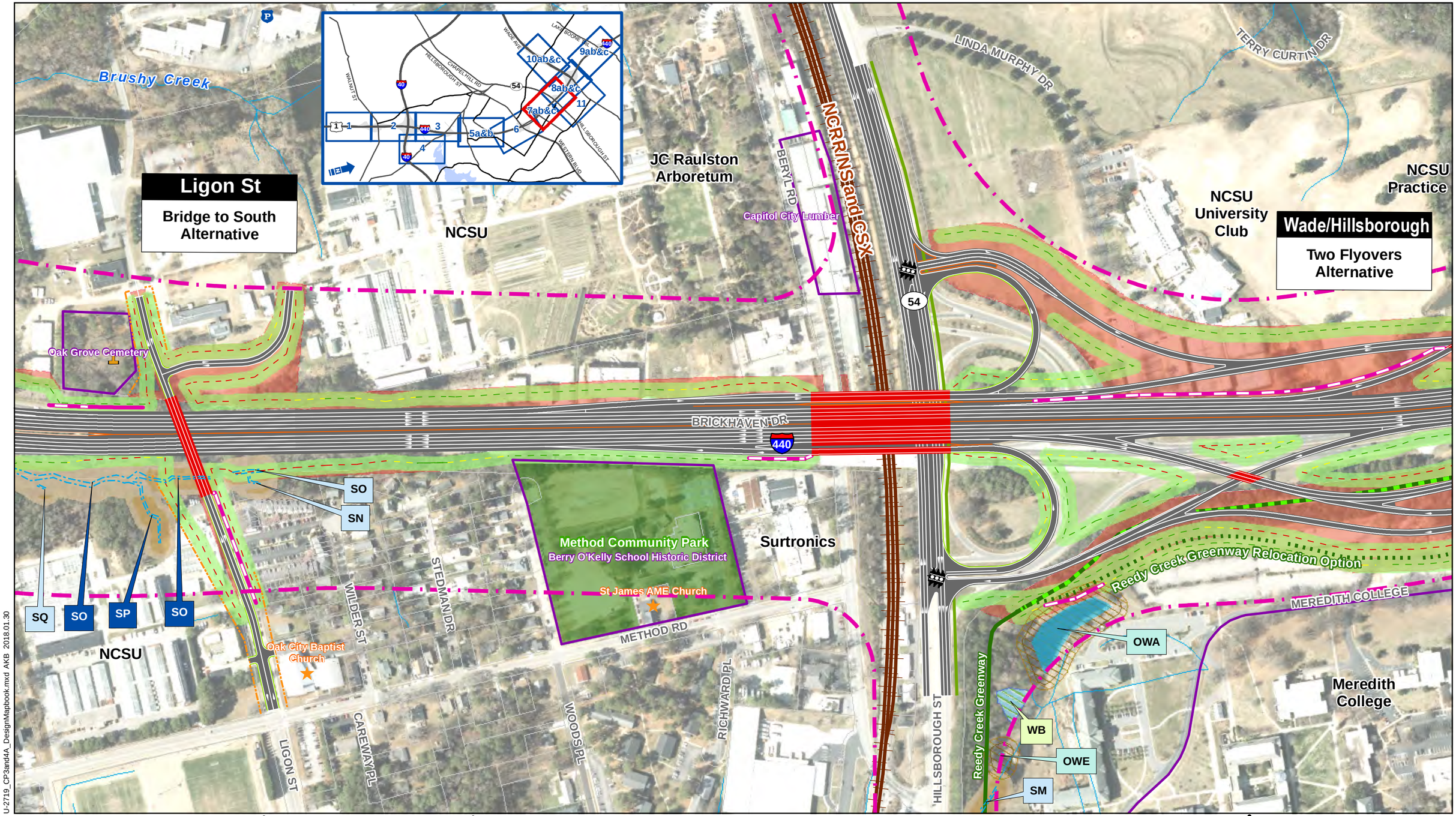
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 7a



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I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

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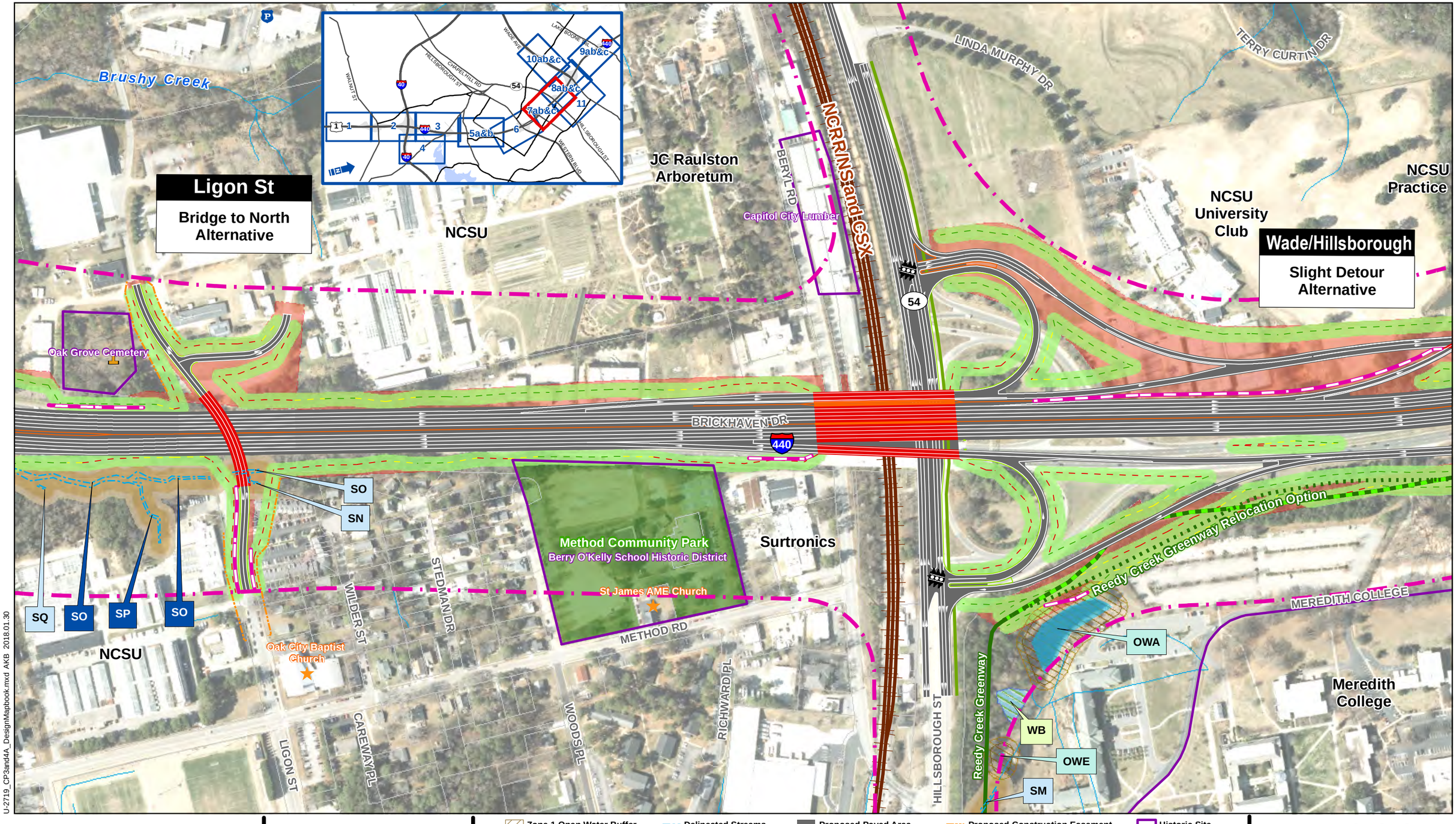
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 7b



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I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

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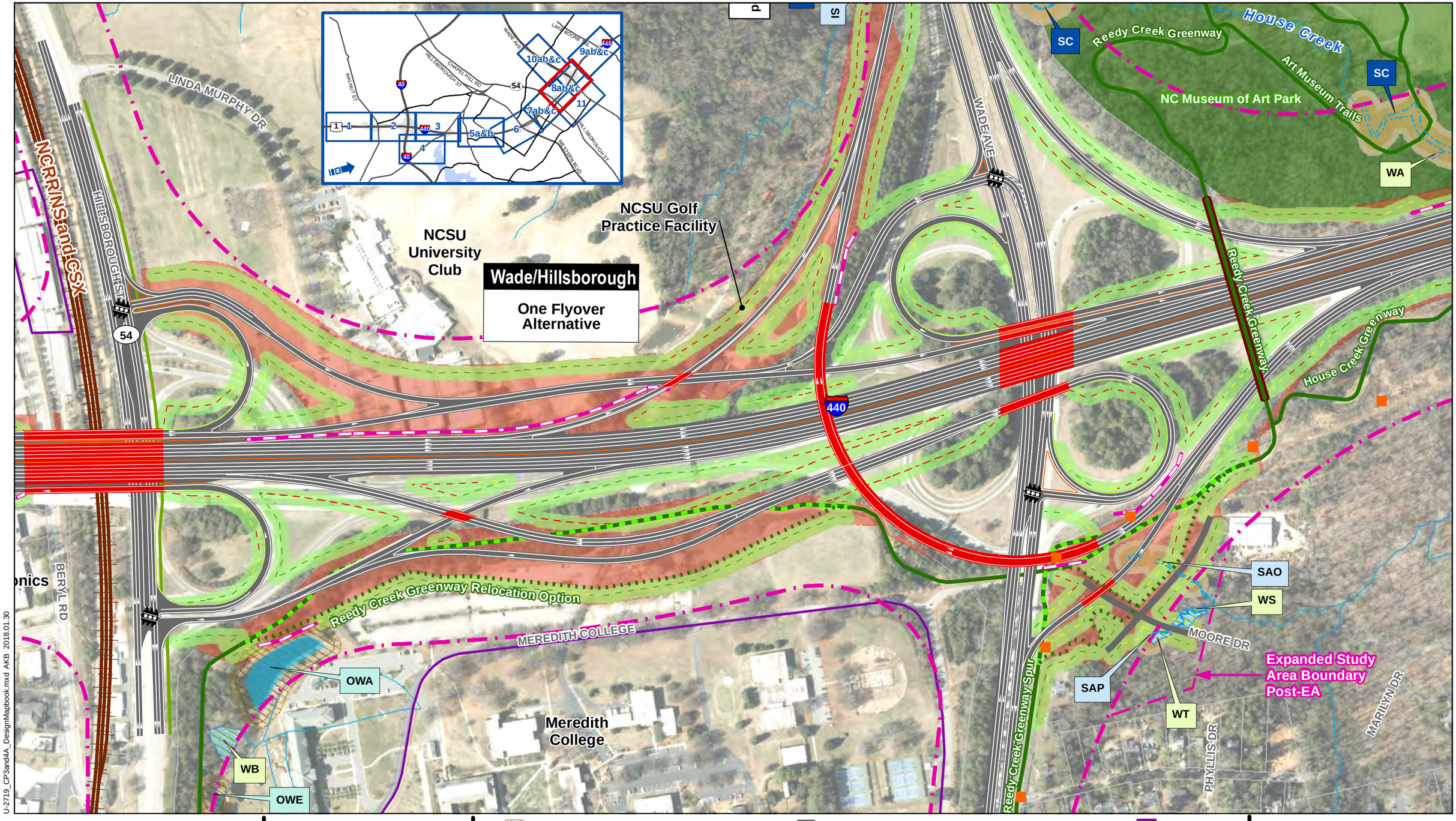
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 7c


LINDA MURPHY DR
NCRR/NS and CSX
HILLSBOROUGH ST
54
NCSU University Club
NCSU Golf Practice Facility
Wade/Hillsborough
One Flyover Alternative
WADE AVE
440
SC
Reedy Creek Greenway
House Creek
Art Museum Trails
NC Museum of Art Park
WA
Reedy Creek Greenway
House Creek Greenway
BERYL RD
Reedy Creek Greenway Relocation Option
MEREDITH COLLEGE
OWA
WB
OWE
Meredith College
Reedy Creek Greenway Spur
SAO
WS
MOORE DR
SAP
WT
Expanded Study Area Boundary Post-EA
PHYLLIS DR
MARILYN DR
10ab&c
9ab&c
8ab&c
7ab&c
11
6
5a&b
4
3
2
1
WALNUT ST
CHAPEL HILL RD
LAKE BOONE TRL
WESTERN BLVD
HILLSBOROUGH ST
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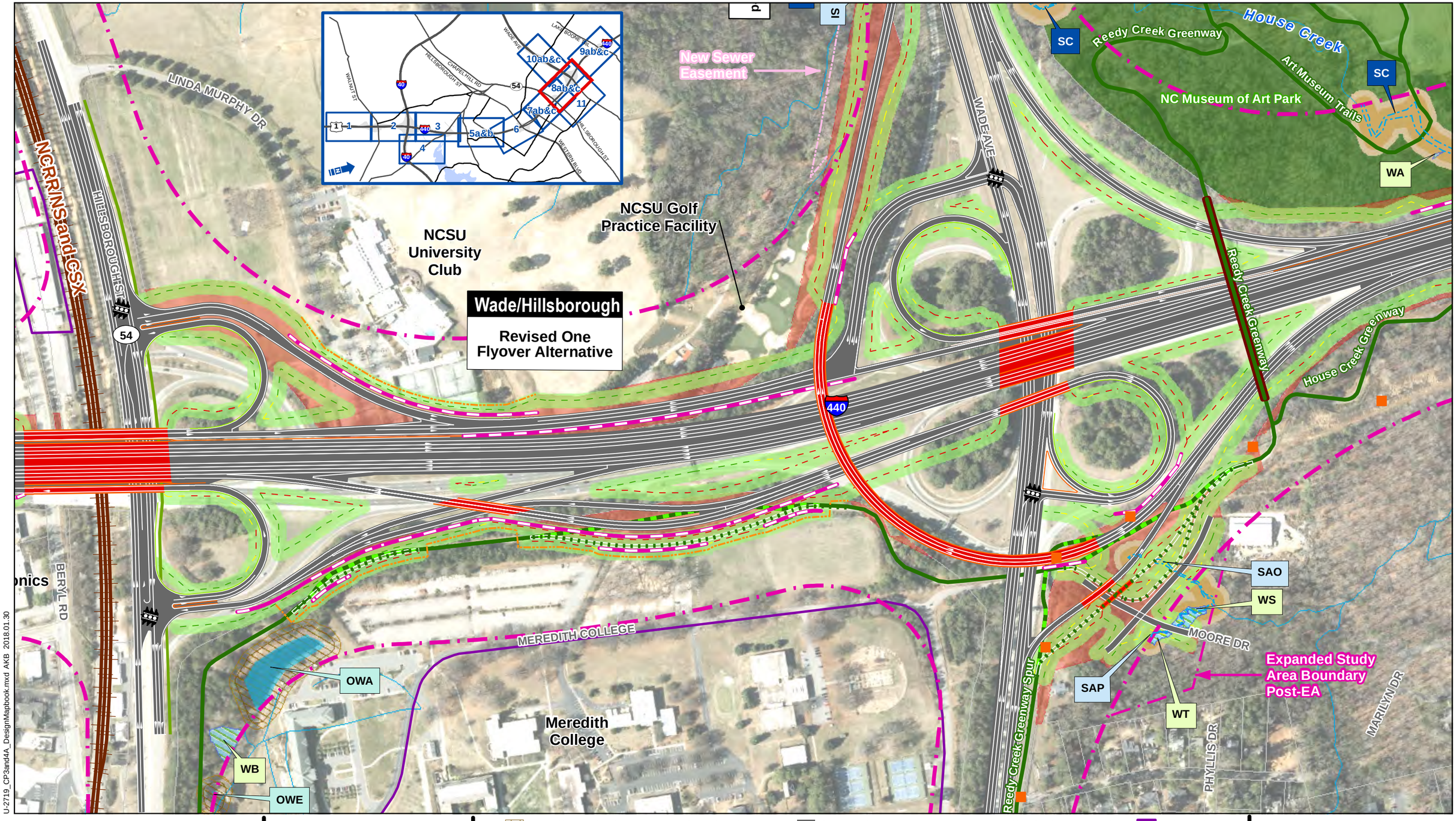
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS
Mapbook - Figure 8a
U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30



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I-440 IMPROVEMENTS

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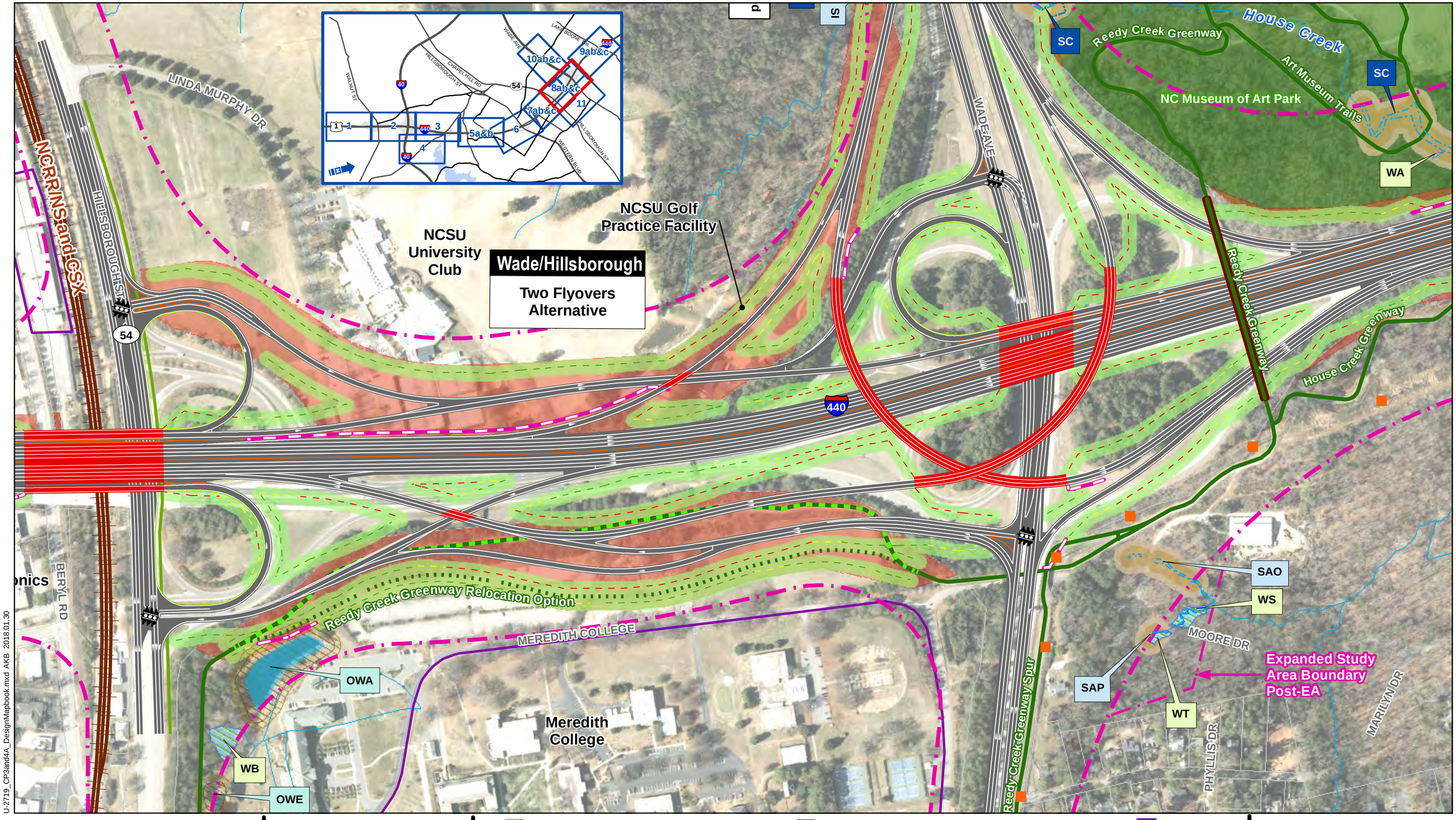
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 8a Rev



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- Zone 1 Stream Buffer
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- Proposed Cut Line
- Proposed Fill Line
- Proposed Transition Line
- Delineated Streams
- Delineated Wetlands
- 25' Slopestake Buffer
- Study Area Boundary
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- Existing Power Towers
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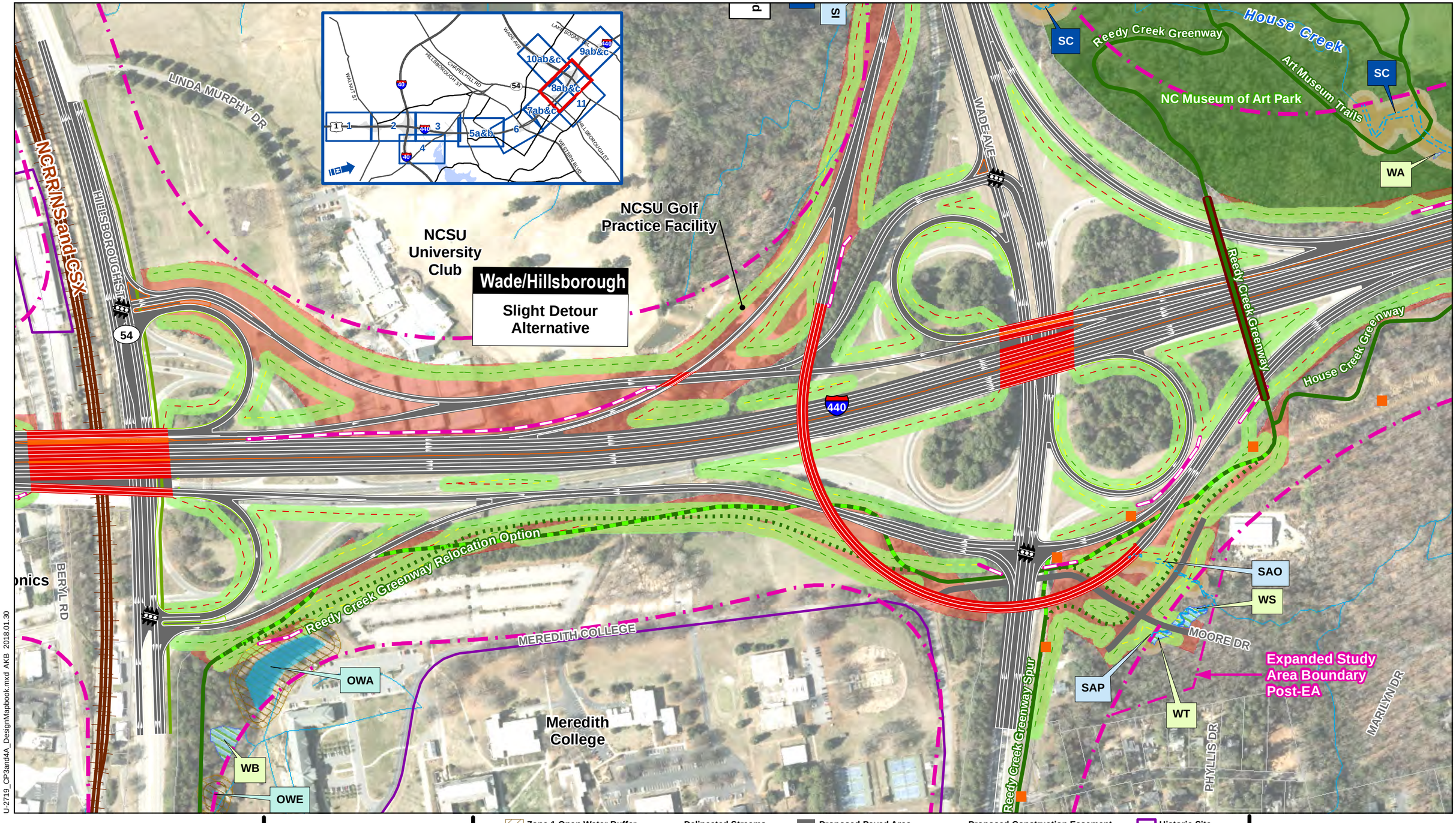
- Prop Easement Permanent Drainage
- Multi-Use Paths
- Potential Greenway Relocation
- Proposed Greenway Removal
- Existing Greenways
- Historic Site
- Delineated Ponds
- Stop Lights
- Parks
- Parcels
- Railroads

JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 8b



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

Legend

- Zone 1 Open Water Buffer
- Zone 1+2 Open Water Buffer
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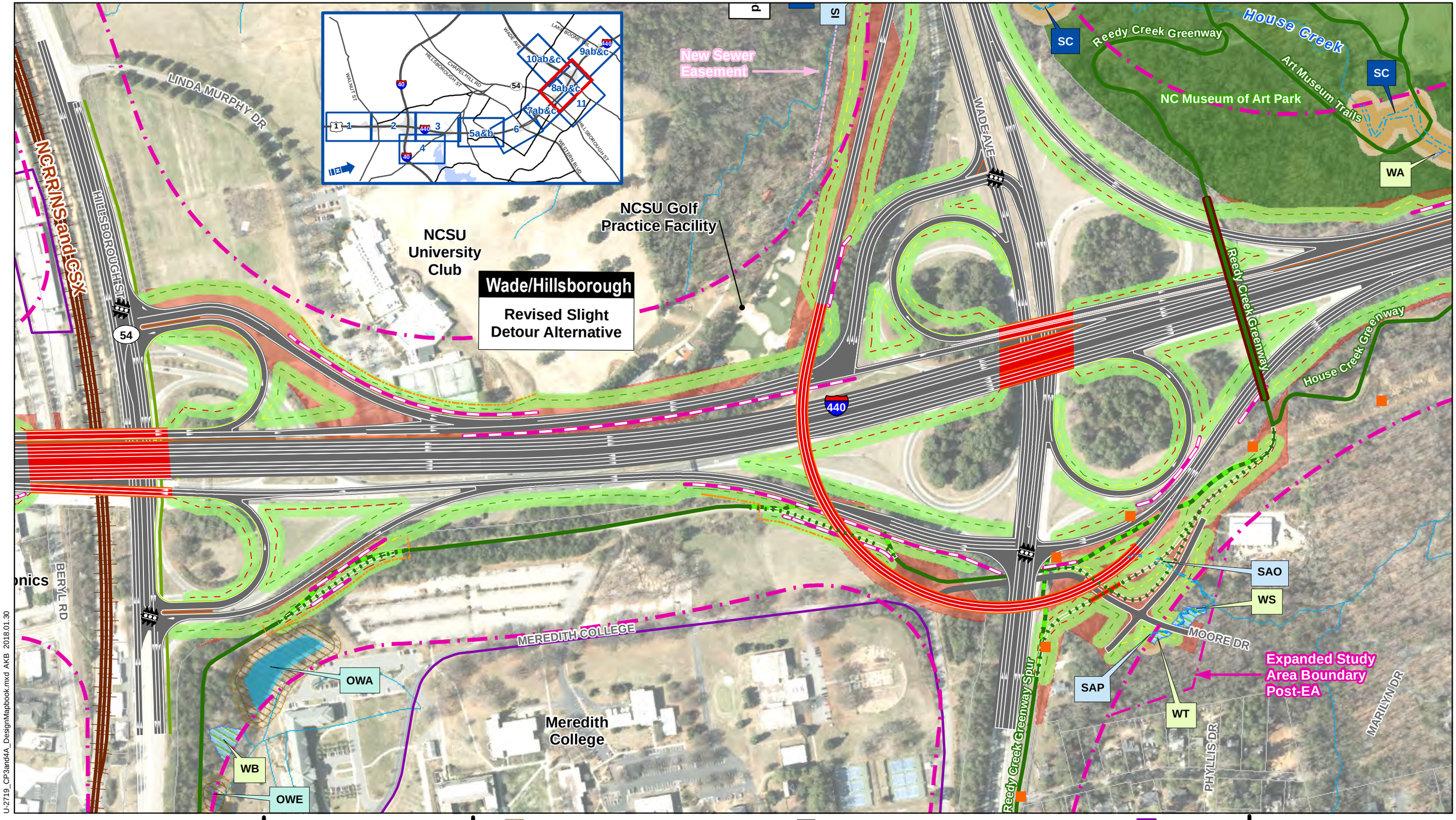
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 8c



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

I-2

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

Legend

- Zone 1 Open Water Buffer
- Zone 1+2 Open Water Buffer
- 30' Stream Buffer
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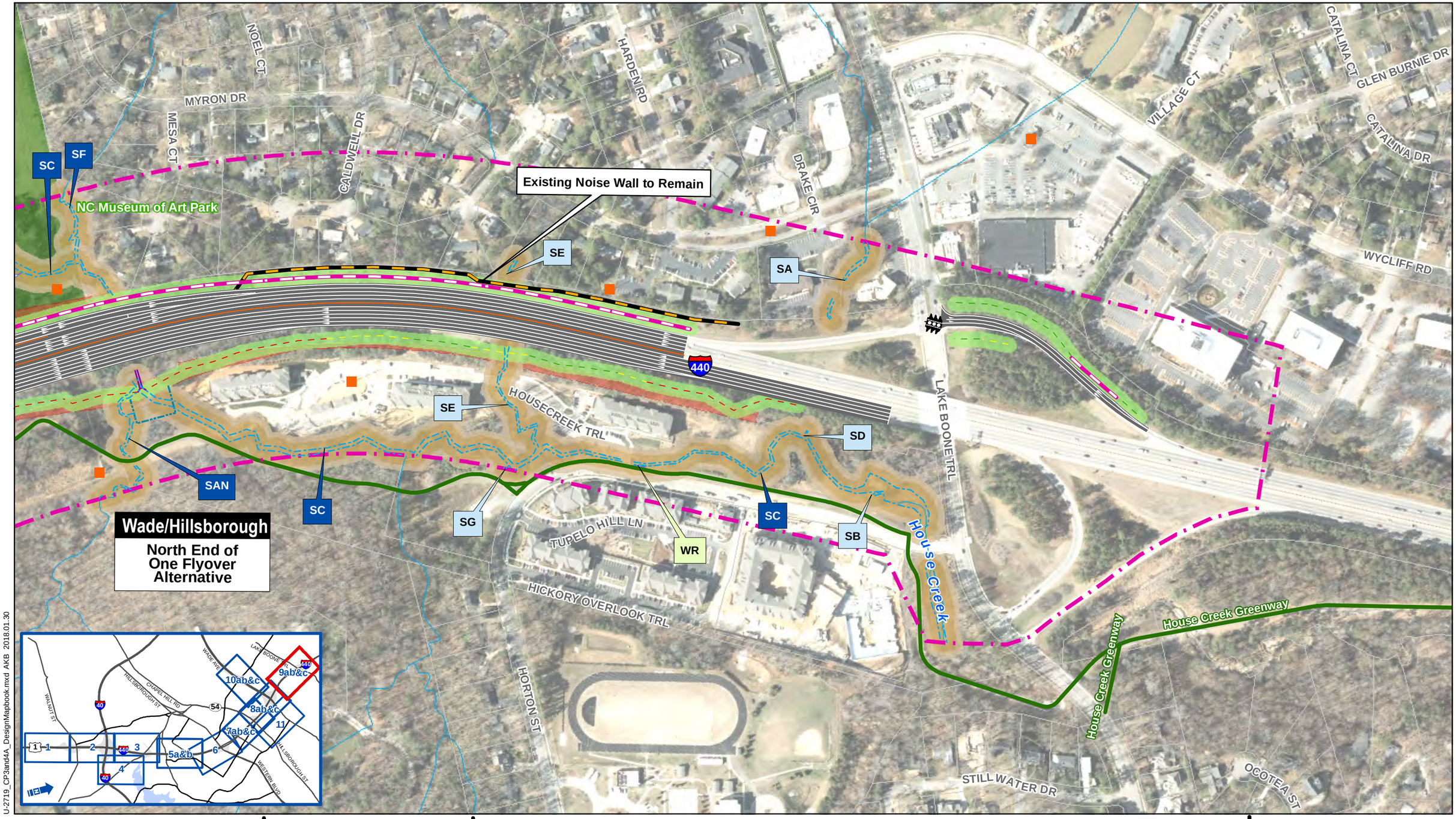
- Parcels
- Railroads

JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 8c Rev



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

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Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

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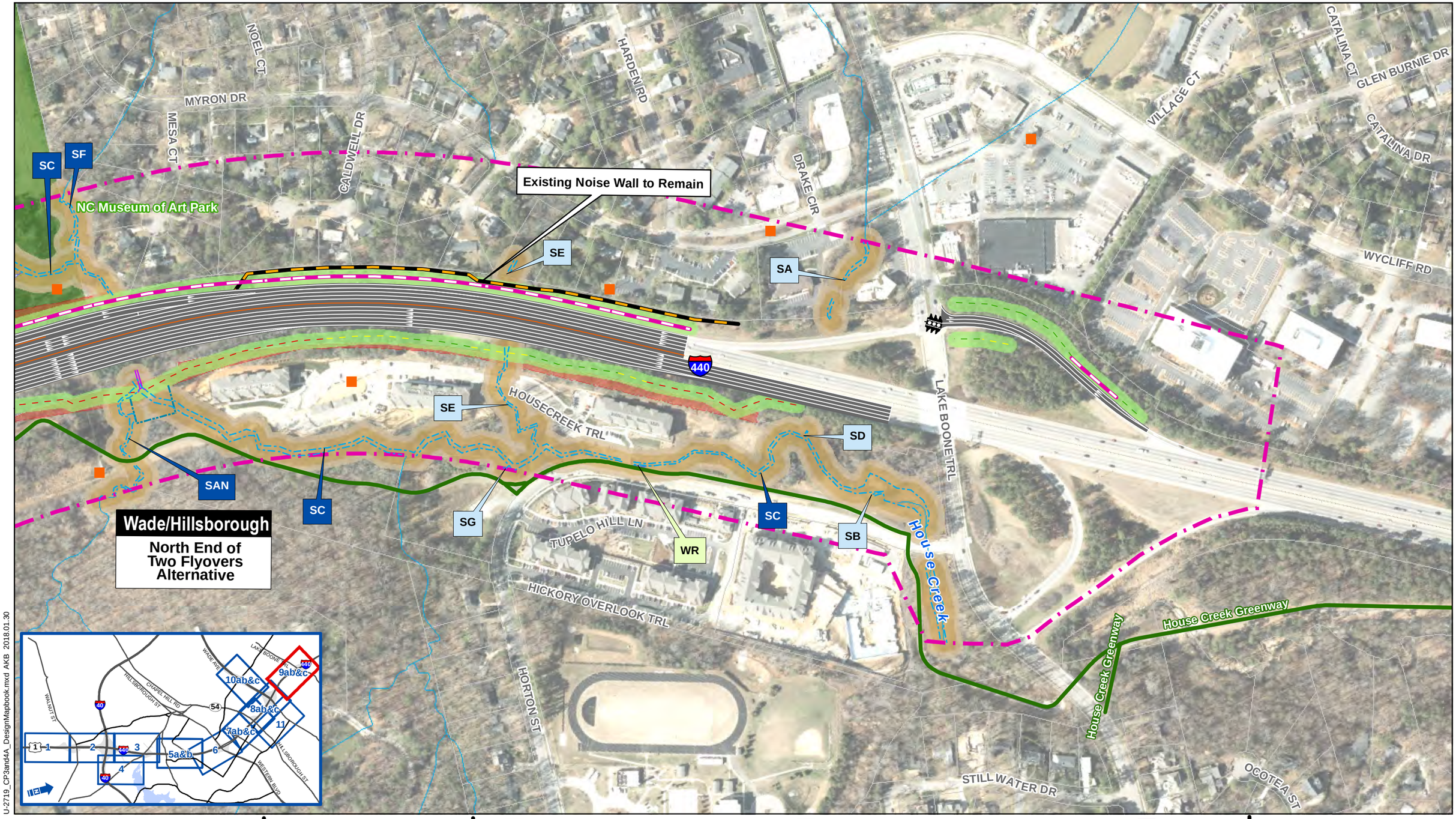
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 9a



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

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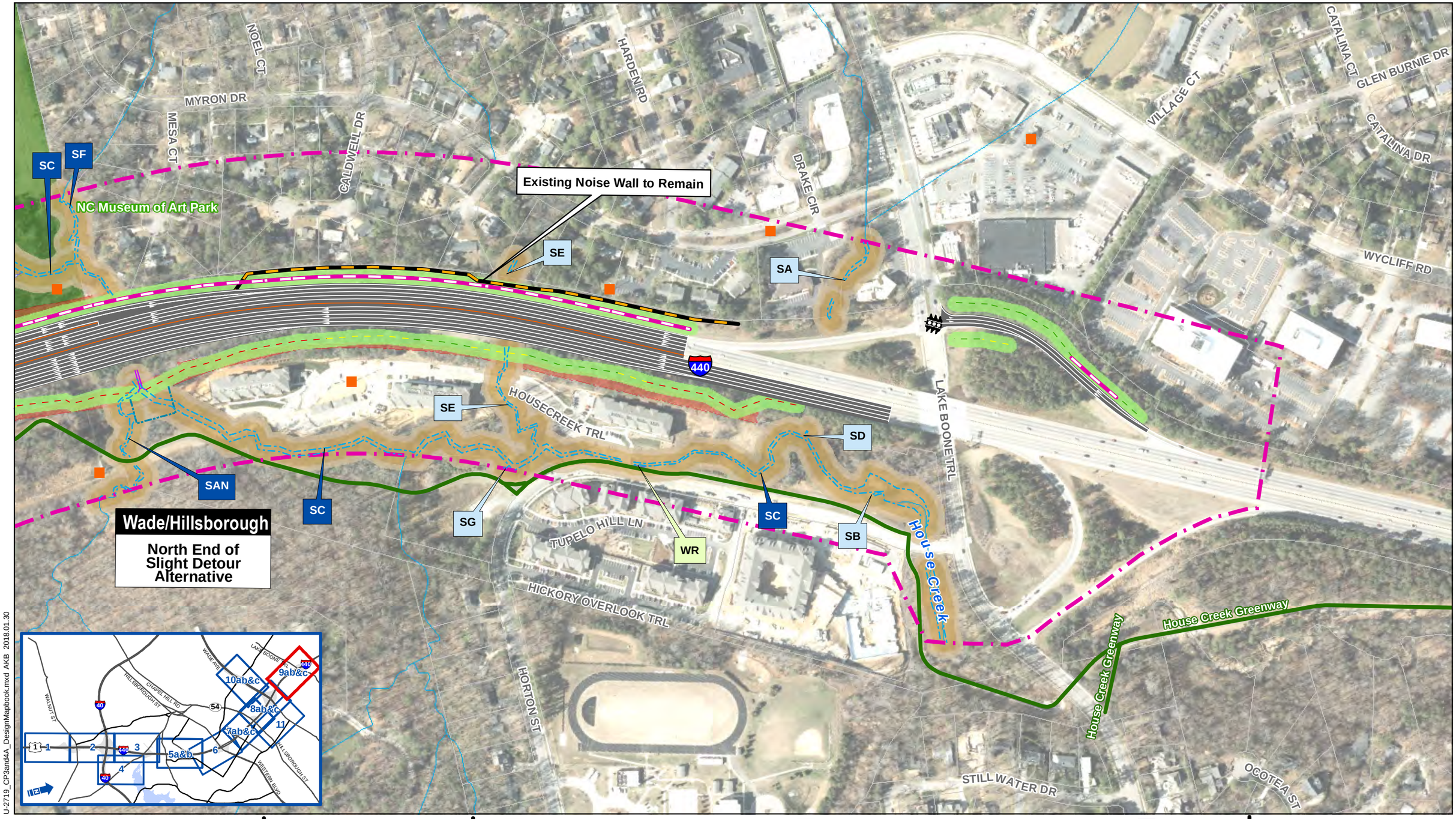
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 9b



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

Legend

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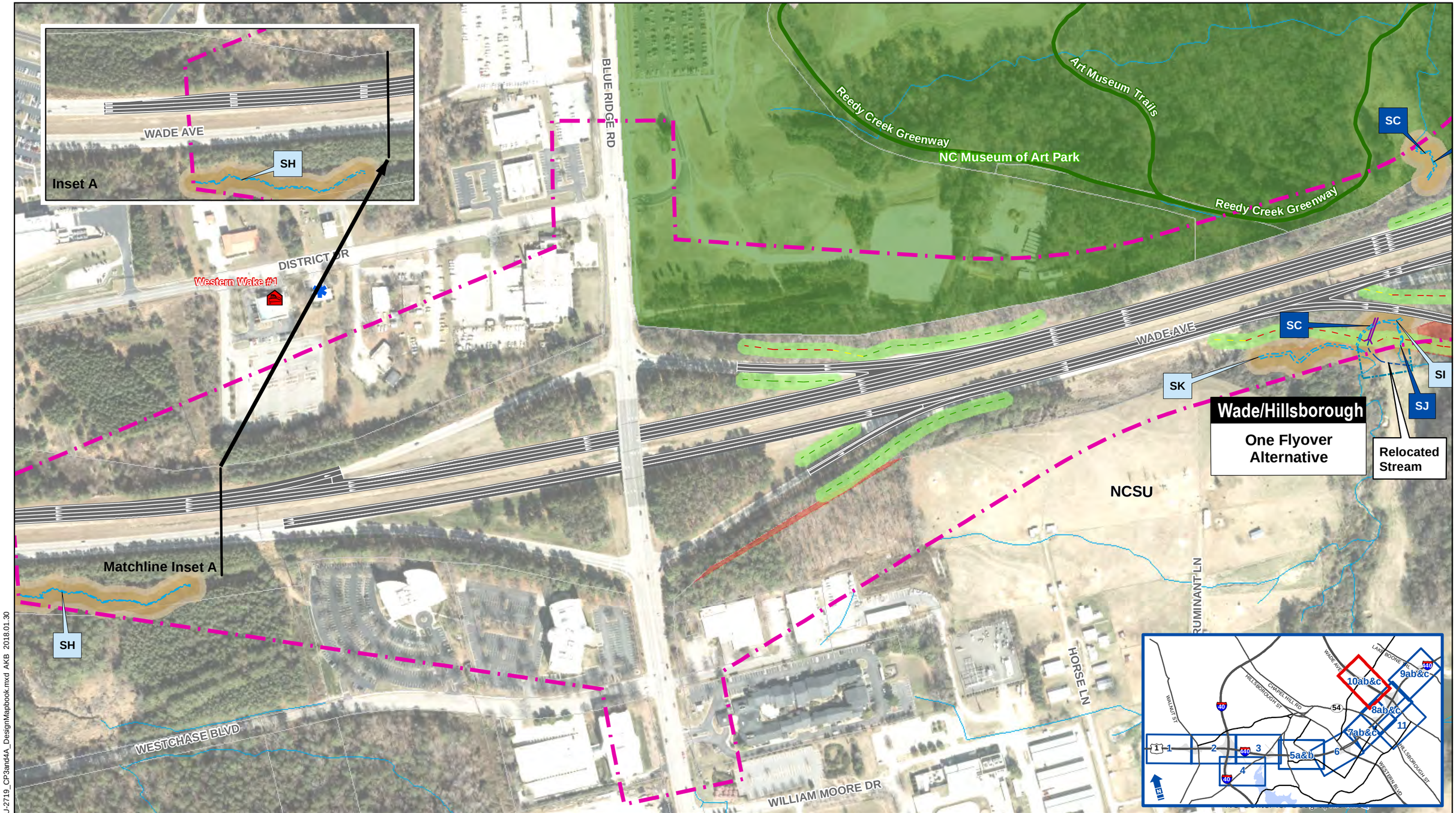
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 9c



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 150 300 Feet

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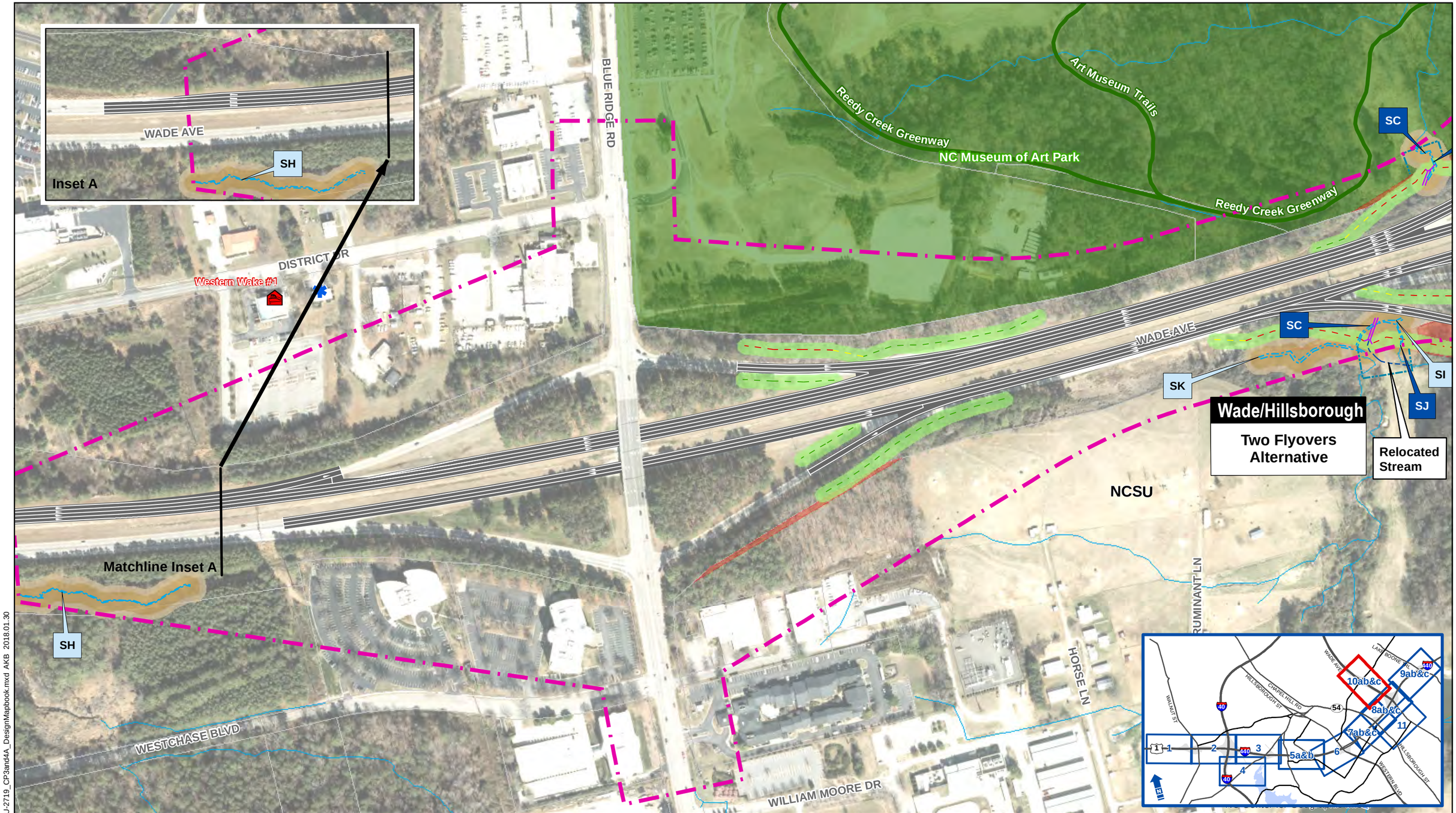
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 10a



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

N

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

Legend

- Zone 1 Open Water Buffer
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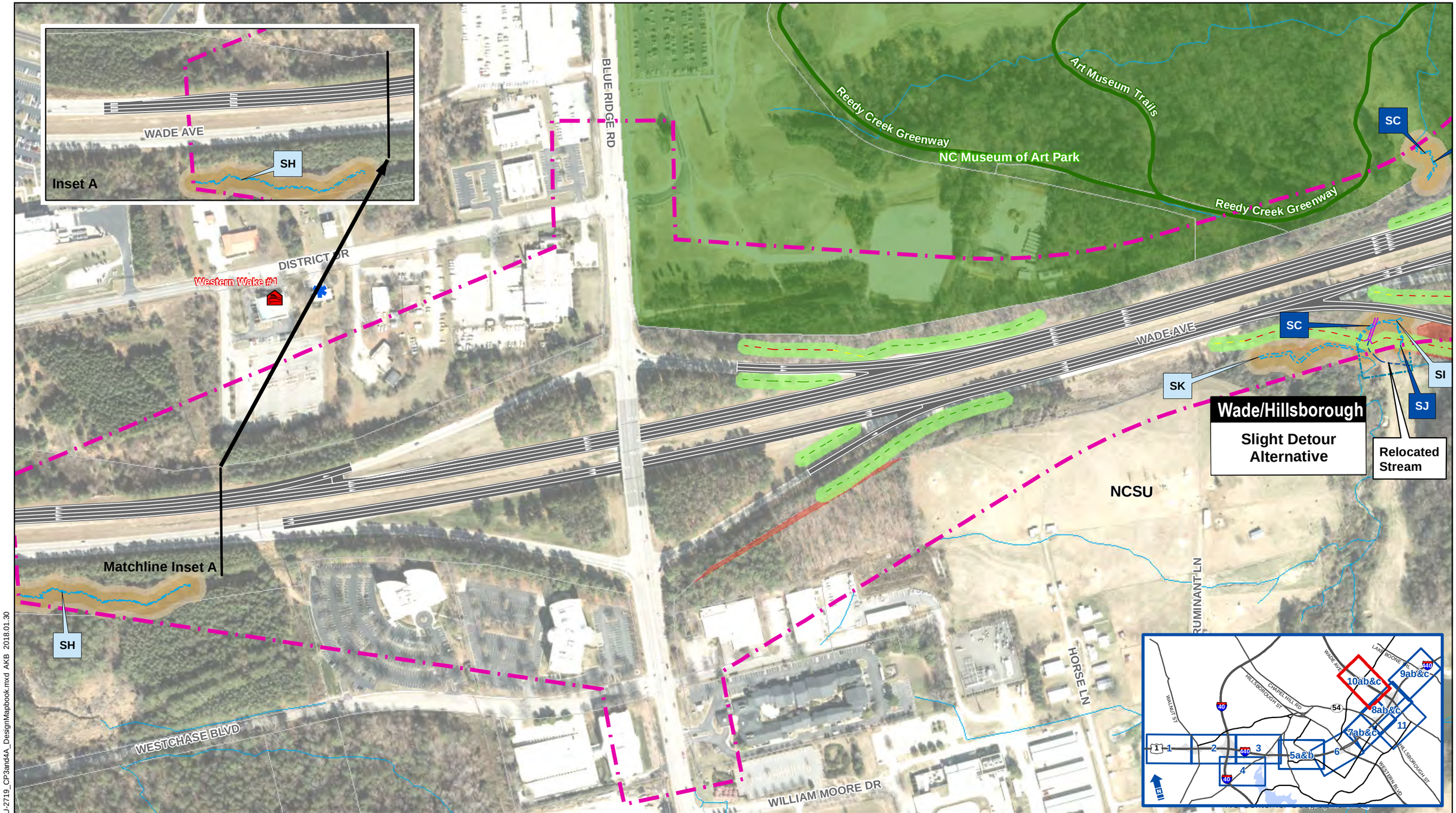
JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 10b



U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

N

0 150 300 Feet

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JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 10c

Hillsborough St

All Detailed Study Alternatives

Wade Ave

All Flyover Alternatives

Wade Ave

Slight Detour Alternative

OWA
WB
OWE
SM
WD
SM
SAP
WZA
SZA
SZB
WZB
WZC

Meredith College
Meredith College
Follow the Child Montessori School
Royal Baking Company
Rocky Branch
NCRR/NS and CSX
Reedy Creek Greenway Spur
SW Prong Beaverdam Creek
Reedy Creek Greenway
Gorman St Connector
WEST RALEIGH HISTORIC DISTRICT

BERYL RD
MEREDITH COLLEGE
ROYAL ST
HOGAN LN
NEIL ST
HILLSBOROUGH ST
ELIZABETH ST
GORMAN ST
FAIRCLOTH ST
RUFFIN ST
FURCHES ST
BEAVER DAM RD
BROOKWOOD DR
CHERRY LN
WADE AVE
PHYLLIS D
RIDGE RD
CRABAPPLE LN
LEONARD ST
BRADLEY
MARILYN DR

U-2719_CP3and4A_DesignMapbook.mxd AKB 2018.01.30

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

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- Railroads

JURISDICTIONAL RESOURCES AND DSA PRELIMINARY DESIGNS

Mapbook - Figure 11

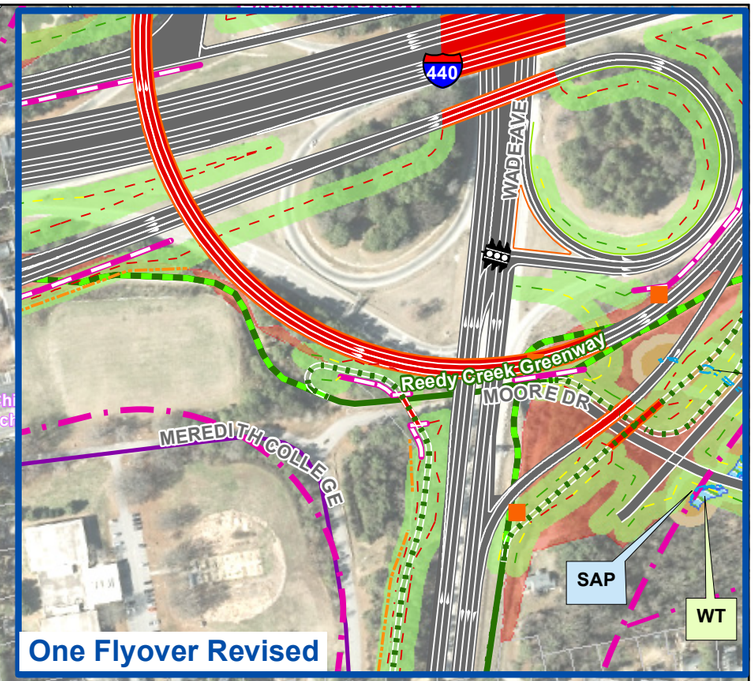
See insets to right for portions above this point.

Meredith College

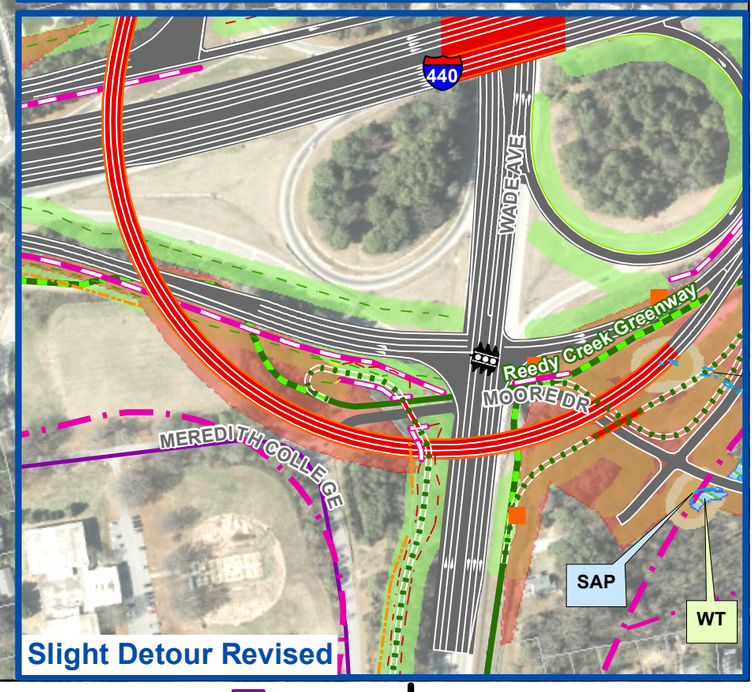
OWA
WB
OWE
SM
WD
SM
SAP
WZA
SZA
SZB
WZB
WZC

MEREDITH COLLEGE
Meredith College
Royal Baking Company
Reedy Creek Greenway Spur
WADE AVE
Follow the Chi
Montessori Sch
HILLSBOROUGH ST
Reedy Creek Greenway
SW Prong Beaverdam Creek
FAIRCLOTH ST
RUFFIN ST
FURCHES ST
BEAVER DAM RD
BROOKWOOD DR
CHERRY LN
WEST RALEIGH HISTORIC DISTRICT

One Flyover Revised



Slight Detour Revised



U-2719_CP3and4A_Fig12_ReedyCrkGwy.mxd AKB 2018.01.31

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

I-440 IMPROVEMENTS

STIP PROJECT NO. U-2719

Wake County, North Carolina

0 150 300 Feet

Source: Wake County, NCDOT, ESRI, NCONEMAP NC Statewide Orthoimagery

Legend

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- 30' Stream Buffer
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REEDY CREEK GREENWAY FAIRCLOTH ST OPTION

Figure 12

Section 404/NEPA Merger Project Team Meeting Agreement
Concurrence Point 3

Least Environmentally Damaging Practicable Alternative (LEDPA)/Preferred Alternative Selection

Project Name/Description: Widen I-440/US1/64 from four lanes to six lanes from south of Walnut Street to north of Wade Avenue, reconstruct interchanges, replace structures, and repair pavement conditions. The project is entirely within Wake County.

STIP Project: U-2719

The Merger Team has concurred on this date of **_____** that the following alternatives together comprise the **Least Environmentally Damaging Practicable Alternative** for **STIP Project U-2719**:

Location	**Alternative**
I-40 Interchange and south	Widen I-440 Only
Jones Franklin Road interchange	Upgrade Existing Partial Clover
Athens Drive grade separation	Replace Bridge in Place
Melbourne Road interchange	Replace Bridge in Place
Western Boulevard interchange	Double Crossover Diamond
Ligon Street grade separation	Build Bridge to North
Hillsborough Street and Wade Avenue interchange area	Either One Flyover Revised or Slight Detour Revised. Either Reedy Creek Greenway adjacent to I-440 or along the Faircloth Street Option

USACE _____ NCDOT _____

USFWS _____ SHPO _____

USEPA _____ FHWA _____

CAMPO _____ NCWRC _____

NCDWR _____

Section 404/NEPA Merger Project Team Meeting Agreement
Concurrence Points 2a/4a

Bridging Decisions and Avoidance and Minimization Measures

Project Name/Description: Widen I-440/US1/64 from four lanes to six lanes from south of Walnut Street to north of Wade Avenue, reconstruct interchanges, replace structures, and repair pavement conditions. The project is entirely within Wake County.

STIP Project: U-2719

This is a widening project and all stream crossings are proposed to be culverts.

Avoidance and minimization measures for jurisdictional resources:

- Included retaining wall along westbound I-440 just west of Jones Franklin Road to avoid encroachment on Walnut Creek and its floodway and Wetland WK.
- Included retaining wall at the Jones Franklin Road interchange and proposed a slight offset in the ramp termini intersections with Jones Franklin Road to avoid encroachment on Lake Johnson Park and Walnut Creek and to minimize impacts to Wetland WL.
- Preliminary alternatives that encroached on Lake Johnson Park, Walnut Creek, and Wetland WL were eliminated from detailed study.

Avoidance and minimization measures for human environment resources:

- Revised designs of the One Flyover and Slight Detour Alternatives included retaining walls to reduce right of way impacts to Meredith College and University Club. On Meredith College's main campus, the commuter parking lot is avoided and impacts to the athletic field are reduced.
- Revised design of the Melbourne Road bridge from three lanes to two lanes at request of City of Raleigh to be more context-sensitive to the surrounding neighborhood. This change will be made during final design.
- Included retaining walls to avoid impacting existing noise walls located on cut slopes along southbound US 1/64 south of Walnut St and along westbound I-440 between Lake Boone Trail and Wade Avenue.
- Included retaining wall along westbound I-440 and the Melbourne Road off ramp to avoid impacting several apartment buildings.
- Included retaining wall along westbound I-440 at the historic Oak Grove Cemetery to avoid encroachment.
- Included retaining walls for the bridge approaches east of I-440 for the Ligon Street bridge alternatives to minimize impacts to adjacent NCSU research facility and Method Townes townhome development.
- Will include down lighting at the Ligon Street bridge alternatives in the final lighting plan to minimize light impact to NCSU greenhouses on both sides of I-440.
- Chose a best-fit alignment for the widening of I-440 that avoids encroaching on Kaplan Park, Method Community Park, the Berry O'Kelly School Historic District, and the historic Oak Grove Cemetery.
- Included a retaining wall at Museum Park to minimize encroachment onto this Section 4(f) resource.

Additional Measures:

The Merger Team has concurred on this date of **_____** with the **Bridging Decisions (CP 2a)** and **Avoidance and Minimization Measures (CP 4a)** listed above for **STIP Project U-2719**.

USACE _____ NCDOT _____

USFWS _____ SHPO _____

USEPA _____ FHWA _____

CAMPO _____ NCWRC _____

NCDWR _____

APPENDIX A

CONCURRENCE FORMS

CP1 – Signed form

CP2 – Signed form

CP2 – Meeting minutes

Section 404/NEPA Merger Project Team Meeting Agreement
Concurrence Point No. 1 - Purpose and Need

Project No./TIP No./Name/Description:

Federal Project Number: IMSNHS-0440(10); WBS Number 35869.1.2
TIP Number: U-2719
Description: I-440 Improvements from US 1 south of Walnut Street (SR 1313) to north of Wade Avenue (SR 1728), Wake County

Purpose and Need of Proposed Project:

The purpose of the project is to improve traffic flow and operational efficiency and enhance mobility on this segment of I-440. The overall needs for the project are described below.

- The project section of I-440 consists of four through lanes, forming a "bottleneck," with six through lanes to the north and south. The four through lanes in the project section regularly experience congestion. Traffic volumes are forecasted to increase in the future.
- The roadway and interchanges in this section of I-440 have substandard design elements such as poor sight lines, narrow shoulders and medians, and short acceleration/deceleration lanes.
- Pavement, structures, and interchanges along the project segment are in need of rehabilitation.

The Project Team concurred on this date of 22 Aug 2012 with the purpose of and need for the proposed project as stated above.

USACE _____ NCDOT _____

USEPA _____ USFWS _____

NCDWQ _____ NCWRC _____

NCDCR _____ FHWA _____

CAMPO _____

Section 404/NEPA Merger Project Team Meeting Agreement
Concurrence Point No. 2 – Detailed Study Alternatives

Project No./TIP No./Name/Description:

Federal Project Number: IMSNHS-0440(10); WBS Number 35869.1.2
TIP Number: U-2719
Description: I-440 Improvements from US 1 south of Walnut Street (SR 1313) to north of Wade Avenue (SR 1728), Wake County

Detailed Study Alternatives for the Proposed Project:

The following are the Detailed Study Alternatives for the various elements of the project:

Mainline
- Best Fit Alignment

I-40 interchange
- Widen I-440 Only
- Southwest Quadrant Flyover

Jones Franklin Road interchange
- Braided Partial Clover

Athens Drive grade separation
- Replace Bridge in Place
- Replace Bridge to North

Melbourne Road half interchange
- Replace Bridge in Place
- Replace Bridge to North

Western Boulevard interchange
- Double Crossover Diamond

Ligon Street grade separation
- Traffic Culvert
- Two-Lane Bridge

Hillsborough Street/Wade Avenue interchanges
- One Flyover
- Two Flyovers
- Slight Detour

The Project Team concurred on this date of 3/12/15 with the Detailed Study Alternatives for the proposed project as stated above.

USACE _____ NCDOT _____

USEPA _____ USFWS _____

NCDWQ _____ NCWRC _____

NCDCR _____ FHWA _____

CAMPO _____

Meeting Minutes

ATKINS

I-440 Widening and Improvement Project

Merger Team Meeting – Concurrence Point 2 - Recommended Detailed Study Alternatives
Hydraulics Conference Room, Century Center B, Poole Road, Raleigh, NC
March 12, 2015 12:30 pm – 2:30 pm

Purpose: Discuss the alternatives development process and the recommended Detailed Study Alternatives for the I-440 improvement project. Achieve concurrence on the Detailed Study Alternatives.

Attendees

NCDOT
Mack Bailey – Structures Mgmt
Rachelle Beauregard – Natural Env Section (NES)
Jason Dilday - NES
Sheryl Evans – ITS and Signals
Tony Houser – Roadway Design
Matt Lauffer - Hydraulics
Derrick Lewis – Feasibility Studies (phone)
Chris Murray – Division 5
Simone Robinson – Human Env Section (HES)
Mark Staley – Roadside Environmental
Mike Stanley - STIP
John Williams – PDEA

Federal Highway Administration
Felix Davila

Natl Ocean and Atmospheric Admin - Fisheries
Keith Harrison (phone)

US Army Corps of Engineers
Eric Alsmeyer

US Environmental Protection Agency
Cynthia Van Der Wiele (phone)

US Fish and Wildlife Service
Gary Jordan

CAMPO
Chris Lukasina

NC DENR – Div of Water Resources
Rob Ridings

NC Wildlife Resources Commission
Travis Wilson

State Historic Preservation Office (HPO)
Renee Gledhill-Earley (phone)

Atkins
Jill Gurak
Tom Kelly
Clint Morgan

Meeting Minutes

ATKINS

Meeting Materials

- Agenda
- Packet for 3/12/15 Merger Meeting for Concurrence Point 2 (this mtg rescheduled from 2/18/15 due to weather)
- PowerPoint presentation

Minutes

John Williams opened the meeting. Jill Gurak led the presentation on the alternatives development process and the recommended Detailed Study Alternatives. Questions and discussion occurred throughout the presentation.

The Merger Team agreed with the recommended Detailed Study Alternatives and the signed Concurrence Point 2 form is attached to these minutes. It is also noted that issues related to Concurrence Point 2a were covered and all attendees concurred with CP2a.

Project Status

The project scoping activities began in 2012. Concurrence on purpose and need was achieved with the Merger team in August 2012. The first public meeting (on purpose and need) was held in December 2012. The results of the alternatives analysis and the recommended Detailed Study Alternatives were presented to the Stakeholder Advisory Committee and the public in October and November 2014.

Mr. Williams noted that the EA is anticipated to be complete in late 2015, with the Public Hearing in early 2016.

Resource Overview

Jill Gurak provided an overview of the natural and historic resources along the corridor. There are four named streams that cross I-440 in culverts. These are, from north to south, House Creek (north of Wade Avenue), Brushy Creek (near Western Boulevard), Simmons Branch (north of Athens Drive), and Walnut Creek (near Jones Franklin Road). The largest is Walnut Creek, which crosses under in a triple box culvert. There are a few other unnamed tributaries either parallel to or crossing under I-440.

An historic architectural resources survey conducted for the project identified four resources determined eligible for the National Register of Historic Places (NRHP) near the northern end of the project. These are the Oak Grove Cemetery, Berry O'Kelly School District, Capitol City Lumber, and Royal Bakery. All or a portion of the Meredith College campus may also be eligible for the NRHP. Detailed surveys are underway and are expected to be complete in April 2015.

Mainline

A best fit mainline option was developed based on consideration of surrounding features and resources. The decisions were typically clear cut as to how widening should occur along each section of the corridor. Very little right of way is anticipated to be required for the widening. However, additional right of way will be needed in spot locations. The mainline widening will be matched with each of the interchange and grade separation alternatives.

Discussion. Where will widening occur in the middle? Many sections of the mainline have no grass median in the center. At the northern end of the project, the existing hard median is a substandard width. Where there is a wider median, the widening will use this area to the maximum extent possible. Wider medians occur near Western Boulevard and from Jones Franklin Road through the I-40 interchange. Planters within

the median, similar to those that exist along other sections of I-440, may be proposed where they would not cause substantial impacts.

I-40 Interchange Area

Four sketch options were considered for this area: Widening Only, SW Quadrant Flyover, NE Quadrant Flyover, and Flyovers in NE and SW Quadrants. The "Flyovers in NE and SW Quadrants" option was eliminated due to substantial impacts to the South Hills Mall and because access between I-40 and the Crossroads Boulevard bridge would be removed. Removing this access would result in more traffic using the Walnut Street interchange, which is already over capacity. NE Quadrant Flyover was eliminated due to impacts to Walnut Creek and South Hills Mall.

The SW Quadrant Flyover was retained because it could be constructed within existing right of way and would have notable traffic operations improvements in this area.

The Widening Only option also was retained. There are several other potential projects being planned for I-40. Both the NCDOT Feasibility Studies Unit and CAMPO are conducting studies of this interchange that will be completed this year.

The timing of any planned/programmed projects for I-40 in the interchange area may be close in time to Project U-2719, but will depend on the STIP that is ultimately adopted later this year. NCDOT would not want to implement improvements to I-40 under U-2719, or expend funds, that would not be at least partially usable under these other projects.

Discussion. The Merger Team agreed on the recommended Detailed Study Alternatives for the I-440/I-40 interchange: Widen I-440 Only and SW Quadrant Flyover.

Jones Franklin Road Interchange

Three sketch options were considered for this area: Half Clover, Elongated Half Clover, and Braided Partial Clover. Resources in this area include Lake Johnson Park (a Section 4(f) and Section 6(f) resource), Walnut Creek and its floodway/floodplain, and a wetland adjacent to Lake Johnson. Currently Walnut Creek flows under I-440 through a triple box culvert. On the west side of the highway, there are existing apartment complexes within the floodplain that frequently experience flooding. Even small changes to the built environment in the interchange area could impact flooding. There are several power towers along the eastbound side of I-440, including two that are within the right of way of the eastbound I-440 on-ramp (the Lake Johnson Park quadrant).

The Half Clover was eliminated at the sketch stage because it would have substantial impacts to Lake Johnson Park, the floodplain of Walnut Creek (which drains into Lake Johnson), and a wetland in the same area.

Conceptual designs were prepared for the Elongated Half Clover and the Braided Partial Clover. The Elongated Half Clover would still impact Lake Johnson Park, and would also impact approximately 17 homes on Thea Lane. This concept was eliminated from consideration due to these impacts.

The Braided Partial Clover would result in the best traffic operations along the mainline compared to the half-clover options. This concept avoids impacts to Lake Johnson Park and its associated wetland, and also avoids impacts to residences.

Under the Braided Partial Clover, at least two power towers adjacent to Capital Center Drive would need to be relocated. In addition, the power towers within the right of way of the eastbound I-440 on ramp could remain within the right of way. Typically, power towers should be located outside roadway rights of way. However, moving these two towers likely would impact Lake Johnson Park property, so consideration will be given to keeping them in place.

The Braided Partial Clover would unavoidably impact the unnamed tributary located adjacent to Capital Center Drive.

Discussion. USACE noted that the stream adjacent to Capital Center Drive has riprap and is of low quality. An attendee asked if the culvert carrying Walnut Creek would need to be extended. Based on information available to date, it is anticipated that the culvert would not need to be lengthened. However, more information will become available as the preliminary hydraulic studies and preliminary designs are prepared in the next phase of the project. The Merger Team concurred with the Partial Braided Clover as the recommended Detailed Study Alternative.

Athens Drive Grade Separation

Three options were considered for this grade separation: Replace Bridge in Place, Replace Bridge to North, and Replace Bridge to South. There are two options recommended for detailed study, replace bridge in place or replace bridge to the north. Replacing the bridge to the south may impact a major power tower and had no advantage over the other options. The Replace Bridge in Place option would be the least expensive, but would require an off-site detour for possibly up to a year.

Discussion. There was no discussion about this grade separation, except that the Merger Team agreed with the recommendations.

Melbourne Road Half Interchange

Three options were considered for this half interchange: Replace Bridge in Place, Replace Bridge to North, and Replace Bridge to South. All alternatives are half interchanges. All would close the connection to Deboy Street that currently exists on the westbound I-440 off ramp. Currently, this closure is shown as a cul-de-sac, but a private driveway also will be considered during preliminary design since it would service only one property. Two concepts are proposed for detailed study: replace the Melbourne Road bridge in place and replace bridge to the north. The Replace Bridge to the South would potentially impact an electric power tower, so this option was eliminated.

Feedback from the surrounding neighborhoods indicates this half interchange is important to the community. It also provides access to Combs Elementary School and Athens Drive High School.

Discussion. There was no discussion about this grade separation, except that the Merger Team agreed with the recommendations.

Western Boulevard Interchange

Five sketch options were evaluated for this interchange: Double Crossover Diamond, SPUI, Traditional Diamond, Partial Clover, and Modernize Existing Interchange Form.

The Modernize Existing Interchange Form was eliminated due to high impacts and cost compared to the other options. This interchange also would need to be braided with the Melbourne Road westbound I-440 off ramp, so there would be no access between Western Boulevard and Melbourne Road in that direction.

The City of Raleigh has expressed support for a service interchange, which would be more compatible with their long term land use plans for the area.

Traffic operations analyses conducted for the Double Crossover Diamond, SPUI, and Traditional Diamond showed that the Traditional Diamond and SPUI would need triple lefts for off ramps. Triple lefts are not desirable, so these two concepts were eliminated. The Partial Clover would need triple rights for the eastbound I-440 off ramp. This also is not a desirable configuration for traffic or pedestrians/bicyclists.

The Double Crossover Diamond did not need triple lefts or rights to achieve acceptable traffic operations. In comparison, this option also would be the best for accommodating bicyclists and pedestrians. Western

Boulevard is an important access roadway to NC State University and there currently is a multi-use path along the north side of Western Boulevard in the interchange area.

Discussion. USACE asked whether the small segment of Brushy Creek near the K-Mart property would be impacted. Yes, this small (approximately 70 linear feet) daylighted segment of Brushy Creek likely would be impacted.

The Merger Team agreed with the recommendation of carrying forward the Double Crossover Diamond for detailed study.

Ligon Street Grade Separation

Two sketch options were evaluated for this grade separation: Traffic Culvert and Two-Lane Bridge. Currently, Ligon Street passes under I-440 via a one-lane traffic culvert. The existing condition of the culvert is good. Ligon Street provides access from Method Road on the east side of I-440 to NCSU research facilities and the Oak Grove Cemetery on the west side of I-440.

The one-lane traffic culvert was included with the original construction of I-440 specifically to provide access to Oak Grove Cemetery to/from the Method community at the request of the Method Civic League. The access to Oak Grove Cemetery is still important to the community. The cemetery, determined eligible for listing in the National Register of Historic Places, is still actively used and maintained by the Oak City Baptist Church and the St James AME Church in the Method neighborhood.

Both the City of Raleigh and NCSU would like to have a two-lane grade separation that would allow for two-way traffic and transit buses to cross I-440. The existing one-lane culvert cannot accommodate transit buses. The City of Raleigh's transportation plan includes improved connection of Ligon Street to Blue Ridge Road.

The existing one-lane culvert could be extended to accommodate a widened I-440. This would fulfill the original purpose of the culvert, but would not provide the improved access desired by the City of Raleigh and NCSU. Cost sharing may be necessary from the City and/or NCSU to implement a bridge option.

A two-lane culvert would be expensive and difficult to construct since it would need to be done while maintaining traffic flow on I-440. Construction time also would be substantial. This is not considered a reasonable option.

A two-lane bridge over I-440 would accomplish the same service as a two-lane traffic culvert and would be less disruptive to construct. The bridge could accommodate sidewalks and areas for bicyclists. A bridge could impact NCSU research buildings and apartment buildings on the east side of I-440. It is anticipated the Oak Grove Cemetery could be avoided. The team will work with NCSU regarding alternative access to the research buildings.

The Method community is concerned about access and parking for the cemetery if a bridge were constructed. They also are concerned about increased traffic through their neighborhood. The NCDOT is preparing a small-area traffic forecast for the area around Ligon Street and the Method community, and also is planning on preparing a computer visualization of the options to help discuss them with the public.

Discussion. The USACE asked about potential impacts to the unnamed tributary located adjacent to eastbound I-440. A culvert extension may have impact a small segment of this stream. Impacts due to the bridge will vary depending on the bridge alignment and length of the structure. More detailed information on impacts will be available once the preliminary engineering design is completed.

HPO asked why the concept design for the bridge is shown at a skew toward the cemetery. The concept is subject to change, but is initially shown this way to smoothly connect the Ligon Street alignment across I-440. Other alignments that may minimize impacts also will be explored during preliminary design. HPO is concerned about visual and traffic noise impacts to Oak Grove Cemetery. These potential impacts will need to be studied in consultation with HPO as part of the Section 106 process.

There was a general preference expressed by some attendees and members of the Merger Team for the One-Lane Culvert option as the option that would minimize impacts, and that if the City of Raleigh and NCSU wanted to construct a bridge for Ligon Street over I-440 that could be a separate project constructed at a later date.

The Merger Team agreed with the recommendation to study the one-lane traffic culvert and the two-lane bridge in detail.

Wade Avenue and Hillsborough Street Interchange Area

Five sketch options were evaluated for this interchange area: Reduced Access, Collector-Distributor Weave and Braid, One Flyover, Two Flyovers, and Slight Detour. All five options would result in substantially better traffic operations through the interchange area compared to just widening I-440 with no interchange improvements. Based on available information, none of the options are anticipated to impact the existing pedestrian bridge carrying the Reedy Creek Greenway over I-440.

Reduced Access and Collector-Distributor Weave and Braid were eliminated at the sketch option stage. The Reduced Access option would substantially compromise the ability of the roadway network in the area to handle the frequent special event traffic that occurs throughout the year.

The Collector-Distributor Weave and Braid option would not provide substantial improvements in traffic operations over the other options. Traffic on westbound I-440 wanting to exit to Wade Avenue or Hillsborough Street must exit I-440 north of Wade Avenue to get on the collector-distributor road. This movement interacts with the traffic getting on westbound I-440 from the Lake Boone Trail on-ramp, creating an undesirable situation.

Conceptual designs were prepared for the One Flyover, Two Flyover, and Slight Detour options. All are recommended to be carried forward for detailed study.

All options would impact the Reedy Creek Greenway across Meredith College property. Coordination with Meredith College and the City of Raleigh will be required to discuss how to replace the greenway. One possibility may be to reroute the greenway via the existing power easement along Faircloth Street.

All options are anticipated to require a culvert extension for House Creek.

Preliminary designs will be influenced by what is determined eligible for the NRHP on Meredith C ollege. Preliminary designs may also show the alternatives may require a temporary construction easement or a small area of right of way for drainage at Method Park/Berry O'Kelly School District historic site. Impacts will be avoided and minimized where practicable.

Discussion: HPO asked if the JC Raulston Arboretum was a Section 4(f) resource. NCDOT stated they would research this question. *(Note: after the meeting it was determined by NCDOT and FHWA that the arboretum, publicly owned by the State of North Carolina, does not have recreation as a primary use. Therefore, this facility is not a Section 4(f) resource.*)

An attendee asked if Beryl Road would remain open under I-440. Beryl Road will remain connected under I-440.

The Merger Team agreed with the recommendations the three alternatives to study in detail for the Wade Avenue and Hillsborough Street interchange area: One Flyover ,Two Flyovers, and Slight Detour.

Agenda

STIP Project U-2719 – I-440 Improvement Project, Wake County

Concurrence Point 2 Merger Team Meeting – Detailed Study Alternatives

February 18, 2015
Century Center, Poole Road, Raleigh, NC

Purpose: Discuss the alternatives development process and obtain concurrence on CP 2, the Detailed Study Alternatives for the I-440 Improvement Project.

Materials

Agenda
CP2 Packet
Powerpoint presentation
Draft Alternatives Development Report (January 26, 2015)

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1. **Introductions**
2. **Project description and overview**
3. **Summary of purpose and need and CP1** (CP1 form in packet Attachment D)
4. **Resources in project study area** (packet Figures 1 and 2 and Table 2)
5. **Recommended Detailed Study Alternatives** (packet Attachments A, B, and C)
    a. Alternatives development process
    b. Typical section (packet Figure 3)
    c. Mainline alignment
    d. I-40 interchange
    e. Jones Franklin Road interchange
    f. Athens Drive grade separation
    g. Melbourne Road half interchange
    h. Western Boulevard interchange
    i. Ligon Street grade separation
    j. Hillsborough Street/Wade Avenue interchange area
6. **Concurrence Point 2 Form**
    a. Summary of recommended Detailed Study Alternatives (packet Table 1)
    b. Discussion and concurrence form CP2

I-440 Improvements

MERGER TEAM MEETING

Concurrence Point #2
Detailed Study Alternatives

March 12, 2015

(rescheduled from 2/18/15 due to weather)

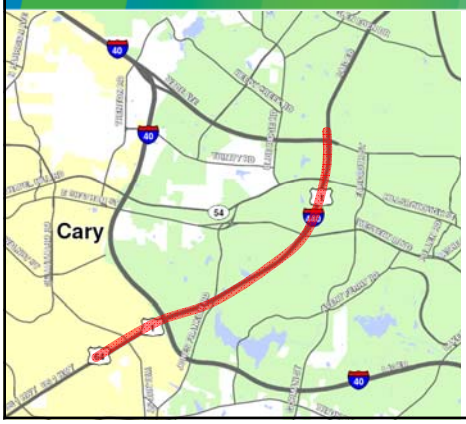
STIP No. U-2719

I-440 Improvements

Agenda

- Project overview and status
- Alternatives recommended for detailed study
- Discussion of CP2
- Next steps

I-440 Improvements



Project extends from south of Walnut St to just south of Lake Boone Trail.

I-440 Improvements

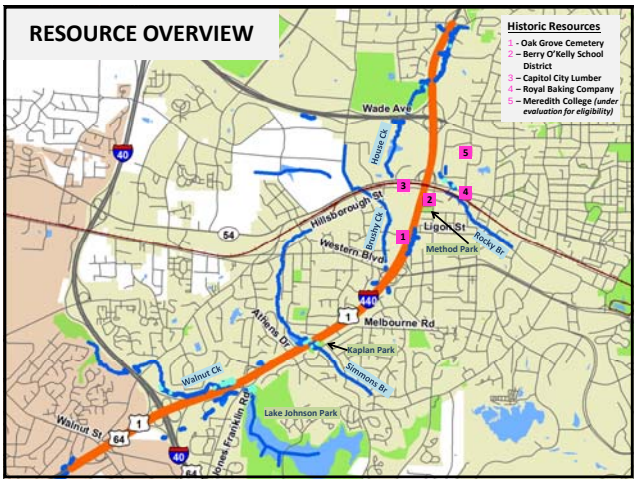
Project Milestones

Date	Milestone
Jul 2012	Scoping request transmitted
Aug 2012	CP #1 Merger Meeting – CP #1 signed (Purpose and Need)
Nov 2012	Stakeholder Advisory Committee Mtg #1 – P&N
Dec 2012	Public Meeting #1 – P&N
Sep 2014	Purpose and Need Statement finalized
Oct 2014	Stakeholder Advisory Committee Mtg #2 – Alternatives
Nov 2014	Public Meeting #2 - Alternatives

I-440 Improvements

Project Purpose and Need

- *Capacity deficiencies* – the 4-lane project section forms a bottleneck between the 6-lane sections at either end
- *Geometric deficiencies* – the project section has substandard design elements
- *Condition deficiencies* – due to the age of the facility, many elements are in need of rehabilitation



I-440 Improvements

Alternatives Evaluation Process

- Multi-step process
- Considered the following elements:
  - Mainline
  - Interchanges
  - Grade separations

I-440 Improvements

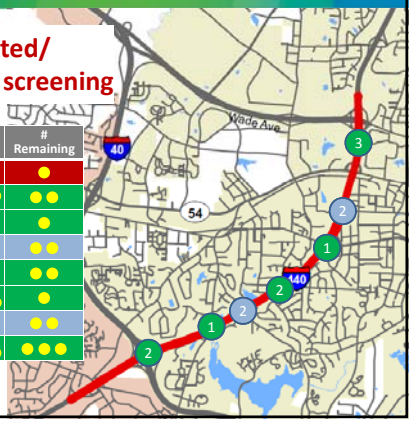
Alternatives Evaluation Process

- Step 1 – Sketches comparison
  - Design considerations
  - Impacts
  - Traffic operations
- Step 2 – Conceptual designs comparison
  - Design considerations
  - Impacts
  - Traffic operations

I-440 Improvements

 # Concepts evaluated/
 # Remaining after screening

Area	# Evaluated	# Remaining
Mainline	●	●
I-40	●●●●	●●
Jones Franklin Rd	●●●	●
Athens Dr	●●●	●●
Melbourne Rd	●●●	●●
Western Blvd	●●●●	●
Ligon St	●●	●●
Wade/Hillsborough	●●●	●●●



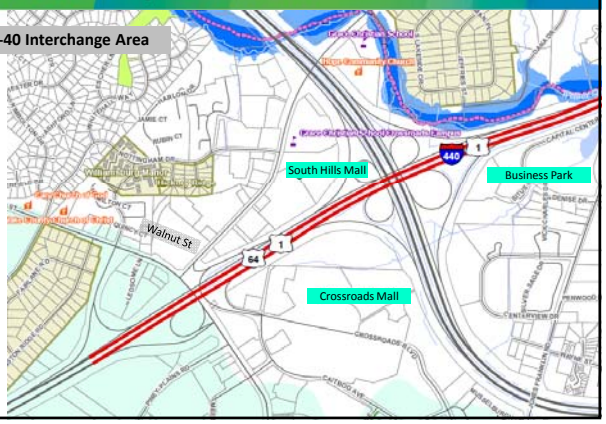
I-440 Improvements

Mainline

Best Fit Alignment – *Retain as DSA*

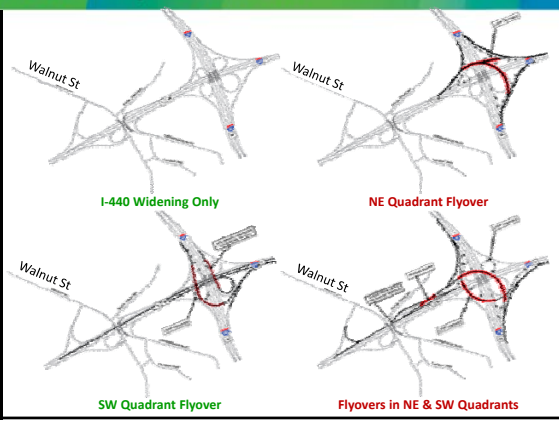
I-440 Improvements

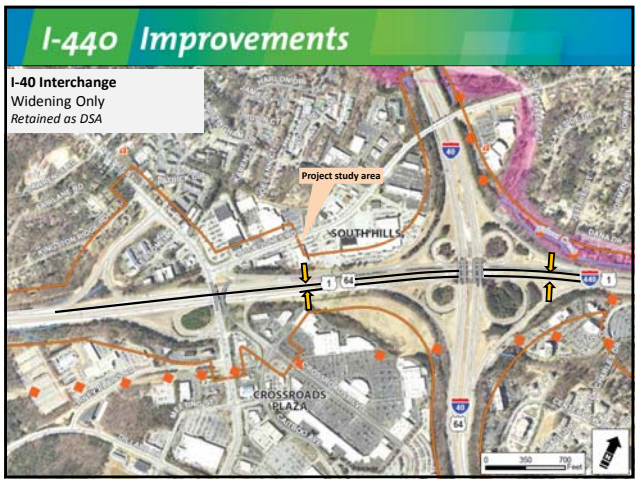
I-40 Interchange Area

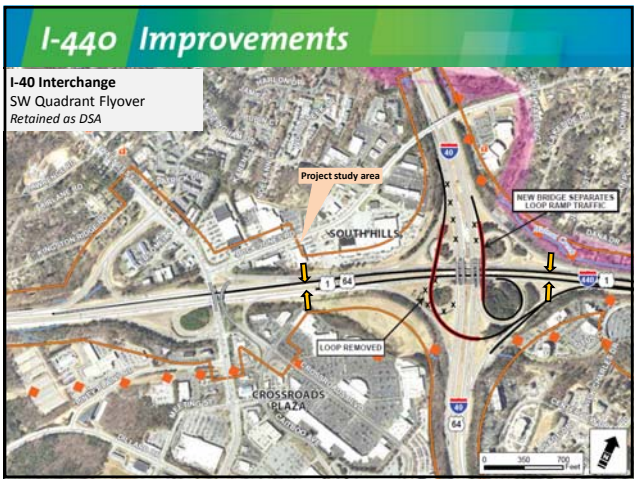


I-440 Improvements

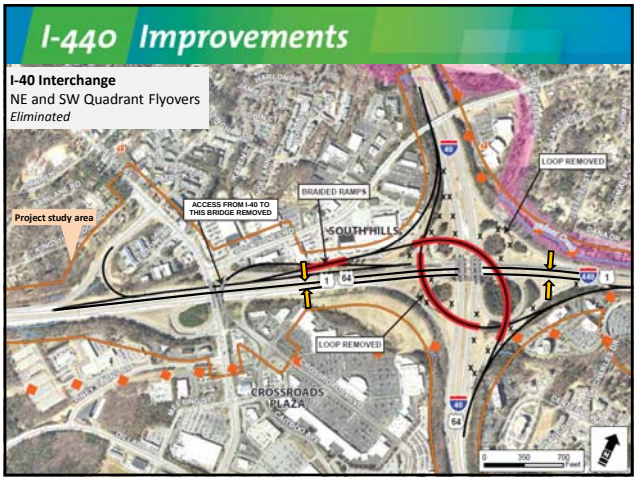
I-40 INTERCHANGE AREA SKETCHES




I-440 Improvements
I-40 Interchange
Widening Only
Retained as DSA
Project study area
SOUTH HILLS
CROSSROADS PLAZA


I-440 Improvements
I-40 Interchange
SW Quadrant Flyover
Retained as DSA
Project study area
NEW BRIDGE SEPARATES LOOP RAMP TRAFFIC
LOOP REMOVED
SOUTH HILLS
CROSSROADS PLAZA


I-440 Improvements
I-40 Interchange
NE Quadrant Flyover
Eliminated
Project study area
LOOP REMOVED
SOUTH HILLS
CROSSROADS PLAZA


I-440 Improvements
I-40 Interchange
NE and SW Quadrant Flyovers
Eliminated
Project study area
ACCESS FROM I-40 TO THIS BRIDGE REMOVED
BRAIDED RAMPS
LOOP REMOVED
LOOP REMOVED
SOUTH HILLS
CROSSROADS PLAZA

I-440 Improvements

Traffic Operations Comparison – I-40 Interchange Area Concepts

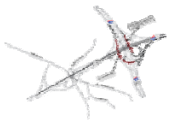
	Year 2030 AM Peak Period (2 hrs)				Year 2030 PM Peak Period (2 hrs)			
	I-440 Widening Only	SW Quadrant Flyover w/ Loop	SW Quadrant Flyover w/ Loop and Addtl I-40 Ramp Improvements	NE and SW Quadrant Flyover	I-440 Widening Only	SW Quadrant Flyover w/ 1-Lane Loop	SW Quadrant Flyover w/ Loop and Addtl I-40 Ramp Improvements	NE and SW Quadrant Flyover
Network Avg Speed (mph)	23.0	27.0	35.2	18.3	23.6	24.4	32.8	21.7
Network Total Delay (hr)	6,363	4,998	2,944	8,222	5,927	5,764	3,337	6,693
Latent Demand (veh)	11,013	6,466	3,022	8,799	6,292	5,854	1,438	6,059
I-440 Avg Speed (mph)	38.8	44.5	55.2	44.7	52.1	52.2	61.0	53.1
I-440 Vehicles Processed	25,049	28,682	30,963	26,954	27,545	27,743	31,020	27,348
I-40 Avg Speed (mph)	40.9	42.0	48.2	34.7	39.2	39.1	44.7	37.7
I-40 Vehicles Processed	32,058	34,835	37,748	30,556	33,122	34,465	37,771	33,030

I-440 Improvements

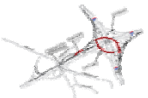
I-40 Interchange Area - Summary

I-440 Widening Only - Retain
- Least expensive
- Won't conflict with future I-40 projects
- No impact to surrounding resources
- Traffic operations ok

NE Quadrant Flyover - Eliminate
- Walnut Creek impacts
- Likely impacts to South Hills Mall



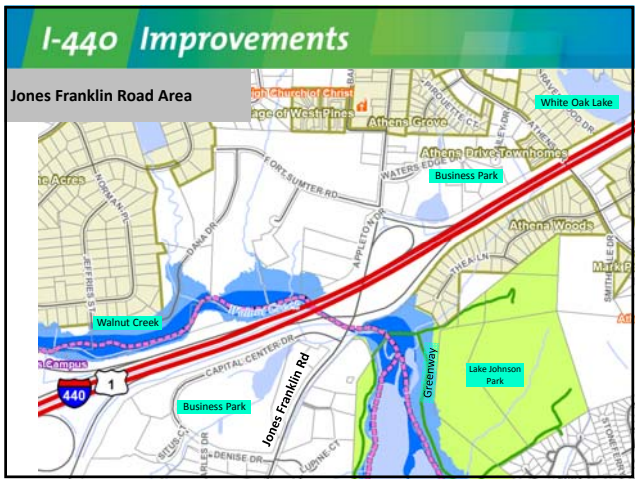
SW Quadrant Flyover - Retain
- Little to no impact to surrounding resources
- Best overall traffic operations

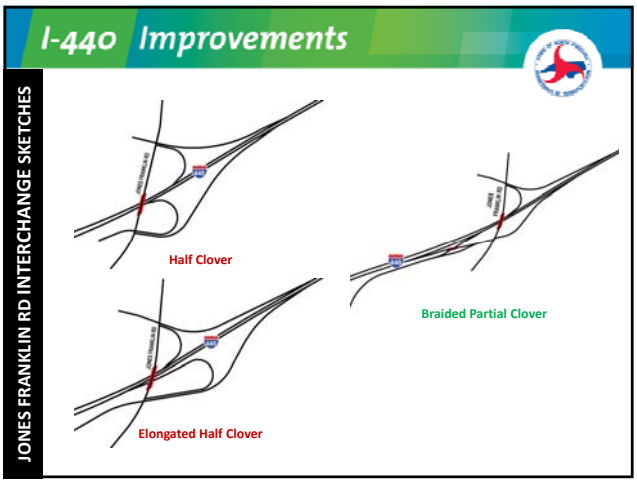


NE and SW Quadrant Flyovers - Eliminate
- Most expensive
- Most impact to South Hills Mall
- Eliminates access to Crossroads Blvd bridge from I-40
- Least benefit to traffic operations

Concept Design – I-40 Interchange
Widen I-440 Only Alternative

Concept Design – I-40 Interchange
SW Quadrant Flyover Alternative

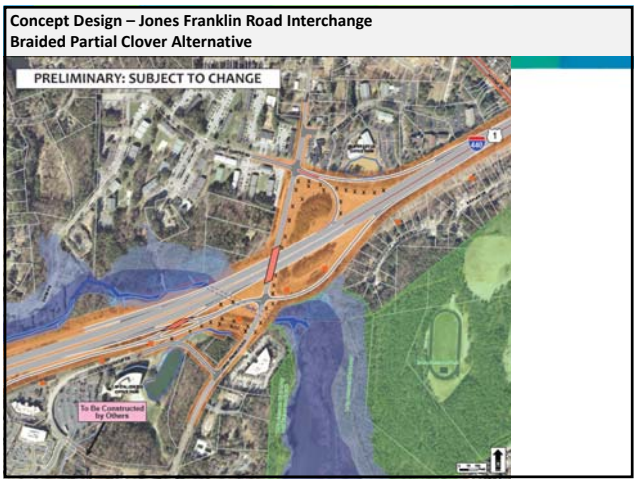

I-440 Improvements
Jones Franklin Road Area
White Oak Lake
Athens Grove
Athens Drive Townhomes
Business Park
Athena Woods
Walnut Creek
Jones Franklin Rd
Greenway
Lake Johnson Park
Business Park
440
1

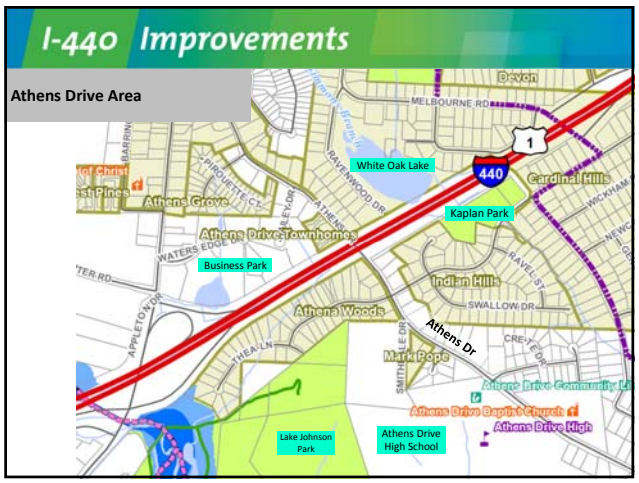

I-440 Improvements
JONES FRANKLIN RD INTERCHANGE SKETCHES
Half Clover
Braided Partial Clover
Elongated Half Clover

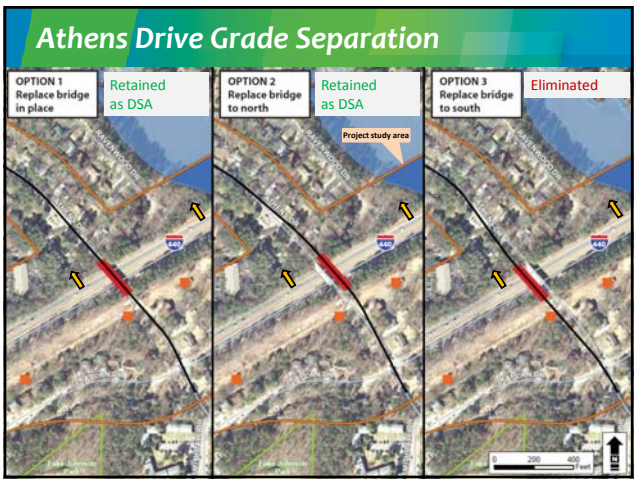

I-440 Improvements
Jones Franklin Road Interchange
Half-Clover
Eliminated
Project study area
To Be Constructed by Others
Lake Johnson Park


I-440 Improvements
Jones Franklin Road Interchange
Elongated Half-Clover
Eliminated
Project study area
To Be Constructed by Others
Lake Johnson Park


I-440 Improvements
Jones Franklin Road Interchange
Braided Partial Clover
Retained as DSA
Project study area
To Be Constructed by Others
Lake Johnson Park


Concept Design – Jones Franklin Road Interchange
Braided Partial Clover Alternative
PRELIMINARY: SUBJECT TO CHANGE
To Be Constructed by Others


I-440 Improvements
Athens Drive Area
White Oak Lake
Kaplan Park
Business Park
Athena Woods
Athens Dr.
Mark Pope
Lake Johnson Park
Athens Drive High School
Athens Drive High


Athens Drive Grade Separation
OPTION 1
Replace bridge in place
Retained as DSA
OPTION 2
Replace bridge to north
Retained as DSA
Project study area
OPTION 3
Replace bridge to south
Eliminated

I-440 Improvements

OPTION 1 ONLY – TEMPORARY OFFSITE DETOUR
Detour Length: approximately 2.8 miles

Athens Drive 2035 Build AADT = 8,400 vehicles per day

Concept Design – Athens Drive Grade Separation
Replace Bridge in Place Alternative

Concept Design – Athens Drive Grade Separation
Replace Bridge to North Alternative

I-440 Improvements

Melbourne Road Area

Melbourne Road Interchange

OPTION 1
Replace bridge in place

Retained as DSA

OPTION 1 ONLY – TEMPORARY OFFSITE DETOUR
Detour Length: approximately 3.1 miles

Melbourne Rd 2035 AADT: 6,800 vpd east; 2,500 vpd west

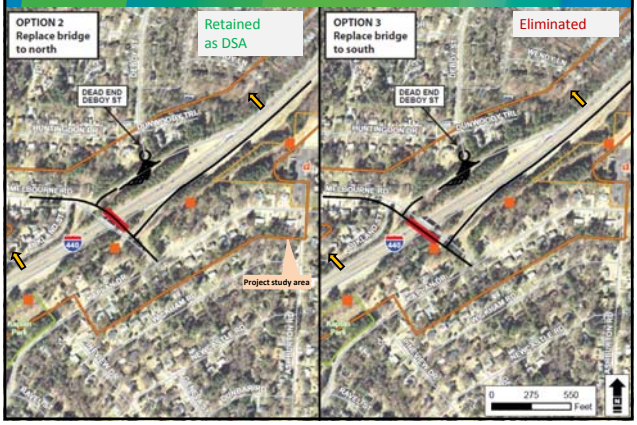
Melbourne Road Interchange

OPTION 2
Replace bridge to north

Retained as DSA

OPTION 3
Replace bridge to south

Eliminated

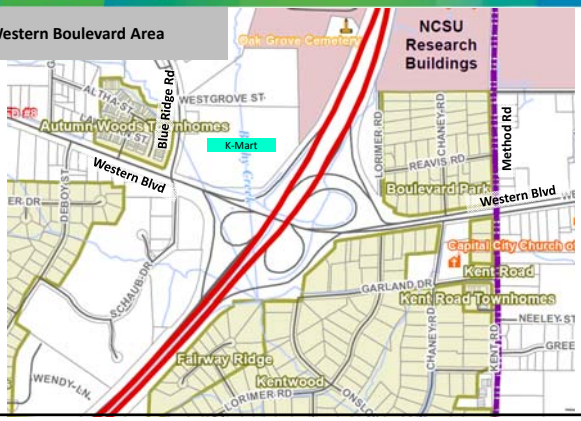


Concept Design – Melbourne Road Interchange
Replace Bridge in Place Alternative

Concept Design – Melbourne Road Interchange
Replace Bridge to North Alternative

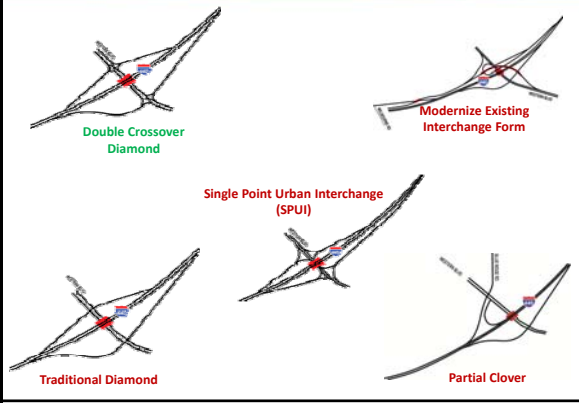
I-440 Improvements

Western Boulevard Area



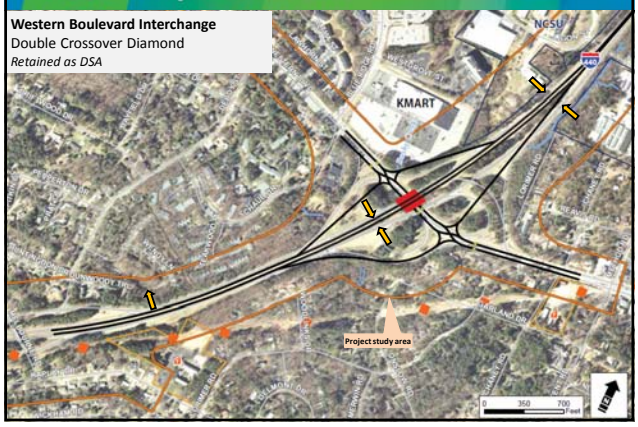
I-440 Improvements

WESTERN BOULEVARD INTERCHANGE SKETCHES



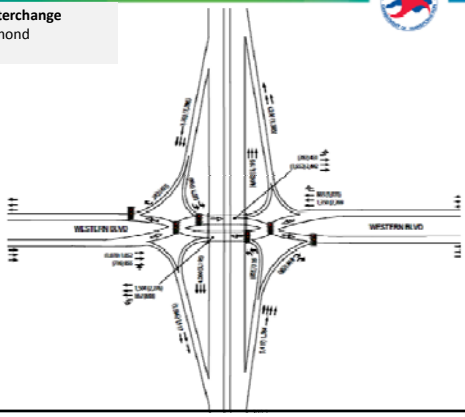
I-440 Improvements

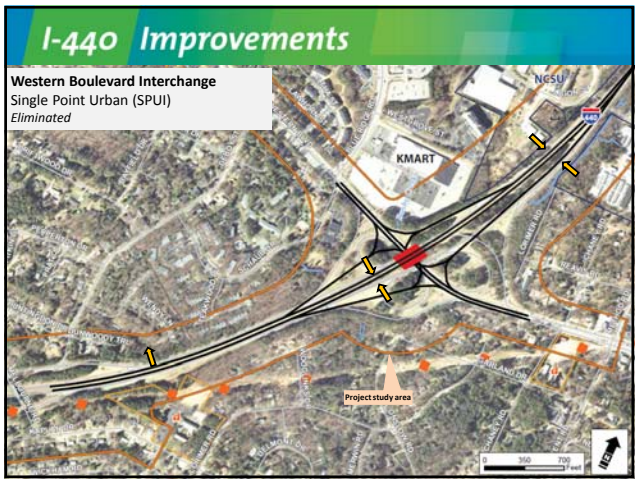
Western Boulevard Interchange
Double Crossover Diamond
Retained as DSA



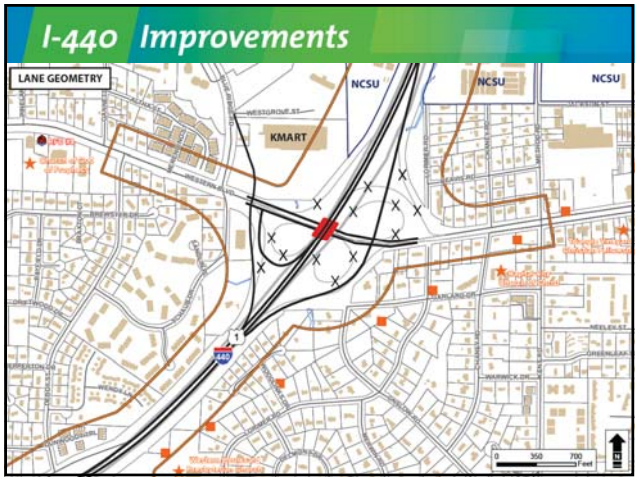
I-440 Improvements

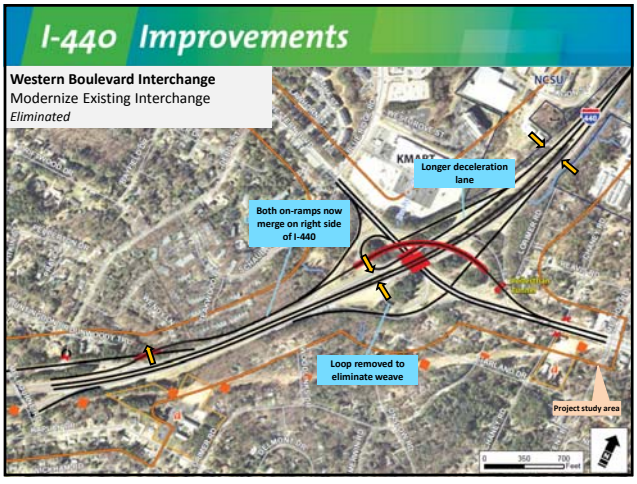
Western Boulevard Interchange
Double Crossover Diamond
Retained as DSA




I-440 Improvements
Western Boulevard Interchange
Single Point Urban (SPUI)
Eliminated
NCSU
KMART
Project study area


I-440 Improvements
Western Boulevard Interchange
Traditional Diamond
Eliminated
NCSU
KMART
Project study area

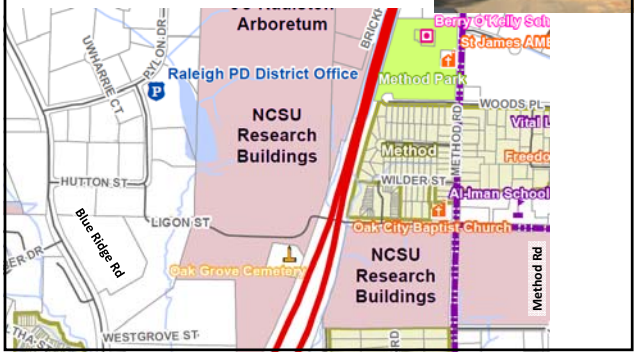

I-440 Improvements
LANE GEOMETRY
NCSU
NCSU
NCSU
KMART


I-440 Improvements
Western Boulevard Interchange
Modernize Existing Interchange
Eliminated
NCSU
KMART
Longer deceleration lane
Both on-ramps now merge on right side of I-440
Loop removed to eliminate weave
Project study area

Concept Design – Western Boulevard Interchange
Double Crossover Diamond (Diverging Diamond) Alternative

I-440 Improvements

Ligon Street Area



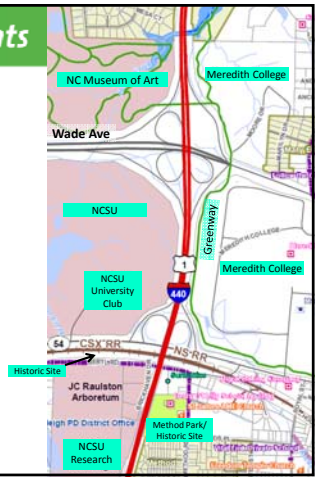
I-440 Improvements

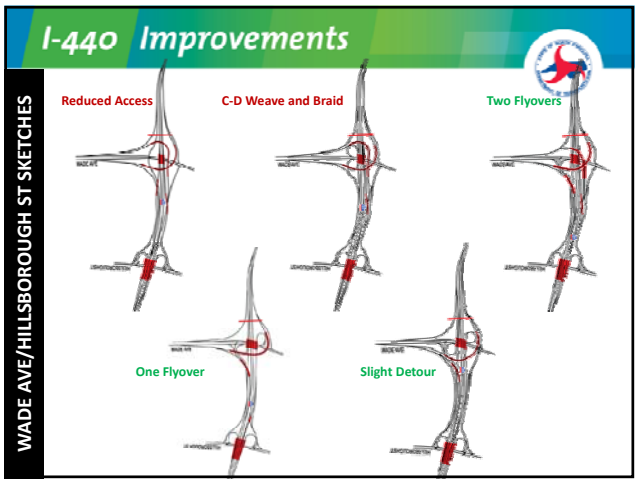
Ligon Street Grade Separation

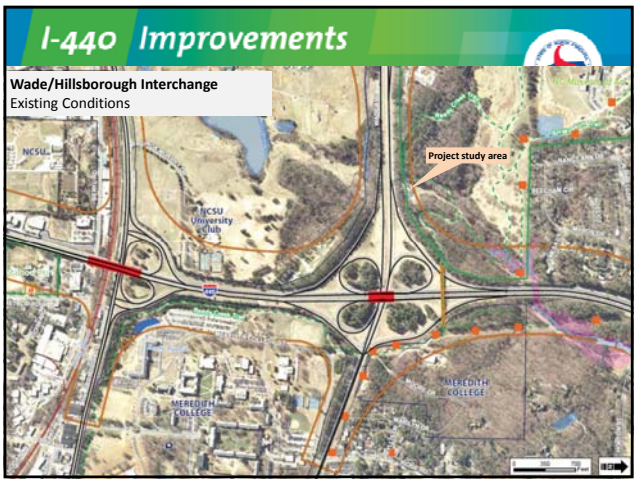
Traffic Culvert Extension – *Retain as DSA*
Two-Lane Bridge – *Retain as DSA*

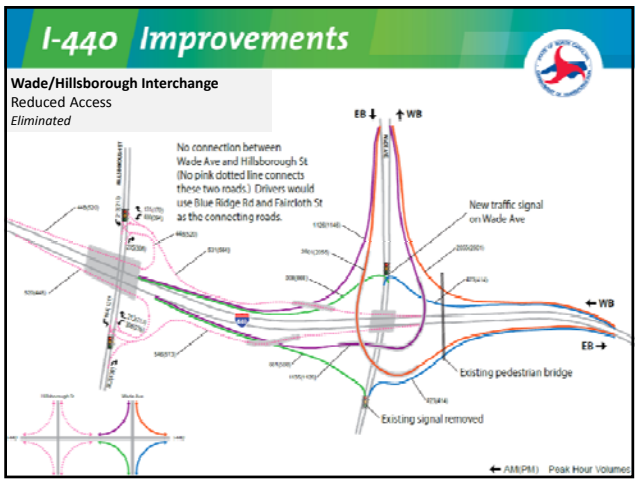
I-440 Improvements

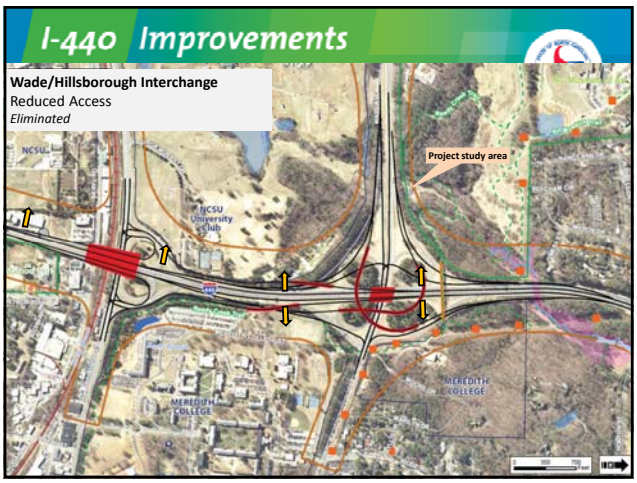
Wade Ave / Hillsborough St Interchange Area

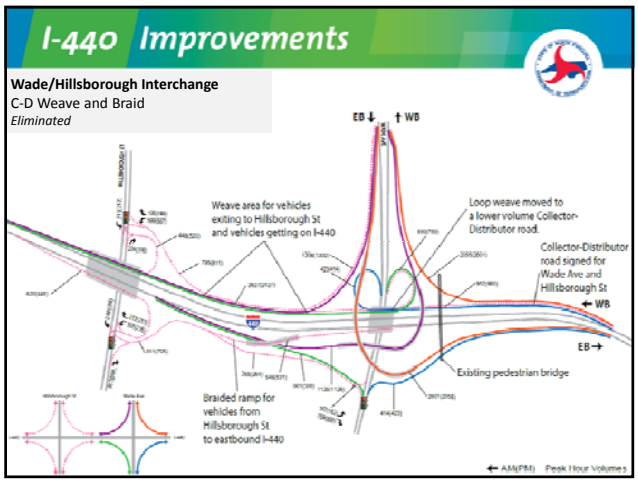


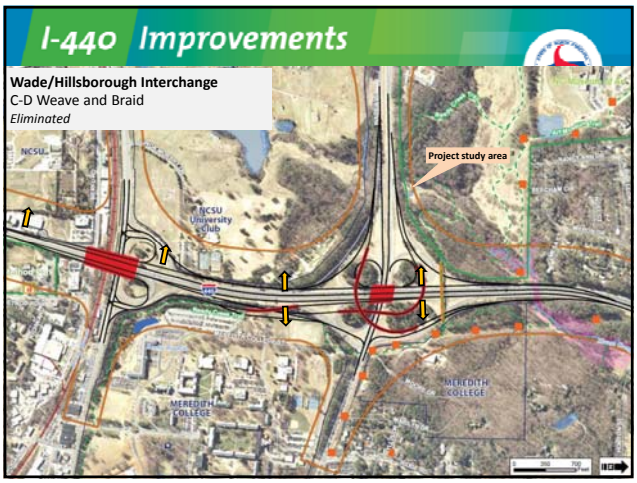

I-440 Improvements
WADE AVE/HILLSBOROUGH ST SKETCHES
Reduced Access
C-D Weave and Braid
Two Flyovers
One Flyover
Slight Detour

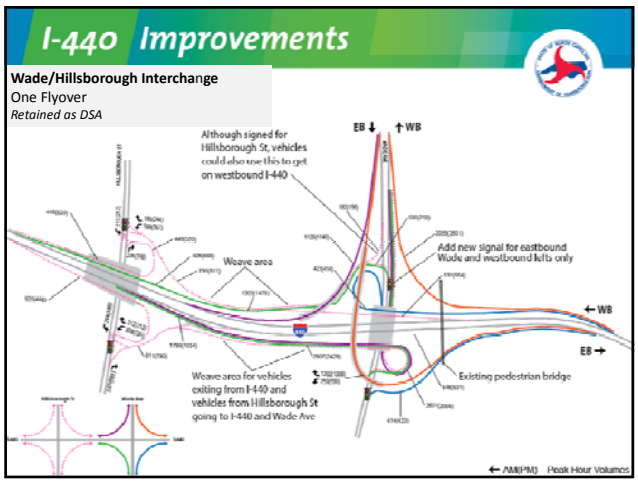

I-440 Improvements
Wade/Hillsborough Interchange
Existing Conditions
Project study area
NCSU
NCSU University Club
MEREDITH COLLEGE

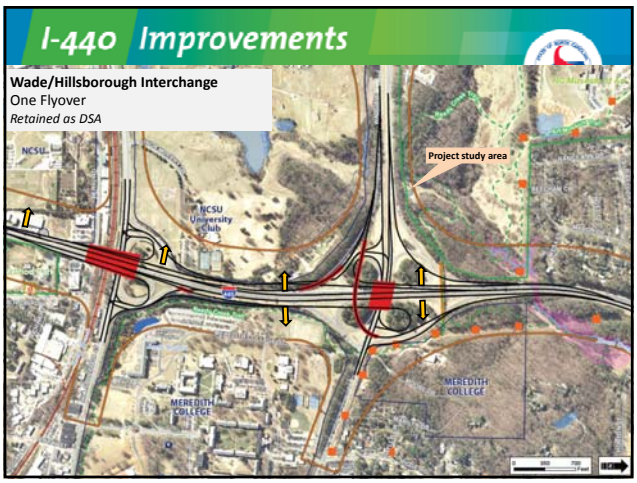

I-440 Improvements
Wade/Hillsborough Interchange
Reduced Access
Eliminated
No connection between Wade Ave and Hillaborough St (No pink dotted line connects these two roads.) Drivers would use Blue Ridge Rd and Faircloth St as the connecting roads.
EB
WB
New traffic signal on Wade Ave
WB
EB
Existing pedestrian bridge
Existing signal removed
AM/PM Peak Hour Volumes

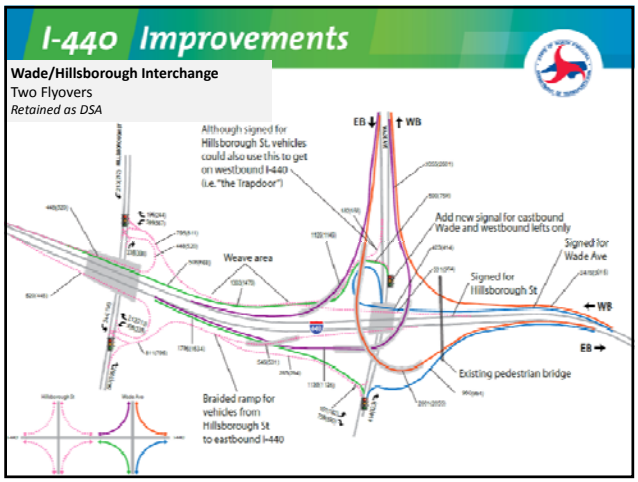

I-440 Improvements
Wade/Hillsborough Interchange
Reduced Access
Eliminated
Project study area
NCSU
NCSU University Club
MEREDITH COLLEGE

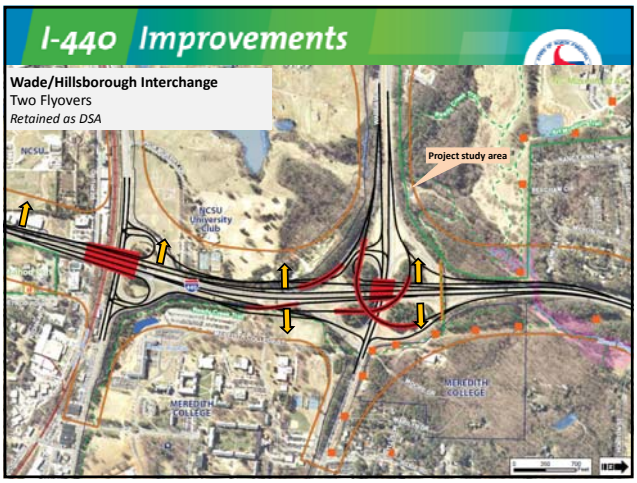

I-440 Improvements
Wade/Hillsborough Interchange
C-D Weave and Braid
Eliminated
EB
WB
Weave area for vehicles exiting to Hillsborough St and vehicles getting on I-440
Loop weave moved to a lower volume Collector-Distributor road.
Collector-Distributor road signed for Wade Ave and Hillsborough St
WB
EB
Existing pedestrian bridge
Braided ramp for vehicles from Hillsborough St to eastbound I-440
AM(PM) Peak Hour Volumes

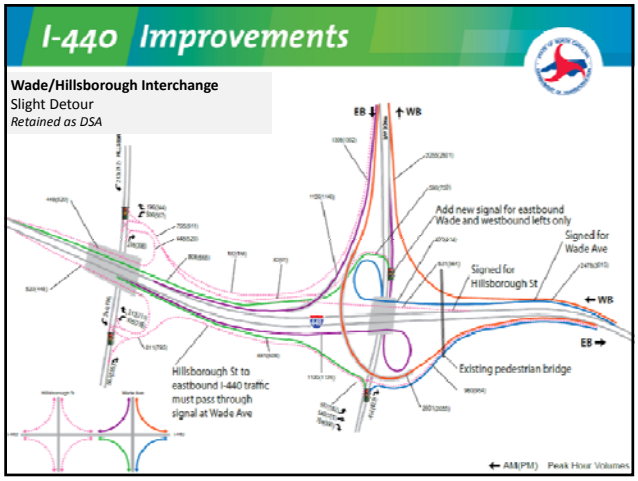

I-440 Improvements
Wade/Hillsborough Interchange
C-D Weave and Braid
Eliminated
Project study area
NCSU
NCSU University Club
MEREDITH COLLEGE

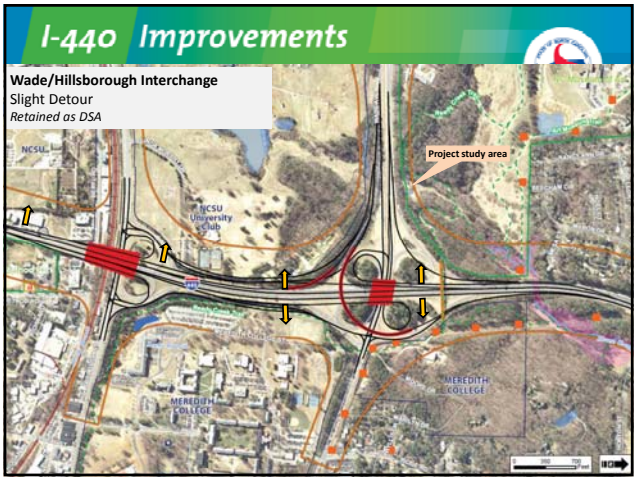

I-440 Improvements
Wade/Hillsborough Interchange
One Flyover
Retained as DSA
EB
WB
Although signed for Hillsborough St, vehicles could also use this to get on westbound I-440
Weave area
Add new signal for eastbound Wade and westbound lefts only
WB
EB
Weave area for vehicles exiting from I-440 and vehicles from Hillsborough St going to I-440 and Wade Ave
Existing pedestrian bridge
AM(PM) Peak Hour Volumes


I-440 Improvements
Wade/Hillsborough Interchange
One Flyover
Retained as DSA
Project study area
NCSU
NCSU University Club
MEREDITH COLLEGE


I-440 Improvements
Wade/Hillsborough Interchange
Two Flyovers
Retained as DSA
Although signed for Hillsborough St, vehicles could also use this to get on westbound I-440 (i.e. "the trapdoor")
EB
WB
Add new signal for eastbound Wade and westbound lefts only
Signed for Wade Ave
Weave area
Signed for Hillsborough St
WB
EB
Existing pedestrian bridge
Braided ramp for vehicles from Hillsborough St to eastbound I-440


I-440 Improvements
Wade/Hillsborough Interchange
Two Flyovers
Retained as DSA
Project study area
NCSU
NCSU University Club
MEREDITH COLLEGE


I-440 Improvements
Wade/Hillsborough Interchange
Slight Detour
Retained as DSA
EB
WB
Add new signal for eastbound Wade and westbound lefts only
Signed for Wade Ave
Signed for Hillsborough St
WB
EB
Existing pedestrian bridge
Hillsborough St to eastbound I-440 traffic must pass through signal at Wade Ave
AM(PM) Peak Hour Volumes


I-440 Improvements
Wade/Hillsborough Interchange
Slight Detour
Retained as DSA
Project study area
NCSU
NCSU University Club
MEREDITH COLLEGE

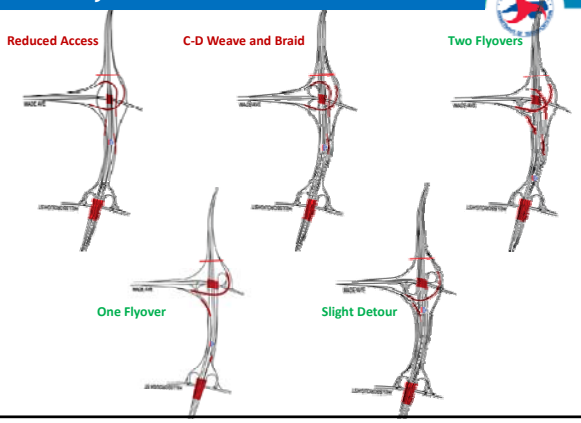
I-440 Improvements

Traffic Operations Comparison –
Wade Avenue and Hillsborough Street Interchange Area

	Year 2035 AM Peak Period (with Ridge Road intersection improvements)						Year 2035 PM Peak Period (with Ridge Road intersection improvements)					
	Widen Only	Reduced Access	CD Weave Braid	One Flyover	Two Flyovers	Slight Detour	Widen Only	Reduced Access	CD Weave Braid	One Flyover	Two Flyovers	Slight Detour
Network Avg Speed (mph)	29.7	40.1	39.0	39.7	39.6	38.1	31.7	39.7	38.4	41.0	40.0	39.6
Network Total Delay (hr)	2,205	906	1,021	953	963	1,099	1,865	1,088	1,242	943	1,042	1,047
Latent Demand (veh)	3,990	762	1,002	899	895	1,137	2,864	2,278	2,819	1,798	2,005	1,804
I-440 Average Speed (mph)	52.0	59.0	57.9	59.9	59.3	58.6	50.6	54.4	53.3	57.4	55.7	56.4
I-440 Vehicles Processed	31,931	33,328	33,196	33,246	33,242	33,136	31,997	31,844	31,467	32,380	32,194	32,338
Relative Average Rank	6.0	1.4	4.2	2.0	2.6	4.8	5.6	4.0	5.2	1.0	2.6	2.6

All build alts similar, and all improve operations compared to Widen Only
Build alts improve I-440 speeds in AM 6-8 mph and in PM 3-7 mph
Build alts improve network speeds in AM 8-10 mph and in PM 7-9 mph

Wade/Hillsborough Interchange Area - Summary

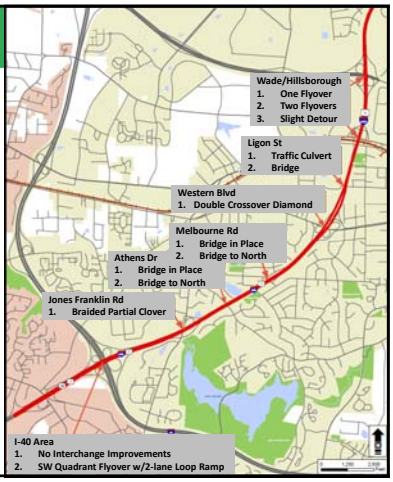


Concept Design – Wade Avenue and Hillsborough Street Interchange Area
One Flyover Alternative

Concept Design – Wade Avenue and Hillsborough Street Interchange Area
Two Flyovers Alternative

Concept Design – Wade Avenue and Hillsborough Street Interchange Area
Slight Detour Alternative

Summary of Recommended Detailed Study Alternatives



I-440 Improvements

Next Steps

- Finalize Detailed Study Alternatives – CP2
- Begin Preliminary Design
- Environmental Assessment – early 2016
- Public Hearing – early 2016
- FONSI – late 2016
- Let Date - Winter 2018

APPENDIX B

DRAFT RESPONSES TO ENVIRONMENTAL RESOURCE AND REGULATORY AGENCY COMMENTS

Environmental Resource and Regulatory Agencies
Responses to Comments

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-001	State Environmental Review Clearinghouse	General	Agency coordination	1	If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review.	Any further environmental review documents will be forwarded to the State Clearinghouse.
A-002	NC Department of Environmental Quality (NCDEQ)	General	Agency coordination	1	The Department encourages the applicant to continue to work with our agencies during the NEPA Merger Process and as this project moves forward.	NCDOT will continue to work with State regulatory agencies through the NEPA Merger Process.
A-003	NC Wildlife Resources Commission (NCWRC)	General	Wildlife and Habitat	1	NCDOT is proposing to improve I-440 from south of Walnut Street in Cary to east of Wade Avenue in Raleigh. This project is being planned under the NEPA/Section 404 Merger 01 process. WRC is represented in this process and comments provided in conjunction with this process have been documented. At this time, we do not have any additional concerns. Thank you for the opportunity to comment on this EA. If we can be of any further assistance please call me at (919) 707-0370.	Comment acknowledged.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	1	This project is being planned as part of the 404/NEPA Merger Process. As a participating team member, the NCDWR will continue to work with the team.	Comment acknowledged.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	2	House Creek, Bushy Branch, Simmons Branch, Lynn Branch and UT Silver Lake are class NSW (Nutrient Sensitive) waters of the State. The NCDWR is very concerned with sediment and erosion impacts that could result from this project. The NCDWR recommends that highly protective sediment and erosion control BMPs be implemented to reduce the risk of nutrient runoff to these streams and their tributaries. Additionally, to meet the requirements of NCDOT's NPDES permit NCS0000250 the NCDWR requests that road design plans provide treatment of the storm water runoff through best management practices as detailed in the most recent version of the *North Carolina Department of Transportation Stormwater Best Management Practices Toolbox* manual.	As discussed in Section 3.10.4 of the Environmental Assessment, prior to construction, an erosion and sedimentation plan will be developed for the Preferred Alternative in accordance with applicable rules, regulations and guidance. This plan will follow *Design Standards in Sensitive Watersheds* and *Neuse River Riparian Buffer Rule* s in accordance with NCDEQ and NCDOT guidance and best management practices. NCDOT's Post-Construction Stormwater Program manages long-term stormwater runoff from NCDOT projects to protect water quality. The requirements of the program would apply to any of the Detailed Study Alternatives since they all would increase the built-upon area. A Stormwater Management Plan will be prepared during final design of the project to direct the drainage design and manage long-term stormwater runoff. As part of the plan, NCDOT will implement new structural best management practices and non-structural pollution minimization measures.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	3	Walnut Creek, Lake Johnson, Rocky Branch and their tributaries are class NSW; 303(d) impaired waters of the State. The NCDWR is very concerned with sediment and erosion impacts that could result from this project. The NCWR recommends that the most protective sediment and erosion control BMPs be implemented in accordance with *Design Standards in Sensitive Watersheds* (15A NCAC 04B .0124) to reduce the risk of further impairment to these waters. Additionally, to meet the requirements of NCDOT's NPDES permit NCS0000250, the NCDWR requests that road design plans provide treatment of the storm water runoff through best management practices as detailed in the most recent version of the *North Carolina Department of Transportation Stormwater Best Management Practices Toolbox* manual.	See response to Comment #2 in Document A-004.

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	4	This project is within the Neuse River Basin. Riparian buffer impacts shall be avoided and minimized to the greatest extent possible pursuant to 15A NCAC 2B.0233. New development activities located in the protected 50-foot wide riparian areas within the basin shall be limited to "uses" identified within and constructed in accordance with 15A NCAC .02B .0295. Buffer mitigation may be required for buffer impacts resulting from activities classified as "allowable with mitigation" within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules. A buffer mitigation plan, coordinated with the North Carolina Division of Mitigation Services, must be provided to NCDWR prior to approval of the Water Quality Certification. Buffer mitigation may be required for buffer impacts resulting from activities classified as "allowable with mitigation" within the "Table of Uses" section of the Buffer Rules or require a variance under the Buffer Rules. A buffer mitigation plan, coordinated with the North Carolina Division of Mitigation Services, must be provided to NCDWR prior to approval of the Water Quality Certification.	NCDOT will obtain all required permits prior to project construction and will implement mitigation. During final design, the amount of buffer area required would be recalculated. As discussed in Section 3.10.4 of the Environmental Assessment, all Detailed Study Alternatives are estimated to impact more than the threshold of one-third acre of riparian buffer that requires mitigation. Written authorization will be required from the NCDWR for disturbance of riparian buffer areas prior to construction. Best management practices will be used to minimize disturbance, preserve aquatic life and habitat, and protect water quality. Mitigation may include payment of a fee to the Riparian Buffer Restoration Fund, donation of property or restoration or enhancement of a riparian buffer area, or other mitigation as approved by the NCDWR.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	5	The environmental documents and permit applications should provide a detailed and itemized presentation of the proposed impacts to wetlands and streams with corresponding mapping. If mitigation is necessary as required by 15A NCAC 2H.0506(h), it is preferable to present a mitigation plan with the environmental documentation. Appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.	The document titled *Methodology and Calculations for Impacts from the U-2719 Preliminary Designs to Jurisdictional Streams, Ponds, Wetlands, and Riparian Buffers* (April 2017) referenced in the Environmental Assessment (page 3-61) provides a detailed presentation of potential impacts to jurisdictional resources for each Detailed Study Alternative's preliminary design. The potential impacts to jurisdictional resources for the Preferred Alternative will be updated in the Finding of No Significant Impact (FONSI). A conceptual mitigation plan will be prepared for the Preferred Alternative. NCDOT has received agreement from the NCDEQ Division of Mitigation Services to provide compensatory mitigation through the in-lieu fee program.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	6	Environmental impact statement alternatives shall consider design criteria that reduce the impacts to streams and wetlands from storm water runoff. To meet the requirements of NCDOT's NPDES permit NCS0000250 these alternatives should include road designs that allow for treatment of the storm water runoff through best management practices as detailed in the most recent version of the North Carolina Department of Transportation Stormwater Best Management Practices Toolbox manual, which includes BMPs such as grassed swales, buffer areas, preformed scour holes, retention basins, etc.	See response to Comment #2 in Document A-004.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	7	After the selection of the preferred alternative and prior to an issuance of the 401 Water Quality Certification, the NCDOT is respectfully reminded that they will need to demonstrate the avoidance and minimization of impacts to wetlands (and streams) to the maximum extent practical. In accordance with the Environmental Management Commission's Rules (15A NCAC 2H.0506[h]). mitigation will be required for impacts of greater than 1 acre to wetlands. In the event that mitigation is required, the mitigation plan shall be designed to replace appropriate lost functions and values. The North Carolina Division of Mitigation Services may be available to assist with wetland mitigation.	NCDOT will work with NCDWR and the USACE to identify and provide all required mitigation to satisfy compensatory mitigation requirements for this project. A conceptual mitigation plan for the Preferred Alternative will be summarized in the Finding of No Significant Impact (FONSI). Itemized impacts to wetlands and streams by individual resource will be provided. Avoidance and minimization measures were incorporated into the preliminary engineering designs for the Detailed Study Alternatives, as summarized in Section 3.11.4 of the Environmental Assessment. For example, retaining walls are proposed where Walnut Creek crosses under I-440 to avoid impacts to this creek. Measures will be discussed with the environmental resource and regulatory agencies at the NEPA/404 Merger Team meeting for Concurrence Points 3 and 4a.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	8	In accordance with the Environmental Management Commission's Rules (l5A NCAC 2H.0506[h]), mitigation will be required for impacts of greater than 150 linear feet to any single stream. In the event that mitigation is required, the mitigation plan shall be designed to replace appropriate lost functions and values. The North Carolina Division of Mitigation Services may be available to assist with stream mitigation.	NCDOT will obtain all applicable permits, including a Section 404 Permit and associated 401 Water Quality Certification. Avoidance and minimization measures incorporated into the Preferred Alternative will be discussed in the Finding of No Significant Impact (FONSI).

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	9	Future documentation, including the 401 Water Quality Certification Application, shall continue to include an itemized listing of the proposed wetland, buffer, and stream impacts with corresponding mapping.	All impacts, corresponding mapping, and mitigation information will be included in the 401 Water Quality Certification Application submitted by NCDOT to NCDWR.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	10	The NCDWR is very concerned with sediment and erosion impacts that could result from this project. The NCDOT shall address these concerns by describing the potential impacts that may occur to the aquatic environments and any mitigating factors that would reduce the impacts.	See response to Comment #2 in Document A-004.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Secondary and cumulative impacts	11	An analysis of cumulative and secondary impacts anticipated as a result of this project is required. The type and detail of analysis shall conform to the NC Division of Water Resources Policy on the assessment of secondary and cumulative impacts dated April 10, 2004.	The *Final Indirect Screening Report* (March 2015) prepared for the project indicated a lower level of concern for indirect effect and recommended no further related studies.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	12	The NCDOT is respectfully reminded that all impacts, including but not limited to, bridging, fill, excavation and clearing, and rip rap to jurisdictional wetlands, streams, and riparian buffers need to be included in the final impact calculations. These impacts, in addition to any construction impacts. temporary or otherwise, also need to be included as part of the 401 Water Quality Certification Application.	All project impacts to jurisdictional resources, including short-term construction impacts, will be included in final impact calculations provided in the permit applications.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	13	Where streams must be crossed, the NCDWR prefers bridges be used in lieu of culverts. However. we realize that economic considerations often require the use of culverts. Please be advised that culverts should be countersunk to allow unimpeded passage by fish and other aquatic organisms. Moreover, in areas where high quality wetlands or streams are impacted, a bridge may prove preferable. When applicable, the NCDOT should not install the bridge bents in the creek, to the maximum extent practicable.	The final *Preliminary Hydraulics Study for Environmental Impact* (August 2017) prepared for the project recommends that culvert inverts be buried one foot below the channel bed.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	14	Whenever possible, the NCDWR prefers spanning structures. Spanning structures usually do not require work within the stream or grubbing of the stream banks and do not require stream channel realignment. The horizontal and vertical clearances provided by bridges shall allow for human and wildlife passage beneath the structure. Fish passage and navigation by canoeists and boaters shall not be blocked. Bridge supports (bents) should not be placed in the stream when possible.	Comment acknowledged. Since this is a widening project, most proposed structures are extensions of existing structures.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	15	Sediment and erosion control measures should not be placed in wetlands or streams.	Comment acknowledged.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	16	Borrow/waste areas should avoid wetlands to the maximum extent practical. Impacts to wetlands in borrow/waste areas will need to be presented in the 401 Water Quality Certification and could precipitate compensatory mitigation.	The design-build team will be required to acquire applicable permits relative to borrow pits and comply with requirements for borrow pits, dewatering, and any temporary work conducted in jurisictional areas.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	17	The 401 Water Quality Certification application will need to specifically address the proposed methods for stormwater management. More specifically, stormwater shall not be permitted to discharge directly into streams or surface waters.	The 401 Water Quality Certification application will include proposed methods for stormwater management.

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	18	Based on the information presented in the document, the magnitude of impacts to wetlands and streams will require an 404 Permit application to the Corps of Engineers and corresponding 401 Water Quality Certification. Please be advised that a 401 Water Quality Certification requires satisfactory protection of water quality to ensure that water quality standards are met and no wetland or stream uses are lost. Final permit authorization will require the submittal of a formal application by the NCDOT and written concurrence from the NCDWR. Please be aware that any approval will be contingent on appropriate avoidance and minimization of wetland and stream impacts to the maximum extent practical, the development of an acceptable stormwater management plan, and the inclusion of appropriate mitigation plans where appropriate.	NCDOT will obtain all required permits, including a Section 404 Permit and associated 401 Water Quality Certification. Avoidance and minimization measures incorporated into the Preferred Alternative will be detailed in the permit application.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	19	If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills.	Comment acknowledged.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	20	If temporary access roads or detours are constructed, the site shall be graded to its preconstruction contours and elevations. Disturbed areas shall be seeded or mulched to stabilize the soil and appropriate native woody species shall be planted. When using temporary structures the area shall be cleared but not grubbed. Clearing the area with chain saws, mowers, bush-hogs, or other mechanized equipment and leaving the stumps and root mat intact allows the area to re-vegetate naturally and minimizes soil disturbance.	Temporary access and haul roads, other than public roads, constructed or used in connection with the project shall be considered a part of the project and addressed in the erosion and sedimentation control plans developed by the design-build team.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	21	Unless otherwise authorized, placement of culverts and other structures in waters and streams shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and downstream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by the NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NCDWR for guidance on how to proceed and to determine whether or not a permit modification will be required.	The final *Preliminary Hydraulics Study for Environmental Impact* (August 2017) prepared for the project recommends that culvert inverts be buried one foot below the channel bed.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	22	If multiple pipes or barrels are required, they shall be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation, floodplain benches, and/or sills may be required where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.	The final design for the Preferred Alternative will be completed in accordance with the NCDOT Guidelines for Drainage Studies and Hydraulic Design.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Geotechnical	23	If foundation test borings are necessary; it shall be noted in the document. Geotechnical work is approved under General 401 Certification Number 3883/Nationwide Permit No.6 for Survey Activities.	If additional geotechnical investigations are needed, subsurface investigations, including borings, will be conducted in accordance with the current NCDOT Geotechnical Unit Guidelines and Procedures Manual.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	24	Sediment and erosion control measures sufficient to protect water resources must be implemented and maintained in accordance with the most recent version of North Carolina Sediment and Erosion Control Planning and Design Manual and the most recent version of NCS000250.	Comment acknowledged. The project's erosion and sediment control/stormwater pollution prevention plan will be implemented and maintained during the construction of the project in accordance with all applicable laws and regulations.

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	25	All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of the NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water.	NCDOT will implement approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities Manual.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	26	While the use of National Wetland Inventory (NWI} maps, NC Coastal Region Evaluation of Wetland Significance (NC-CREWS) maps and soil survey maps are useful tools, their inherent inaccuracies require that qualified personnel perform onsite wetland delineations prior to permit approval.	On-site wetland delineations within the project corridor were performed by qualified biologists on various dates from May 2013 through May 2016.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	27	Heavy equipment should be operated from the bank rather than in stream channels in order to minimize sedimentation and reduce the likelihood of introducing other pollutants into streams. This equipment shall be inspected daily and maintained to prevent contamination of surface waters from leaking fuels, lubricants, hydraulic fluids, or other toxic materials.	NCDOT will implement approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities Manual.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	28	Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed.	All appropriate measures will be taken to protect streams and aquatic life based on NCDOT standard practices. Rip rap is removed from streams where stream velocities are not erosive.
A-004	NC Division of Water Resources (NCDWR) Transportation Permitting Branch	General	Water resources	29	Riparian vegetation (native trees and shrubs) shall be preserved to the maximum extent possible. Riparian vegetation must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.	Appropriate measures will be taken to preserve and reestablish riparian vegetation to the maximum extent possible. NCDOT will require the design-build team to preserve trees, where possible, along the project. In addition, final designs will be prepared in accordance with BMPs from NCDOT's toolbox, which recommend the reestablishment of riparian vegetation
A-005	NC Division of Waste Management (NCDWM) Hazardous Waste Section	General	Hazardous materials	1	Any hazardous waste generated from the demolition, construction, operation. maintenance, and/or remediation (e.g. excavated soil) from the proposed project must be managed in accordance with the North Carolina Hazardous Waste Rules. The demolition, construction, operation, maintenance, and remediation activities conducted will most likely generate a solid waste and a determination must be made whether it is a hazardous waste. If a project site generates more than 220 pounds of hazardous waste in a calendar month, the HWS must be notified, and the site must comply with the small quantity generator requirements. If a project site generates more than 2200 pounds of hazardous waste in a calendar month, the HWS must be notified, and the facility must comply with the large quantity generator requirements.	NCDOT will comply with the NC Hazardous Waste Rules.
A-006	NC DWM Inactive Hazardous Sites Branch - Central Unit	General	Hazardous materials	1	Five sites were identified within one mile of the project as shown on the attached map and in the table below. The Superfund Section recommends that site files be reviewed to ensure that appropriate precautions are incorporated into any construction activities that encounter potentially contaminated soil or groundwater. Superfund Section files can be viewed at: http://deq.nc.gov/waste-management-laserfiche	The NCDOT GeoEnvironmental Unit investigated the project study area to identify hazardous material sites of concern (April 2017), as summarized in Section 3.8 of the Environmental Assessment (EA). No sites with high risks to cost or schedule were identified. As stated on Page 3-33 of the EA, a more detailed field reconnaissance for hazardous waste/material sites will be conducted for the Preferred Alternative. Soil and groundwater assessments will be conducted on each potentially contaminated property identified within the Preferred Alternative before right-of-way acquisition in order that the degree and extent of contamination can be assessed.
A-007	NC DWM Solid Waste Section	General	Solid waste	1	Based on the information provided, the Section does not see an adverse impact on the surrounding community and likewise knows of no situations in the community, which would affect this project.	Comment acknowledged.

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-007	NC DWM Solid Waste Section	General	Solid waste	2	During the land clearing, demolition and construction for this project, the NCDOT and/or its contractors should make every feasible effort to minimize the generation of waste, to recycle materials for which viable markets exist, and to use recycled products and materials in the development of this project where suitable. Any waste generated by this project that cannot be beneficially reused or recycled must be disposed of at a solid waste management facility permitted by the Division. The Section strongly recommends that the NCDOT require all contractors to provide proof of proper disposal for all generated waste to permitted facilities.	NCDOT will require all contractors to provide proof of proper disposal for all generated waste to permitted facilities.
A-008	NC DEQ Raleigh Regional Office	General	Air quality	1	PERMITS: Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900.	NCDOT and the design-build team will comply with all applicable regulations and ordinances related to open burning and fugitive dust control in effect at the time of construction.
A-008	NC DEQ Raleigh Regional Office	General	Water resources	2	PERMITS: The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres are to be disturbed. Plans must be filed with and approved by applicable Regional Office (Land Quality Section) at least 30 days before beginning activity. A NPDES Construction Stormwater permit (NCG010000) is also usually issued should design features meet minimum requirements. A fee of $65 for the first acre or any part of an acre. An express review option is available with additional fees.	NCDOT acknowledges that an erosion and sedimentation control plan will be required prior to any land disturbing activities.
A-008	NC DEQ Raleigh Regional Office	General	Water resources	3	PERMITS: Compliance with Catawba, Goose Creek, Jordan Lake, Randleman, Tar Pamlico or Neuse Riparian Buffer Rules is required.	Comment acknowledged. Riparian buffer impacts and permits are discussed in Section 3.10.4 of the Environmental Assessment.
A-008	NC DEQ Raleigh Regional Office	General	Water supply	4	PERMITS: Abandonment of any wells, if required must be in accordance with Title 15A. Subchapter 2C.0100.	Comment acknowledged.
A-008	NC DEQ Raleigh Regional Office	General	Hazardous materials	5	PERMITS: Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.	The proper regional office will be notified if orphan USTs are discovered.
A-008	NC DEQ Raleigh Regional Office	General	Water supply	6	PERMITS: Plans and specifications for the construction, expansion, or alteration of a public water system must be approved by the Division of Water Resources/Public Water Supply Section prior to the award of a contract or the initiation of construction as per 15A NCAC 18C .0300 et. seq., Plans and specifications should be submitted to 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. All public water supply systems must comply with state and federal drinking water monitoring requirements. For more information, contact the Public Water Section, (919) 707-9100.	Comment acknowledged.
A-008	NC DEQ Raleigh Regional Office	General	Water supply	7	PERMITS: If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section at 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. For more information, contact the Public Water Supply Section, (919) 707-9100.	Existing water lines likely will be relocated to construct the project. Plans will be submitted to the NCDWR Public Water Supply Section as required.
A-009	NC Department of Transportation (NCDOT) Transportation Planning Branch	General	Traffic	1	As a result of this review the following is submitted: No Comment	Comment acknowledged.
A-010	NC Natural Heritage Program (NHP)	General	Wildlife and Habitat	1	As a result of this review the following is submitted: No Comment	Comment acknowledged.
A-011	NC Department of Administration (NCDOA) - Commission of Indian Affairs	General	Indian affairs	1	As a result of this review the following is submitted: No Comment	Comment acknowledged.

Doc. No	Agency/ Organization	Location	Topic	Comment No.	Comment	Response
A-012	NCDEQ Division of Emergency Management - Floodplain Management Program	General	Water resources	1	As a result of this review the following is submitted: No Comment	Comment acknowledged.
A-013	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS)	General	Wildlife and Habitat	1	Based on the information in the public notice, the proposed project would NOT occur in the vicinity of essential fish habitat (EFH) designated by the South Atlantic Fishery Management Council, Mid-Atlantic Fishery Management Council, or the NMFS. Present staffing levels preclude further analysis of the proposed work and no further action is planned. This position is neither supportive of nor in opposition to authorization of the proposed work.	Comment acknowledged.
A-013	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS)	General	Wildlife and Habitat	2	Please note these comments do not satisfy consultation responsibilities under Section 7 of the Endangered Species Act of 1973, as amended. If an activity "may effect" listed species or critical habitat under the purview of the NMFS, please initiate consultation with the Protected Resources Division at the letterhead address.	The project study area was surveyed for protected species, as summarized in Section 3.12.2 of the Environmental Assessment. Only one species, the Northern long-eared bat, was determined to have a May Affect, Likely to Adversely Effect determination from any of the Detailed Study Alternatives because the project is located in eastern North Carolina. The Northern long-eared bat is a mammal, and this animal and its habitat are not under the purview of the NMFS.
A-014	US Fish and Wildlife Service (USFWS)	General	Other	1	I have no comments on the PN for U-2719.	Comment acknowledged.

APPENDIX C

DRAFT RESPONSES TO COMMON COMMENTS RECEIVED FROM THE PUBLIC AND ORGANIZATIONS

COMMON COMMENTS

DRAFT
1/21/18

Location	Topic	Comment No.	Common Comment	Response
Arboretum	Construction	Arboretum Common #1	Maintain access to Beryl Road during the construction process.	NCDOT expects Beryl Rd would be closed for a short period of time to do bridge demolition and to set bridge beams for the new I-440 bridge over Hillsborough St/Beryl Rd/railroad tracks. NCDOT would restrict those activities to weekends or nights to ensure Beryl Rd is open to traffic during business operations. Overall, there may be a few weekends or nights where Beryl Rd would be closed. The Raulston Arboretum and other property owners along Beryl Road will be notified in advance when closures are expected and NCDOT will work with the Arboretum regarding accommodating important arboretum events. In addition, NCDOT will coordinate the construction of the Ligon St crossing with construction activities along Beryl Rd and plans to let both the I-440 project and the Blue Ridge Road grade separation project (U-4437) to the same design-build contractor so that these two projects and their plans to maintain traffic during construction can be coordinated.
Athens	Right of way	Athens Dr Common #1	Will impacted property owners be fairly compensated?	NCDOT tries to minimize right of way impacts as much as possible. Measures to reduce the right of way needs and relocations caused by the project will continue to be investigated through final design. NCDOT will follow their established processes for acquiring property and assisting residents and businesses in relocation, as described on page 3-4 of the EA. NCDOT pays fair market value for all property purchased. In addition, for renters and homeowners who are relocated by the project, NCDOT offers several programs to minimize the inconvenience of relocation.
Athens	Construction	Athens DrCommon #2	Travelers use the Athens Drive bridge to access Athens Drive High School, Thomas Crowder Wetland Center, Lake Johnson Park and other facilities. How will access be maintained, especially if the Melbourne Road bridge also is closed.	Under the Replace Bridge to North Alternative, access for motorists, bicyclists, and pedestrians would be maintained on the existing bridge during construction, with brief closures. Under the Replace Bridge in Place Alternative, motorists would need to use an offsite detour, which will be identified during the construction phase. For bicyclists and pedestrians, access across I-440 at Athens Drive during construction will be addressed during final design and finalized during the construction phase by the design-build team. A temporary bus service across I-440 during bridge closure could be one potential solution. The costs of a temporary bus service would be less than the cost difference between the Replace Bridge in Place and Replace Bridge to North Alternatives (approximately $1.3 million).
Hillsborough-Wade	Right of way	Hillsborough-Wade Common #1	The proposed alternatives take too much land from the University Club and will destroy the club's facilities, which may force it to close. Please consider alternatives that take less land.	Typically, detailed measures to minimize right of way are investigated during the final design process. NCDOT has heard the concerns from the public and area stakeholders regarding the preliminary designs at the Wade Ave and Hillsborough St interchanges and explored ways to minimize estimated right of way needs prior to final design, as presented in the FONSI. Efforts will continue through final design to minimize impacts.

COMMON COMMENTS

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1/21/18

Location	Topic	Comment No.	Common Comment	Response
Hillsborough-Wade	Noise, Air quality, Water resources	Hillsborough-Wade Common #2	The proposed project would bring traffic, traffic noise, and air pollution close to University Club facilities. Also concern about water runoff and control.	The I-440 mainlines will be closer to University Club facilities, and noise levels would be louder in 2035 peak hours compared to the no-build alternative. However, a noise wall was evaluated and determined to not be reasonable based on established FHWA and NCDOT criteria. Regarding air quality (see EA Section 3.6), Wake County is currently meeting the established standards for the six pollutants for which National Ambient Air Quality Standards have been established (for example, carbon monoxide, particulate matter, and ozone) and a project-level analysis of these pollutants is not required. Mobile source air toxics also were addressed. Overall, due to required controls on fuel and engines, air toxic emissions are projected to decrease approximately 88 percent between 2012 and 2035 under both the build and no-build scenarios. The widening will require the clearing of vegetation along the corridor, but disturbed areas will be revegetated. Runoff is discussed in Section 3.10.4 of the EA. For runoff during construction, the project will follow Design Standards in Sensitive Watersheds and Neuse River Riparian Buffer Rules to prevent water pollution, soil erosion, and stream siltation. Also, a Stormwater Management Plan will be prepared during final design of the project to direct the drainage design and manage long-term stormwater runoff.
Hillsborough-Wade	Right of way	Hillsborough-Wade Common #3	How will the University Club be compensated for their losses?	Due to the ownership and lease arrangements for this land, the issue of compensation for right of way acquisition is complex. NCDOT will work with the University Club, NCSU, and NCSU Foundation to explore potential options for relocation of University Club facilities through the right-of-way acquisition process and will continue to look for ways to reduce the project's right of way needs through final design.
Hillsborough-Wade	Right of way	Hillsborough-Wade Common #4	How will the University Club employees be compensated for loss of their jobs?	NCDOT does not work with individual employees of a business. It is the responsibility of the University Club to decide what amenities it will provide on their site after right of way acquisition, and the employees it needs for those amenities. NCDOT will work with the University Club, NCSU, and NCSU Foundation to explore potential options for relocation of University Club facilities through the right-of-way acquisition process and will continue to look for ways to reduce the project's right of way needs through final design.
Hillsborough-Wade	Safety	Hillsborough-Wade Common #5	A safety wall should be built to protect the University Club, especially the pool.	Under any of the Detailed Study Alternatives, right of way fencing will be installed along the right of way boundary for the project. The University Club could construct their own walls or barriers adjacent to the right of way. For the Detailed Study Alternatives, the pavement of the off-ramp to Hillsborough St is approximately 150 feet from the pool.
Hillsborough-Wade	Right of way	Hillsborough-Wade Common #6	All the alternatives take too much land from Meredith College and would impact Meredith College commuter parking and athletic field. Can the project be shifted entirely off Meredith's campus?	Typically, detailed measures to minimize right of way are investigated during the final design process. NCDOT has heard the concerns from the public and area stakeholders regarding the preliminary designs at the Wade Ave and Hillsborough St interchanges and explored ways to minimize estimated right of way prior to final design, as presented in the FONSI. Efforts will continue through final design to minimize impacts.

Location	Topic	Comment No.	Common Comment	Response
Hillsborough-Wade	Noise, Air quality	Hillsborough-Wade Common #7	The project will bring noise and fumes closer to the Meredith College campus .	It should be noted that Meredith College is adjacent to existing I-440, and receives noise from the existing roadway. The proposed I-440 would move the mainlines of I-440 (which generate more noise compared to the ramps) farther away from campus, so the noise generated by the additional mainlines of traffic are countered by the relocation of the mainlines farther from campus. The Traffic Noise Assessment prepared for the Detailed Study Alternatives assessed traffic noise to the Meredith College campus. The Oaks residences and the academic buildings on the western side of campus were included in the computer models of existing and future noise levels. These areas are projected to have a 1-2 decibel increase from existing noise levels to 62-63 dBA Leq in the 2035 peak hour with any of the Detailed Study Alternatives. The projected 2035 peak hour noise levels at The Oaks and the academic buildings would be below the 66 dBA Leq peak hour noise level at which FHWA regulations require consideration of noise abatement in residential areas and schools. Projected year 2035 future noise levels on the athletic field would range from 62 dBA Leq to 70 dBA Leq without the project and 64 dBA Leq to 70 dBA Leq with the project. The athletic field area was evaluated for a noise wall. Based on the traffic noise assessment and the FHWA and NCDOT criteria used to evaluate the reasonableness and feasibility of a noise wall for a particular location, no noise walls are recommended adjacent to the Meredith College campus. Regarding vehicle emissions, the project is part of the region's 2040 Metropolitan Transportation Plan, which is evaluated in whole to ensure that implementation of the projects in the plan would not cause or contribute to any violations of the National Ambient Air Quality Standards for the region. For localized emissions of pollutants, the project is projected to improve traffic flow compared to the no-build alternative, which helps air quality by reducing idling vehicles.
Hillsborough-Wade	Lighting	Hillsborough-Wade Common #8	The lighting masts for the proposed project will be a visual impact to the Meredith College campus and the lights may cause light pollution on campus.	A Lighting Scope of Work will be provided to the design-build teams. Standard 100-ft high mast poles and 45-ft light poles generally are used for interchange lighting design. However, other types of lighting can be considered where warranted, such as 30-ft mounting height single-arm light standards and/or twin-arm light standards . The 30-ft light masts and the light fixtures can be painted black to make them less visually obtrusive. The lighting design requirements will specify use of International Dark-Sky Association (IDA) Approved Lighting Fixtures. The IDA's Fixture Seal of Approval program certifies outdoor lighting fixtures as being Dark Sky Friendly, meaning that they minimize glare while reducing light trespass and skyglow. Lighting design will also specify light fixtures to minimize the quantity of backlight, uplight and glare from the fixtures. During construction, the NCDOT Roadway Lighting Squad is available to come on site to collect ground level foot-candle measurements prior to and during construction for comparison and provide this information to Meredith College. Balloon light towers or LED light towers can be considered as an alternative to the traditional metal halide construction light tower.

Location	Topic	Comment No.	Common Comment	Response
Hillsborough-Wade	Historic resources and land use	Hillsborough-Wade Common #9	The construction and operation of all three alternatives for the Wade Avenue/Hillsborough Street area will negatively affect Meredith College's National Register eligible historic district. The project would compromise Meredith College's ability to continue growing in a manner consistent with the college's 126-year mission and campus master plan, “a state-recognized Designed Historic Landscape," that we have followed for over 50 years.	In a letter dated August 2, 2017, the NC State Historic Preservation Office (HPO) agreed to an expanded boundary for the portion of Meredith College determined eligible for the National Register of Historic Places, as shown in the FONSI. On August 22, 2017, the NC State Historic Preservation Office (NC HPO) reviewed the preliminary designs presented in the EA in relation to the expanded boundary and determined that the proposed Detailed Study Alternatives would have No Effect (One Flyover) or No Adverse Effect (Slight Detour and Two Flyovers) on the historic property. As a condition of the determination of No Adverse Effect for the alternatives on the historic area of Meredith College, the NC Historic Preservation Office requires that NCDOT prepare and install a landscape plan along the western side of Meredith College campus in consultation with Meredith College. This also will help mitigate changes in the visual landscape caused by the project.
Hillsborough-Wade	Design	Hillsborough-Wade Common #10	Eliminate the interchange at Hillsborough Street.	The interchange at Hillsborough St is not proposed to be eliminated. Local government stakeholders responsible for transportation planning for the region, the Capital Area Metropolitan Planning Organization (CAMPO) and City of Raleigh, support retaining the interchange. Eliminating this interchange would redistribute this traffic to other area roadways such as Wade Ave, Faircloth St, Western Blvd, and Blue Ridge Rd, which already carry high volumes of traffic.
Hillsborough-Wade	Construction	Hillsborough-Wade Common #11	Construction noise and lights will impact students at Meredith College. How will construction noise be abated for the students who live in The Oaks residence hall? How will security of the campus be maintained during construction?	DOT will explore cost effective and practicable ways to reduce construction noise at night. Measures to reduce construction noise are discussed in Section 3.5.6 of the Environmental Assessment (EA). During construction, the public will be notified of upcoming construction activities through the regular construction updates expected to be released to the public. For example, on the Fortify project to reconstruct I-40, updates were released every Friday for the upcoming week. The construction area would be fenced off during construction. Any construction-related access needed through the Meredith College campus would not occur without the permission of and coordination with Meredith College. NCDOT will work with Meredith College during construction to address any security concerns.
Hillsborough-Wade	Parks and greenways	Hillsborough-Wade Common #12	What will happen to the Reedy Creek Greenway on the Meredith College campus?	The Reedy Creek Greenway will be replaced, as described in the FONSI. Temporary closures of short duration (e.g. days rather than weeks or months) are anticipated during construction, but will be minimized to the extent practicable.
Hillsborough-Wade	Public Transit	Hillsborough-Wade Common #13	The money for this project would be better spent for public transit, such as light rail or a subway system.	The proposed project is being designed to accommodate traffic forecasted for the year 2040, as described in the FONSI, and is part of the overall set of transportation projects of all modes proposed for the Raleigh region. Transportation investments in the area are described in the region's 2040 long range transportation plan, which plans for all modes of transportation for the next 25 years, including public transit. This long range plan is prepared by the Capital Area Metropolitan Planning Organization (CAMPO). GoTriangle and GoRaleigh also are actively operating and planning transit services for the region.

Location	Topic	Comment No.	Common Comment	Response
Hillsborough-Wade	Visual resources and Land use	Hillsborough-Wade Common #14	The report does not address the visual impacts of highway infrastructure and flyover bridges on Meredith College's campus.	Section 3.2 of the EA addresses visual resources both from I-440 and to I-440. The EA (page 3-10) also states that "At Meredith College, the view on the western side of campus would be changed to include new fill slopes under all alternatives and the single flyover ramp structure under the One Flyover Alternative and Slight Detour Alternative and the two flyover ramp structures under the Two Flyovers Alternative." It should also be noted that as a condition of the determination of No Adverse Effect for the Preferred Alternative on the historic area of Meredith College, the NC State Historic Preservation Office requires that NCDOT prepare and install a landscape plan along the western side of Meredith College campus in consultation with Meredith College. This also will help mitigate changes in the visual landscape caused by the project.
Hillsborough-Wade	Visual resources and Land use	Hillsborough-Wade Common #15	Move the roadway improvements east to avoid impacts to University Club property. Or inversely, move the roadway improvements more to the west to avoid impacts to Meredith College property.	The proposed alignment of widened I-440 is shifted somewhat to the west (onto the University Club side) of the existing mainlines. There are many constraints in this area to the east and west and the proposed alignment "threads the needle" as best it can through the area. **Shifting to the east**. Shifting the alignment east on top of existing I-440 would cause impacts at Method Community Park, which is also the Berry O'Kelly School Historic District. In addition, widening in this area on top of existing I-440 would make maintenance of traffic through the area during construction more difficult. **Shifting more to the west**. Shifting more to the west would impact Museum Park, which is afforded special protection under federal laws. Shifting west also would require relocating the Reedy Creek pedestrian bridge and would impact several homes in the Meredith Woods neighborhood. In addition, shifting more to the west would bring the Wade Ave/I-440 interchange too close to the Wade Ave/Blue Ridge Rd interchange. At the Hillsborough St end, shifting the alignment farther west would impact the Oak Grove Cemetery near Ligon St, which has been determined eligible for listing on the National Register of Historic Places.
Jones Franklin	Right of way	Jones Franklin Rd Common #1	Concern about the estimated relocation of 23 residences and the Learn With The Best special needs school.	Measures to reduce the right of way needs and relocations caused by the project will continue to be investigated through final design. NCDOT will follow their established processes for acquiring property and assisting residents and businesses in relocation, as described on page 3-4 of the EA. For renters and homeowners who are relocated by the project, NCDOT offers several programs to minimize the inconvenience of relocation. In addition, as stated on page 3-6 of the EA, NCDOT will work closely with the Learn with the Best private school to reduce the possibility of any lapse in availability of services to the community provided by this facility.
Jones Franklin	Design	Jones Franklin Common Rd #2	The proposed median to the north of I-440 extends too far north and prevents residents from turning left into and out of their driveways.	The addition of the median will improve traffic flow and make turning movements safer. Along Jones Franklin Rd north of I-440, there will be median breaks with U-turn opportunities at Barringer Rd and at the signalized ramp intersection. These two locations are approximately 750 feet apart. Changing the proposed concrete median north of Barringer Drive to a painted median will be considered during final design.

Location	Topic	Comment No.	Common Comment	Response
Jones Franklin	Design	Jones Franklin Rd Common #3	The proposed median to the south that prevents left turns into and out of the Sonner Aquatic Facility is not safe or convenient.	The addition of the median will improve traffic flow and make turning movements safer. South of I-440, if no median is installed, vehicles wanting to turn left out of the Sonner Aquatic facility to head south would have to turn against two lanes of oncoming northbound traffic and then merge in with the two lanes of southbound traffic. With a median, traffic to/from the aquatic facility would travel slightly farther to the Denise Drive signalized intersection or to the u-turn provided to the north. In both locations, vehicles would be turning only with traffic going the same way. This is a safer configuration. However, the placement of median breaks south of I-440 will be reevaluated during final design.
Jones Franklin	Bicycles/ pedestrians	Jones Franklin Rd Common #4	Incorporate accommodations for bicycles and pedestrians.	The project would make improvements to Jones Franklin Road in the interchange area that include widening Jones Franklin Rd to four lanes with a median, adding sidewalks and bicycle lanes (subject to cost-sharing with the City of Raleigh), and accommodating a future multi-use path on the Jones Franklin Rd bridge over I-440.
Ligon	Bicycles/ pedestrians	Ligon St Common #1	This crossing needs to accommodate bicyclists and pedestrians.	The two-lane bridge would have an anticipated 25 mph speed limit and also have sidewalks. The low speed and relatively low volume of traffic on this roadway would be a safe alternative for bicycles, especially compared to the Extend Existing Traffic Culvert Alternative. The Extend Existing Traffic Culvert Alternative would not include any pedestrian or bicycle accommodations.
Ligon	Traffic	Ligon St Common #2	The bridge alternatives will increase traffic in the neighborhood.	A small area traffic forecast was completed for the Method neighborhood area, as described in Section 4.4 of the EA under the subheading Method Neighborhood. As discussed on Page 4-8, Ligon St would see increased traffic if a two-lane bridge were built and the road was connected to Blue Ridge Rd. However, traffic on Method Rd through the heart of the neighborhood would be about the same with or without the project (about 9,300 to 9,500 vehicles per day in 2035) as any additional traffic that may be attracted to use Method Rd as a cut-through is offset by traffic that would now stay on Ligon St to/from Gorman St as a more convenient route.
Ligon	Alternatives	Ligon St Common #3	Close the culvert, it is out of date and unnecessary and a waste of money.	The existing Ligon St traffic culvert provides an important connection between the historic Oak Grove Cemetery and the churches and residents of the Method neighborhood. Ligon St also provides a connection between NCSU research facilities. In addition, the City of Raleigh has future plans to connect Ligon St to Blue Ridge Rd. It is not practical to entirely close this connection.

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Location	Topic	Comment No.	Common Comment	Response
Melbourne	Design	Melbourne Rd Common #1	Keep the Melbourne Road bridge but eliminate the interchange ramps.	NCDOT balances multiple factors, including public input, in developing Detailed Study Alternatives for a project and in selecting the alternatives to implement. The Detailed Study Alternatives at Melbourne Road and the decision to retain the interchange ramps were developed based on a number of factors, including considerations related to roadway design, impacts from the proposed alternatives, traffic operations, and input from the public and agencies such Federal Highway Administration, City of Raleigh, and the Capital Area Metropolitan Planning Organization. Public input was received at the two open house meetings as well as at several small group meetings with local organizations (for example, the West Citizens Advisory Council and the Combs Elementary School PTA). In general, urban highly developed areas benefit from as much access and connectivity as practicable to provide options for travelers. No options that remove the interchange ramps are planned at this time. Additional information about the final designs and construction activities will be shared with the public by NCDOT and the design-build team as the project progresses.
Melbourne	Design	Melbourne Rd Common #2	Keep the Deboy St connection open on the Melbourne Rd off ramp from westbound I-440	The connection of Deboy St to the off-ramp will be closed because current FHWA policy does not allow for breaks in access control along a freeway ramp for features such as side streets or driveways to connect to a ramp.
Melbourne	Design	Melbourne Rd Common #3	Traffic signals are not needed at the ramp intersections with Melbourne Rd	The traffic signals shown on the Public Hearing Map at the I-440 ramp intersections at Melbourne Rd were incorrect. Traffic operations analysis for the year 2035 recommended stop signs as sufficient for these intersections. Traffic signals will not be installed in these locations as part of the project.
Melbourne	Design	Melbourne Rd Common #4	Do not widen Melbourne Road.	The Detailed Study Alternatives at the Melbourne Rd interchange shown in the EA and the Public Hearing both proposed widening the bridge over I-440 to three lanes to accommodate a left turn lane for the on-ramp to eastbound I-440 and a left turn at Kaplan Rd. During the public review period, the City of Raleigh requested that Melbourne Rd remain two lanes wide with bicycle lanes and sidewalks. This design change will be made during final design, as discussed in the Finding of No Significant Impact (FONSI).
Melbourne	Design	Melbourne Rd Common #5	Do not add bicycle lanes to Melbourne Road.	Sidewalks and lane width for bicycle lanes on the bridge are included at the request of the City of Raleigh. Melbourne Rd is a signed bicycle route.
Western	Alternatives	Western Blvd Common #1	Were any other designs considered? The proposed design will be too confusing to drivers.	The Double Crossover Diamond was the best solution to carry the projected traffic volumes and turning movements at this interchange location. Pages 2-9 and 2-10 of the EA describe the other alternatives initially evaluated for the Western Blvd interchange and the reasons they were eliminated from further study. It may take drivers a few times navigating a double crossover diamond until they feel comfortable, but these interchanges are well-signed. The double crossover diamond looks more complicated from above then when actually driving it. Over time, drivers will become familiar with the interchange design, as they have at other locations around the state. There is a poster titled How to Navigate A Double Crossover Diamond available on the project website that shows how to navigate a double crossover diamond. The project website is www.ncdot.gov/projects/i-440improvements. In addition, NCDOT has a video on their YouTube channel showing how this type of interchange works.

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Location	Topic	Comment No.	Common Comment	Response
Western	Bicycles/ pedestrians	Western Blvd Common #2	The interchange needs to accommodate bicyclists and pedestrians.	There is an existing multi-use path through the interchange area. The multi-use path will be replaced and sidewalk will be constructed to accommodate pedestrians and bicyclists through the proposed interchange. Options for the path and sidewalk include along the sides of Western Blvd or through the median. This will be decided during final design.
Western	Cost/funding	Western Blvd Common #3	The proposed design is too expensive.	Much of the cost associated with this interchange is the need to reconstruct the stormwater drainage system, which would be necessary for each alternative.