

SOUTH CREEK MIXED-USE DEVELOPMENT

TRANSPORTATION IMPACT ANALYSIS

EXECUTIVE SUMMARY



Prepared for:

The Town of Chapel Hill
Public Works Department - Engineering

Prepared by:

HNTB North Carolina, PC

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Suite 200
Raleigh, NC 27609*

NCBELS License #: C-1554

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Project Overview

A mixed-use residential and commercial development known as South Creek, to be located on the east side of US 15-501 across from Southern Village and Southern Community Park, is being proposed in Chapel Hill. The project proposes to construct multiple residential multi-story condominium and townhouse buildings featuring 650 total units with approximately 42,000 square feet of new office/commercial retail space included. **Figure ES-1** shows the general location of the site. The project is anticipated to be fully complete by 2028. This report analyzes the complete build-out scenario for the year 2029 (one year after anticipated completion), the no-build scenario for 2029, as well as 2022 existing year traffic conditions.

The proposed preliminary site plan shows three vehicular access point along US 15-501, one forming the fourth leg to Market Street, one forming the fourth leg to Sumac Drive and a third restricted access connection north of Market Street. This study will analyze two access scenarios for the Sumac Drive connection – allowing a full access median break at this location and comparing that to a “left-over” access concept with left-turns allowed from US 15-501 to the minor streets but right-turns only allowed exiting the two streets. There is no current access break at this intersection. All access driveways will service internal site driveways and alleys that connect to on-site parking decks or surface parking facilities. **Figure ES-2** displays the preliminary concept plan of the South Creek Mixed-Use and nearby land uses and roadways.

Study Area Summary

This report analyzes and presents the transportation impacts that the South Creek Mixed-Use development will have on the following existing and future intersections in the project study area:

- NC 86 (S. Columbia Street) & NC 54 Bypass (Fordham Boulevard) Westbound Ramps
- US 15-501 & NC 54 Bypass (Fordham Boulevard) Eastbound Ramps
- US 15-501 & Culbreth Road / Mt. Carmel Church Road
- US 15-501 & Arlen Park Drive / Bennett Road
- US 15-501 & Proposed Limited Access Site Driveway #1
- US 15-501 & Market Street / Proposed Site Driveway #2
- US 15-501 & Sumac Drive / Proposed Site Driveway #3
- US 15-501 & Dogwood Acres Drive
- US 15-501 & Smith Level Road

The study area contains seven signalized intersections along US 15-501. US 15-501, NC 54 and NC 86 are major arterial facilities providing regional connectivity between the UNC Main Campus/downtown area, Pittsboro, Carrboro. Remaining study area network roadways are either collector streets or local neighborhood access streets. The existing study area transportation network features frequent transit service to the adjacent Southern Village Park-and-Ride and also has connected sidewalks and bicycle facilities throughout areas west and north of the site.

Site Traffic Generation

With the addition of new peak hour trips during the weekday AM, noon, and PM peak hours, there are potential site traffic impacts to the study area intersections. **Table ES-1** shows the site trip generation details, with generation rates and methodologies taken from the *Institute of Transportation Engineers (ITE) Trip Generation Manual, Version 10* and adjusted for transit and pedestrian/bicycle trip reductions as well as the effect of “pass-by” trips for the retail component of the development.



Table ES-1. Weekday Vehicle Trip Generation Summary

Trip Generation Statistic	Daily			AM Peak Hour			Noon Peak Hour			PM Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Raw ITE Trip Generation	2,746	2,746	5,492	144	212	356	166	177	343	257	221	478
Multi-Modal Trip Estimates	-631	-631	-1,262	-21	-33	-54	-12	-13	-25	-39	-33	-72
Total Vehicular Trip (Driveway Volumes)	2,115	2,115	4,230	123	179	302	154	164	318	218	188	406
Pass-By Trips	-127	-127	-254	0	0	0	-18	-18	-36	-21	-21	-42
Total External Vehicular "New" Trips	1,988	1,988	3,976	123	179	302	136	146	282	197	167	364

Background Traffic

Background traffic growth for the 2029 analysis year is expected to come from two sources - ambient regional traffic growth and specific development-related traffic growth. Based on existing information, one Town-approved development project and two projects in northern Chatham County in or near the project study area are expected to background traffic growth by the 2029 analysis year. All remaining estimated traffic growth in the area is assumed to occur due to overall region-wide ambient growth and a continuing rebound of traffic activity affected by COVID 19. To account for this, an ambient area-wide traffic growth percentage of 2.0 percent per year was applied to existing traffic volumes based on information from the historic daily traffic growth patterns in the project study (NCDOT and Town daily traffic information) and comparison of current 2022 traffic count data to pre-COVID conditions.

Impact Analysis

Peak Hour Intersection Traffic Simulation Level-of-Service (LOS_s)

Study results indicate existing traffic operations at all study area intersections are acceptable during the AM and noon weekday peak hours but drop to a LOS_s F for one study area intersection in the 2022 PM peak hour. 2029 build-out year+1 background traffic growth impacts are mitigated by Town of Chapel Hill planned and committed transportation improvement projects. The addition of peak hour site-generated trips to the projected 2029 background traffic volumes, do not cause any additional study area intersections to experience deficient traffic operations in any peak hour. A summary of the traffic operations for each intersection, related to vehicular delays (intersection average as a whole if signalized, critical movement if stop-controlled) and the corresponding simulation Level-of-Service (LOS_s) is shown in **Table ES-2**.

Access Analysis

Vehicular site access is to be accommodated via three proposed site driveway connections to US 15-501. Two will be local street extensions (fourth legs) of existing Market Street and Sumac Drive. The third connection is proposed to be a right-turn in/right-turn out only (RIRO) driveway located to the north of the US 15-501 and Market Street intersection. Minimum distances related to driveway throat lengths, separation from existing intersections and separation from other driveways, as forth in the 2003 *NCDOT Policy on Street and Driveway Access to North Carolina Highways* and in the 2017 *Town of Chapel Hill Public Works Engineering Design Manual* are adhered to in the current site concept plan.

Access for pedestrians is currently limited, with sidewalk present on the west side of US 15-501 but not along the east side in the vicinity of the site and all the way to the Mr. Carmel Church Road intersection.



Table ES-2. Intersection Capacity Analysis Summary

Intersections	Peak Hour	2022 Existing		2029 No-Build		2029 Build – Sumac Full Access		2029 Build – Sumac Left-Over Access		2029 Mitigated	
		LOS _s	Delay	LOS _s	Delay	LOS _s	Delay	LOS _s	Delay	LOS _s	Delay
NC 86 (S. Columbia St) & NC 54 Bypass (Fordham Blvd) WB Ramps	AM	C	20.7	B	17.0	B	17.6	see Full Access Results	Operational Issues to be Addressed by NCDOT STIP U-5304A		
	NOON	C	22.5	D	36.9	D	36.2				
	PM	D	48.2	F	115.3	F	137.2				
US 15-501 & NC 54 Bypass (Fordham Blvd) EB Ramps	AM	C	21.6	B	17.5	B	17.5	see Full Access Results			
	NOON	B	11.9	B	16.0	B	15.3				
	PM	B	13.8	B	18.7	C	20.2				
US 15-501 & Culbreth Road / Mt. Carmel Church Road	AM	C	23.9	D	39.4	E	70.4	see Full Access Results		E	58.7
	NOON	B	18.6	B	17.2	B	15.1				
	PM	B	19.2	C	23.6	C	25.0				
US 15-501 & Arlen Park Drive / Bennett Road	AM	B	14.6	B	13.7	B	13.3	see Full Access Results		N/A	N/A
	NOON	A	9.6	B	12.7	B	12.2				
	PM	B	10.1	A	9.8	A	8.9				
US 15-501 & Proposed Site Driveway #1 (RIRO)	AM	N/A	N/A	N/A	N/A	B*	14.0*	B*	14.0*	N/A	N/A
	NOON	N/A	N/A	N/A	N/A	A*	7.6*	A*	8.0*	N/A	N/A
	PM	N/A	N/A	N/A	N/A	A*	7.9*	A*	7.7*	N/A	N/A
US 15-501 & Market Street / Proposed Site Driveway #2	AM	B	11.6	B	15.4	B	18.4	C	28.7	N/A	N/A
	NOON	B	13.0	B	13.2	C	21.0	C	24.6	N/A	N/A
	PM	B	18.9	C	31.3	C	29.4	D	35.9	N/A	N/A
US 15-501 & Sumac Drive / Proposed Site Driveway #3	AM	A*	5.6*	A*	5.9*	B	15.9	B	15.0	N/A	N/A
	NOON	A*	6.3*	A*	6.9*	B	14.5	A	9.2	N/A	N/A
	PM	A*	9.2*	B*	11.5*	B	19.3	B	10.9	N/A	N/A
US 15-501 & Dogwood Acres Drive	AM	A	2.3	A	2.5	A	2.5	see Full Access Results		N/A	N/A
	NOON	A	1.5	A	2.2	A	1.5				
	PM	A	2.6	A	3.3	A	3.2				
US 15-501 & Smith Level Road	AM	C	29.8	C	23.5	C	23.3	see Full Access Results		N/A	N/A
	NOON	C	32.1	C	24.4	C	24.4				
	PM	C	34.9	D	49.6	D	45.6				

N/A – Not Applicable or No Improvements Necessary

BOLD/ITALICS – Critical Movement or Overall Intersection Requires Mitigation Per Town TIA Guidelines

* - Worst-Case LOS/Delay for Unsignalized/Stop-Controlled Critical Movement

Crosswalk/pedestrian signalization are provided at all signalized study area intersections for quadrants where existing sidewalk exists. Bicycle access is available to and from the site via painted bicycle lanes along US 15-501 north of Market Street and through greenway connections in the Southern Village area.

Crash Analysis

Data from the NCDOT Traffic Safety Unit TEAAS software database was compiled for the recent five-year period for the study area intersections and for the US 15-501 corridor in the study area. Crash rates for the US 15-501 corridor indicates that the frequency of crashes for the facility are generally lower than



North Carolina statewide average for similar four-lane median divided US Highway facilities. Crashes are generally clustered at high volume intersections, with relatively few crashes occurring at existing mid-block locations along the corridor. Relatively lower crash numbers and frequencies were noted at the intersections (Market Street and Sumac Drive) adjacent to the proposed site.

Other Transportation-Related Analyses

Other transportation-related analyses relevant to the 2001 Town of Chapel Hill Guidelines for the preparation of Traffic Impact Studies were completed, as appropriate. The following topics listed in **Table ES-3** are germane to the scope of this study.

Table ES-3. Other Transportation-Related Analyses

Analysis	Comment
Long-Range Daily Volume-Capacity Analysis	The proposed site is expected to add approximately 4,000 new daily trips to the study area network. A comparison of No-Build to Build Scenario daily traffic assignment estimates from the 2045 Triangle Regional Travel Demand model indicates that the distribution of site trips will only cause relatively small (8 percent or less) daily traffic volume increases along the US 15-501 corridor or connecting roadways. Several roadway segments are projected to be at or over daily capacity in 2045 with or without site traffic impacts.
Turn Lane Storage Requirements	Storage bay lengths at study area intersections were analyzed using TransModeler to generate estimated maximum queue lengths for the 2029 Build Scenario. In most cases, existing storage for turn lanes is adequate in the project study area, and can be managed with signal timing adjustments, if necessary. Turn bay storage issues in the vicinity of the NC 54 / US 15-501 interchange will require more robust improvements than adjustments to signal timing or simply lengthening existing turn lanes. Turn bays shown on the site concept plan for South Creek generally provide adequate storage for future traffic demands, with a recommendation to extend the southbound left-turn from US 15-501 into Site Driveway #3.
Appropriateness of Acceleration/Deceleration Lanes	The proposed site concept plan includes delineation of specific left-turn and right-turn auxiliary lanes at all three site driveway intersections to allow adequate traffic operations and provide additional safety benefits. All other existing study area intersections beyond the immediate site contain auxiliary lanes to facilitate turning movements. No other acceleration or deceleration lanes are required due to the proposed South Creek development.
Pedestrian and Bicycle Analysis	Existing pedestrian access and connectivity is provided through the study area in areas west of the US 15-501 corridor. Additional provisions would be necessary to connect the South Creek development to existing pedestrian infrastructure. Crosswalks and pedestrian signals exist along the corridor where sidewalk connections are provided. Bicycle lanes exist on US 15-501 north of Market Street. .
Public Transportation Analysis	Public transportation service to the site is excellent, with frequent direct service provided by the NS Route to/from the adjacent Southern Village Park-and-Ride facility, though there are no bus stops along the existing site frontage The site concept plan proposes a bus stop and extended pull-out as part of a right-turn lane on northbound US 15-501 at Market Street / Site Driveway #2. This stop provides excellent proximity and access to all areas within the South Creek concept plan. At this location, the bus stop would necessitate a slight revision to the existing NS Route to access the stop from Sumac Drive either directly if full access at Sumac Drive is constructed or via a u-turn at this location coming from Market Street if full access is not constructed.

Mitigation Measures/Recommendations

Planned Improvements

There is one NCDOT improvement project to study area transportation facilities within the analysis year time frame of 2022-2029. **STIP BL-0044** is a pedestrian safety improvement project located along NC 54 Bypass west of the project study area. There are three other NCDOT STIP projects in the early project



development process that are not funded for construction and are expected to be constructed post-2029. **STIP U-5304A** is a project to improve the NC 54 Bypass / US 15-501 interchange. **STIP U-5304B** is a project to provide capacity and multi-modal improvements along US 15-501/NC 54 (Fordham Boulevard) from NC 86 (S. Columbia Street) to NC 54 (Raleigh Road). **STIP U-6192** is a project to convert remaining full access segments lacking access management along US 15-501 between Smith Level Road and the US 64 Bypass in Pittsboro to a “synchronized street”,

The Town of Chapel Hill’s *North-South Corridor Bus Rapid Transit (NSBRT)* project includes additional transit amenities for the US 15-501 corridor through the study area, as well as potential cross-section widening and reallocation for dedicated transit lanes. Since final design details are not complete, the changes associated with this project were not explicitly considered to be complete for the purposes of this study. Impacts of the South Creek site on preliminary planning concepts for the NSBRT project are discussed below.

Background Committed Improvements

There are no known background committed improvements at study area intersections from any of the other private development project background traffic generators analyzed in this report.

Applicant Committed Improvements

Based on the preliminary site concept plans and supporting development information provided, there are several external transportation-related improvements proposed adjacent to the South Creek Mixed-Use development, with supporting internal transportation facility infrastructure. These are highlighted in **Figure ES-2** and include necessary auxiliary turn lanes along US 15-501, provision of paved multi-use paths along US 15-501 site frontage and internal to the site, and delineation of a bus stop along US 15-501 northbound that would utilize and extended right-turn lane for a bus pull-off point.

Necessary Improvements

Based on the 2029 design year peak hour intersection capacity analyses results for Build Scenario conditions and analyses of vehicular circulation, pedestrian/bicycle connectivity and transit operations, the following are recommended necessary improvements to the study area network.

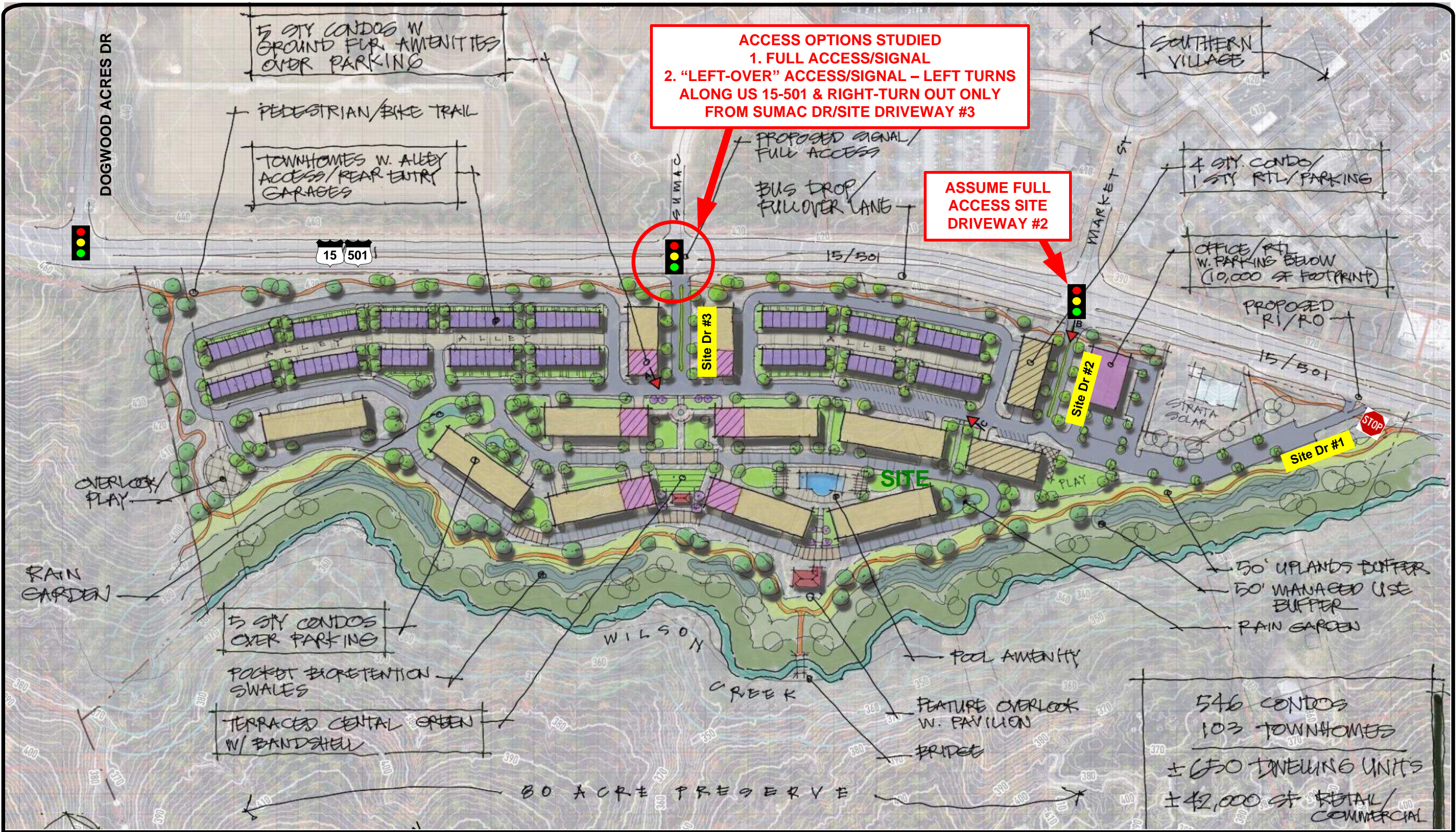
- US 15-501 / NC 54 Bypass Westbound ramp
This intersection is expected to be well over capacity (LOS_s F) in the 2029 analysis year with or without the South Creek site, with extensive PM peak hour queueing on both NC 86 southbound and NC 54 westbound ramp approaches. These issues will be addressed comprehensively in the NCDOT U-5304 A and B projects. No specific mitigation strategies were studied for this intersection/interchange in this analysis, with the exception of an overall corridor signal re-optimization to offset impacts of the South Creek development traffic. The comprehensive interchange improvements are necessary with or without the South Creek development site impacts.
- US 15-501 / Culbreth Road – Mt. Carmel Church Road
This intersection is expected to drop from near capacity (LOS_s D) to at capacity (LOS_s E) conditions in the 2029 AM peak hour with the addition of site-related traffic. A reoptimization of the traffic signal at this location will provide some benefits (dropping the overall average per-vehicle delay at the intersection from 70 seconds to 58 seconds). However, this issue is related to overall northbound through traffic capacity conflicting with high southbound left-turn demands for all periods of the day. Whether or not the South Creek development is constructed, it is recommended that this intersection be included in the STIP U-5304A study area, as it is very close to the NC 54 interchange.



Two potential improvements, as shown in **Figure ES-3** are to either add movement capacity northbound through the intersection (and widen the existing James Taylor bridge) or remove the southbound left-turn movement at this intersection and move left-turning vehicles desiring to access Mt. Carmel Church Road down to Bennett Drive. All other movements would be unchanged.

- US 15-501 & Market Street – Site Driveway #2
Additional necessary improvements include adding high visibility pedestrian crosswalks and pedestrian signals at the south and east intersection legs.. This improvement is necessary if the South Creek development occurs.
- US 15-501 & Sumac Drive – Site Driveway #3
Additional necessary improvements include extending the southbound left-turn bay to 250 feet. In the existing eastbound Sumac Drive cross-section, delineate a left-turn lane with 150 feet of storage and a shared through/right-turn lane for the full access scenario. Provide high-visibility crosswalks and pedestrian signalization for the south, east, and west intersection legs. These improvements are necessary if the South Creek development occurs.
- US 15-501 & Dogwood Drive
Additional necessary improvements include the provision of high-visibility crosswalk and pedestrian signalization on the north intersection leg. This improvement is necessary if the South Creek development occurs.
- US 15-501 Corridor – Dogwood Acres Drive to NC 54 Bypass Interchange
All signals along the corridor should be reoptimized due the changes necessary to the two intersections along the South Creek site frontage that are expected to have signal control and the projected increase in peak hour traffic volumes. The Dogwood Acres Drive signal should be operated in coordination during peak hours to provide efficiency of progressed traffic movements near the proposed site. This improvement is necessary if the South Creek development occurs.
- NSBRT Route/Station Modifications
In the “full access” scenario for the US 15-501 & Sumac Drive / Site Driveway #3 intersection, an opportunity would exist for a direct loop for the NSBRT route that avoids the US 15-501/Market Street intersection heading northbound while providing a direct opportunity to utilize the proposed South Creek transit stop along US 15-501 northbound. Redirecting this route compared to current plans (see **Figure ES-4**) would require the Southern Village BRT station to be located on the opposite side of Sumac Drive in the existing Park-and-Ride Lot. The existing bus loop could be removed and additional parking proximate to this new station location could be created.

Because of this opportunity, and the opportunity to remove a portion of existing and projected future traffic from exiting Southern Village on Market Street by using a full access point on Sumac Drive instead, it is recommended that consideration for full movement access be given at Sumac Drive / Site Driveway #3. Operationally, both access scenarios provide adequate capacity at both intersections. The “Left-Over” design at Sumac Drive is expected to operate with less vehicular delay than a full access concept but would likely not attract any existing traffic to the Sumac Drive intersection from the Park-and-Ride area (relieving congestion on Market Street) and would add some additional u-turning traffic to downstream intersections (including Market Street) along the corridor.



NOT TO SCALE

South Creek Mixed-Use Development
 Transportation Impact Analysis

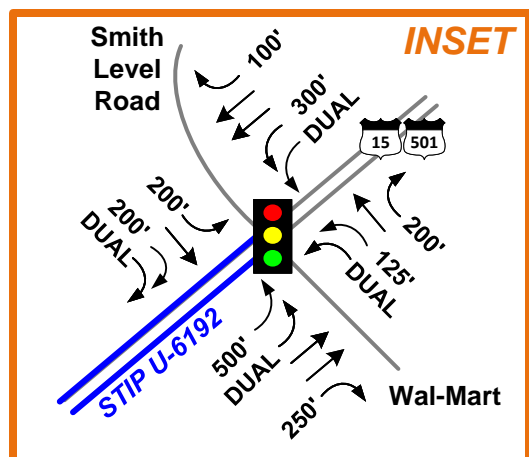
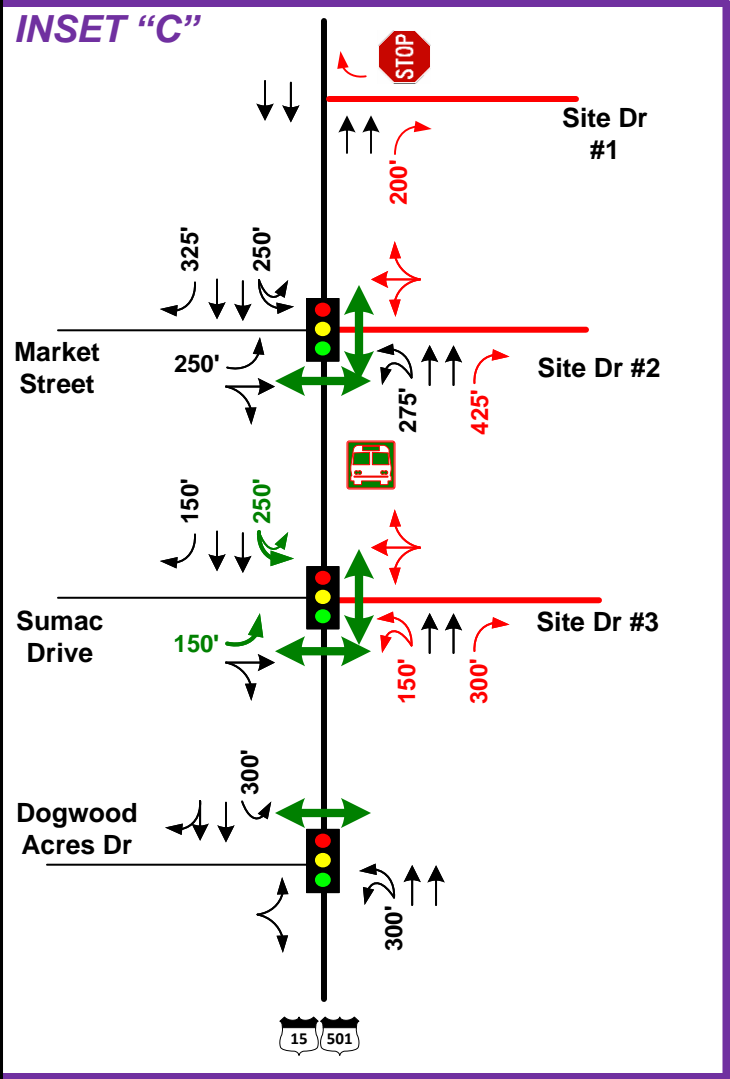
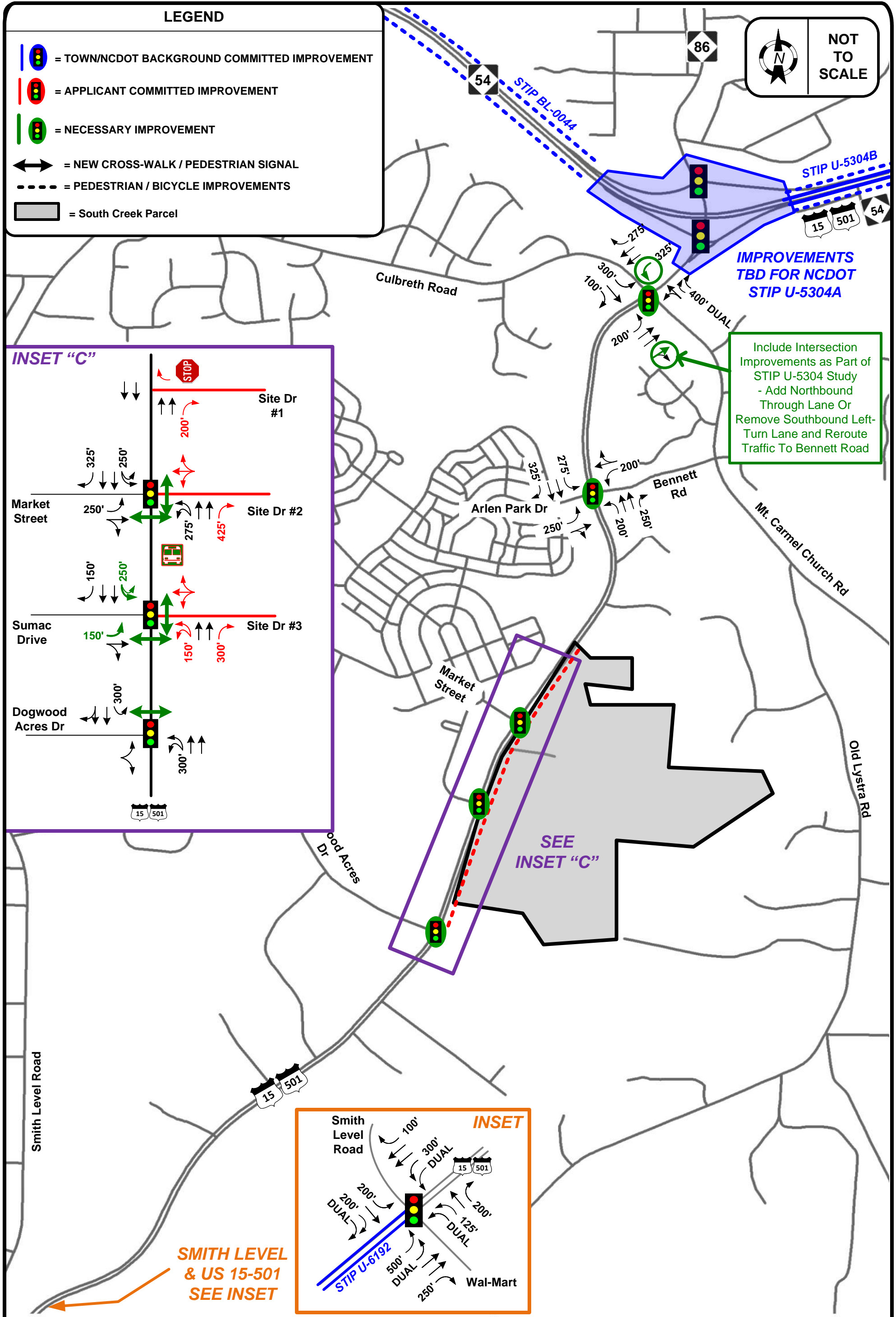
SITE CONCEPT PLAN

DATE: February 2023

FIGURE ES-2

LEGEND

-  = TOWN/NCDOT BACKGROUND COMMITTED IMPROVEMENT
-  = APPLICANT COMMITTED IMPROVEMENT
-  = NECESSARY IMPROVEMENT
-  = NEW CROSS-WALK / PEDESTRIAN SIGNAL
-  = PEDESTRIAN / BICYCLE IMPROVEMENTS
-  = South Creek Parcel



Include Intersection Improvements as Part of STIP U-5304 Study - Add Northbound Through Lane Or Remove Southbound Left-Turn Lane and Reroute Traffic To Bennett Road



**South Creek Mixed-Use Development
Transportation Impact Analysis**

COMMITTED AND RECOMMENDED IMPROVEMENTS

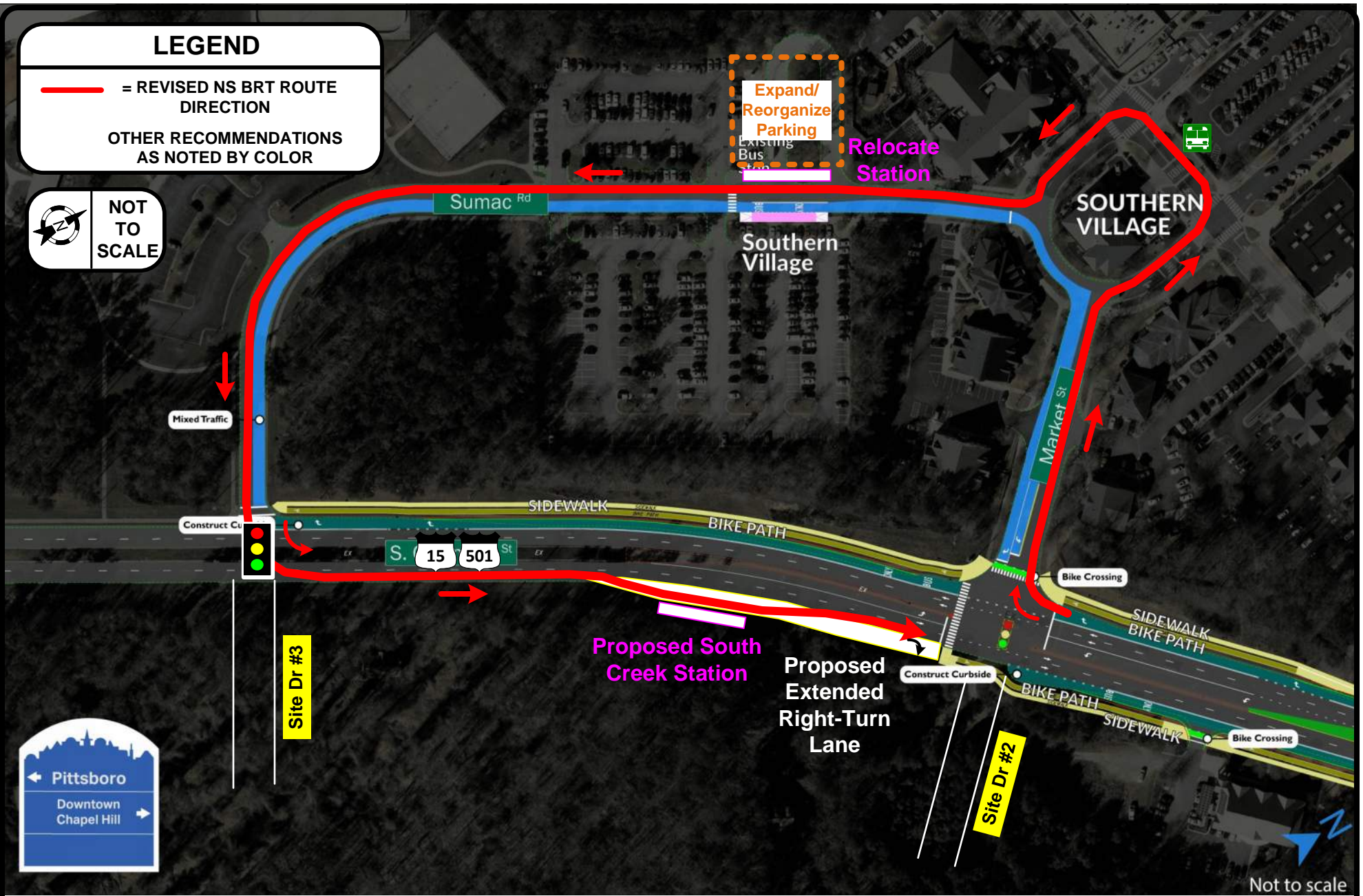
DATE: February 2023

FIGURE ES-3

LEGEND

 = REVISED NS BRT ROUTE DIRECTION

OTHER RECOMMENDATIONS AS NOTED BY COLOR



South Creek Mixed-Use Development Transportation Impact Analysis

DATE: February 2023

RECOMMENDED IMPROVEMENTS – NSBRT PLAN

FIGURE ES-4