VDOT

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

MARCH 2020

Alternatives Analysis Technical Report

State Project #: 0220-044-052, P101; UPC: 110916
Federal Project #: STP-044-2(059)

Prepared in Coordination With:

U.S. Department of Transportation
Federal Highway Administration

ALTERNATIVES ANALYSIS TECHNICAL REPORT

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
APP	Arterial Preservation Program
CFR	Code of Federal Regulations
CIM	Citizen Information Meeting
EIS	Draft Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
ITS	Intelligent Transportation System
JPA	Joint Permit Application
LEDPA	Least Environmentally-Damaging Practicable Alternative
LOD	Limit of Disturbance
MPH	Miles per hour
NEPA	National Environmental Policy Act
OFD	One Federal Decision
PART	Piedmont Area Regional Transit System
PCES	Project Cost Estimating System
RCUT	Restricted Cross-Street U-turn
TDM	Transportation Demand Management
TSM	Transportation System Management
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
VDOT	Virginia Department of Transportation
WPPDC	West Piedmont Planning District Commission

1. INTRODUCTION

The Virginia Department of Transportation (VDOT), in coordination with the Federal Highway Administration (FHWA) as the Federal Lead Agency and in cooperation with the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA), have prepared a Draft Environmental Impact Statement (EIS) for the Martinsville Southern Connector Study – Route 220 EIS (Martinsville Southern Connector Study) in Henry County, Virginia. This study evaluates potential transportation improvements along the U.S. Route 220 (Route 220) corridor between the North Carolina state line and U.S. Route 58 (Route 58) near the City of Martinsville (Martinsville), Virginia.

The Draft EIS and supporting technical documentation have been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), codified in 42 United States Code §4321-4347, as amended, and in accordance with FHWA regulations, found in 23 Code of Federal Regulations (CFR) §771. As part of the Draft EIS, the environmental review process has been carried out following the conditions and understanding of the *NEPA and Clean Water Act (Section 404) Merged Process for Highway Projects in Virginia* (merged process)[1]. The Martinsville Southern Connector Study also follows the One Federal Decision (OFD) process, which was enacted by Executive Order (EO) 13807: *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects* (82 FR 163)[2].

The study area for the Martinsville Southern Connector Study is located south of Martinsville in Henry County, Virginia (see **Figure 1-1**). Positioned on the southern border of Virginia, the study area is located approximately 60 miles southeast of the City of Roanoke (Roanoke) via Route 220, 30 miles west of the City of Danville via Route 58, and 40 miles north of the City of Greensboro (Greensboro) in North Carolina via Interstate 73 and Route 220.

The study area encompasses approximately seven miles of the Route 220 corridor, between the interchange of Route 220 with the William F. Stone Highway and the North Carolina state line. Within the study area, existing Route 220 consists of a four-lane roadway, with two travel lanes in each direction. The William F. Stone Highway is signed as Route 58 to the east of its interchange with Route 220; west of the interchange, Route 220 is collocated with Route 58, as both bypass Martinsville. For the purposes of consistency in this study, portions of the William F. Stone Highway east and west of the Route 220 interchange are herein referred to as Route 58. The study area also includes the interchange of Route 58 at Route 641 (Joseph Martin Highway), approximately 1.25 miles west of Route 220. Additionally, the study area encompasses the Town of Ridgeway (Ridgeway), where Route 220 connects with Route 87 (Morehead Avenue), approximately three miles south of Route 58. The study area boundary for the Martinsville Southern Connector Study has been developed to assist with data collection efforts and the evaluation of alternatives retained for evaluation. The study area covers 12,873 acres and generally encompasses a one-half-mile buffer around the portion of existing Route 220, between the North Carolina state line and Route 58, and each alternative carried forward for evaluation.

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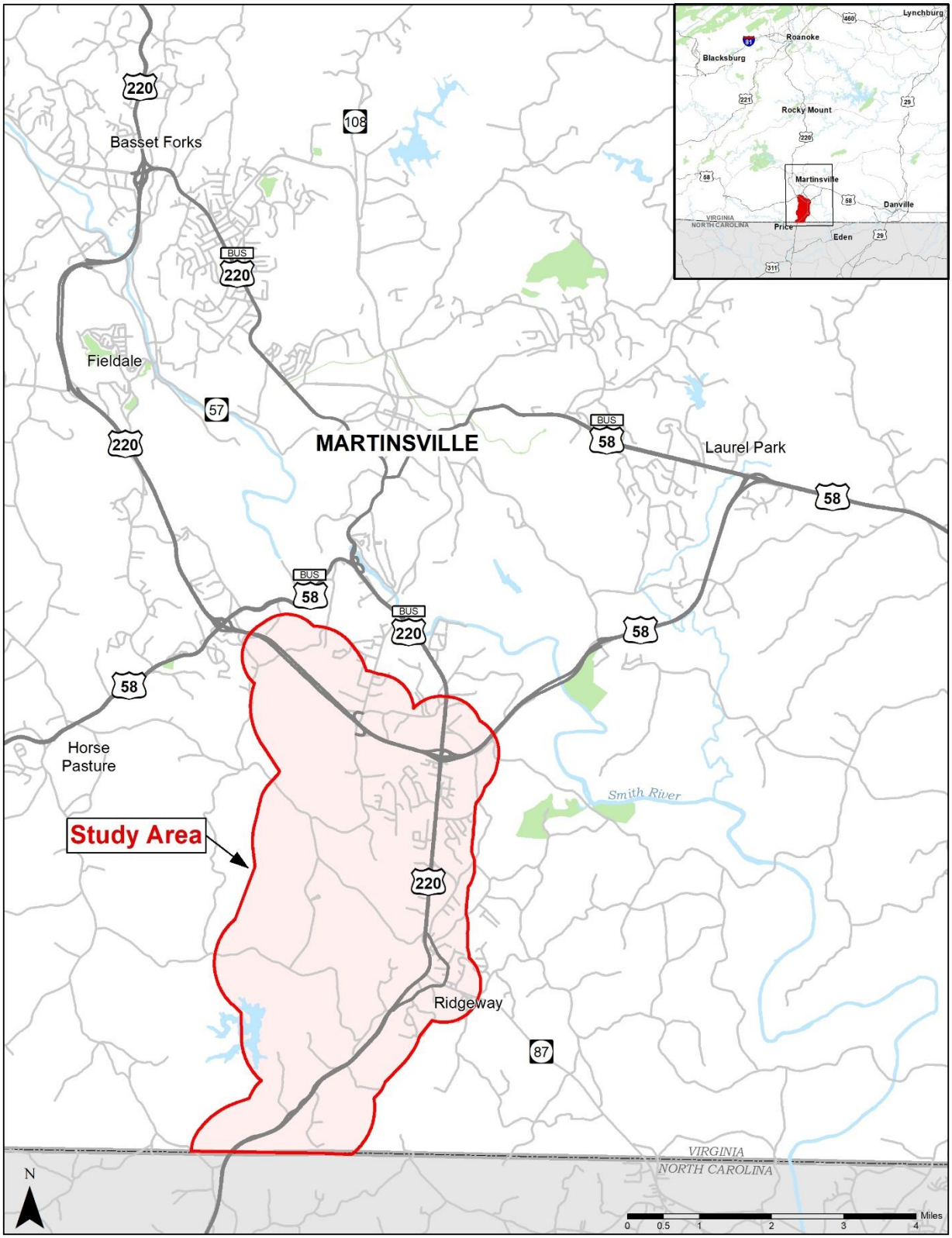
[1]Established under a memorandum of understanding between VDOT, FHWA, USACE, EPA, and the U.S. Fish and Wildlife Service (USFWS), the merged process establishes a procedure for coordinated environmental review and development of documentation in Virginia that complies with the requirements of NEPA and provides sufficient information to support Federal regulatory decision-making, including FHWA approval or permits issued by other Federal agencies.

[2]The Martinsville Southern Connector Study is following the OFD process, subsequent to receiving OFD designation by FHWA. OFD requires that major infrastructure projects have a single permitting timetable for synchronized environmental reviews and authorizations: www.permits.performance.gov/permitting-projects/us-route-58220-bypass-north-carolina-state-line-limited-access-study.

Figure 1-1: Study Area



The study area was used in various instances during preliminary research and to establish an understanding of the potentially affected natural, cultural, and social resources that may be impacted by the improvements evaluated in the Draft EIS.

The purpose of this Alternatives Analysis Technical Report is to describe the process of developing alignment options to potentially evaluate in the Martinsville Southern Connector Study as possible solutions to address the established Purpose and Need. This report also defines the factors that were considered in the evaluation and selection of alignment options carried forward as a reasonable range of alternatives retained for detailed analysis in the Draft EIS, as well as the justifications for those alignment options not carried forward for evaluation. Other alignment options were developed into alternatives for consideration but were not retained for detailed evaluation based on anticipated impacts. As part of the public involvement process during the development of the Draft EIS, additional alternatives were suggested for evaluation. Lastly, a Preferred Alternative has been identified based on the detailed study of the alternatives carried forward evaluation. This Alternatives Analysis Technical Report describes the alternatives development and analysis process that has resulted in the identification of the Preferred Alternative.

1.1 PURPOSE AND NEED

Working with FHWA and the Cooperating and Participating Agencies, the Purpose and Need for the study was concurred upon on November 14, 2018. The purpose of the Martinsville Southern Connector Study is to enhance mobility for both local and regional traffic traveling along Route 220 between the North Carolina state line and Route 58 near Martinsville, Virginia.

The Martinsville Southern Connector Study addresses the following needs:

- **Accommodate Regional Traffic** – current inconsistencies in access, travel speeds, and corridor composition along Route 220 inhibit mobility and creates unsafe conditions considering the high volume of truck and personal vehicle traffic traveling through the corridor to origins and destinations north and south of the study area;
- **Accommodate Local Traffic** – numerous, uncontrolled access configurations along Route 220, combined with high through traffic movement, create traffic delays and contribute to high crash rates for travelers within the corridor accessing residences, commercial buildings, and schools; and
- **Address Geometric Deficiencies and Inconsistencies** – current geometric conditions along Route 220, such as lane widths, horizontal curves, and stopping sight distances, are below current design standards and vary along the length of the corridor, resulting in safety concerns for all users.

1.2 EXISTING CONDITIONS

Route 220 is part of the National Highway System (NHS)[3] classified as an *other principal arterial* within the study area[4]. These types of roadways serve corridor movements of substantial statewide or interstate travel and provide an integrated roadway network between activity and population centers (VDOT, 2014).

Route 220 is designated by VDOT as a Corridor of Statewide Significance (CoSS) in *VTrans2040*[5], Virginia's statewide multi-modal transportation policy plan (OIPI, 2015). In addition to connecting corridors between urban areas and being a primary north-south freight route, Route 220 connects direct access to businesses, homes, schools, and recreational opportunities throughout Henry County and Ridgeway. The portion of Route 220 encompassed by the study area is included within the North Carolina to West Virginia CoSS (Segment F1), which is identified by *VTrans 2040* as a primary facility for both local access of travel originating in the Roanoke Valley Area and for regional throughput of passenger vehicles and freight truck traffic. In addition to connecting population centers in the Roanoke Valley Area and serving a primary north-south freight route, Route 220 connects direct access to businesses, homes, schools, and recreational facilities throughout Henry County and Ridgeway. This section of Route 220 was first identified as a part of the Multimodal Investment Network (the predecessor of the CoSS) in the *VTrans 2025* plan (VDOT, 2004). These corridors were identified to receive a focus on statewide investment.

Route 220 not only serves as a primary north-south through route but is also the "main street" for the many residents in adjacent communities, school children and faculty who attend Drewry Mason Elementary School, and the many business owners and patrons who visit the commercial properties that are along the roadway throughout the study area. Along existing Route 220 in the study area, there are a total of five signalized intersections, 18 unsignalized median crossovers, and over 100 residential and commercial driveways with direct access to the roadway. The Norfolk Southern railroad parallels Route 220 over much of the southern and central portions of the study area. The Norfolk Southern railroad supports freight rail service between Roanoke, Virginia, and Greensboro, North Carolina. Route 220 crosses over the Norfolk Southern railroad on two parallel bridges located north of Ridgeway. As Route 220 crosses Marrowbone Creek, there are two separate bridge structures for northbound and southbound Route 220.

The primary east-west route within the study area is Route 58, which is a four-lane divided highway. Classified as an *other freeway or expressway*, the primary function of Route 58 is to provide service to traffic entering and leaving Martinsville, as well most of the traffic bypassing the central city. Route 58 is a four-lane, divided highway with a varying median width that ranges

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[3] According to FHWA, the NHS includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility (FHWA, 2019).

[4] According to the 6th Edition of the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets* (Green Book), functional classification is the process by which highways and streets are grouped into classes (i.e. arterial, collector, local) or systems, according to the character of service that they are intended to provide. Arterial roadways are intended to provide a high level of mobility while providing a low level of access to adjoining properties. In contrast, local roadways are intended to provide a high level of access to adjoining properties while providing a low level of mobility (AASHTO, 2011).

[5] Corridors of Statewide Significance (CoSS) are those facilities and services that comprise the multimodal network connecting major centers of activity and accommodate inter-city travel between these centers as well as interstate traffic (VTrans2035, 2013).

from 44 feet at the current Route 220 interchange to over 200 feet at the western end of the study area.

Access to Route 58 within the study area occurs via interchanges at Joseph Martin Highway and Route 220. There are entrance gates to the east of the Route 220 interchange along Route 58 that are opened temporarily on race days to provide additional access to Martinsville Speedway, located approximately one-mile northeast of the Route 220 interchange with Route 58. The gates provide travel demand relief for the interchange of Route 220 and Route 58 during events at the Martinsville Speedway.

Morehead Avenue and Route 687 (Soapstone Road) are two-lane rural arterial roadways that also carry traffic to the east and west, located near the center of the study area near Ridgeway. These roads are connected by a signalized intersection with Route 220. Joseph Martin Highway, Route 688 (Lee Ford Camp Road), Route 639 (Phospho Springs Road), Old Leaksville Road, Old Sand Road, and Eggleston Falls Road are other collector and local routes that carry traffic both within and beyond the study area. The local street system functions to permit direct access to abutting lands and connections to higher order systems (e.g. freeways, expressways, and arterials). These primary roadways are shown in **Figure 1-1**.

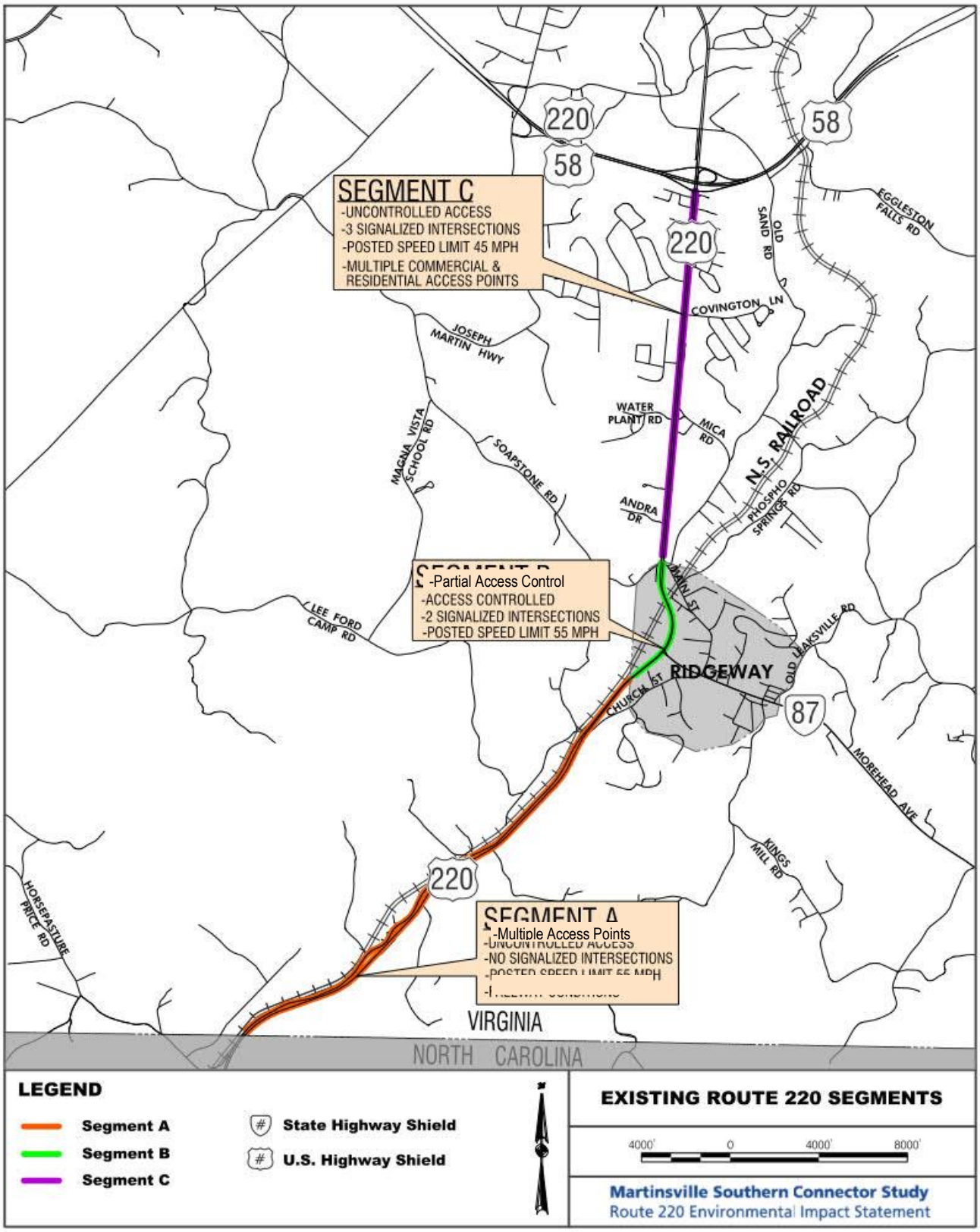
Limiting access to a roadway is called access control. There are different degrees of access control: full access control, partial access control, or uncontrolled access. The principal advantages of controlling access are resulting improvements to the movement of vehicles and the reduction of crash frequency and severity (AASHTO, 2011). Providing access control on a highway serves to manage the interference with regional through traffic.

There are varying degrees of access management, from partial to full access control. Access management measures have been implemented on Route 58 (full access control) north of the study area and on Route 220 south of the study area (partial access control). Since access to adjacent properties is not the primary intent of roadways functionally classified as freeways or expressways, access to Route 58 within the study area occurs via interchanges at Route 220 and Joseph Martin Highway. This access management measure is called full access control[6]. South of the North Carolina state line, access is provided to Route 220 from selected public roads and private driveways through at-grade or grade-separated connections. This access management measure is called partial access control.

Within the study area, Route 220 consists of three distinct segments identified as Segment A, Segment B, and Segment C (see **Figure 1-2**). Each segment has unique traffic and roadway characteristics. Throughout the study area, many cross-streets are only accessible from one direction, either northbound or southbound. Median crossovers provide U-turn opportunities for drivers wishing to access these streets. The three segments that comprise existing Route 220 within the study area are described below.

[6] Regulating access to a roadway is called access control. There are different degrees of access control: full control of access, partial control of access, and no control of access. The principal advantages of controlling access are improvements to the movement of vehicles and the reduction of crash frequency and severity (AASHTO, 2011). Full control of access means that preference is given to through traffic by providing access connections at interchanges with only selected public roads and by prohibiting crossings at grade and direct private driveway connections (AASHTO, 2011). Full control of access to Route 58 is provided by means of ramp connections with only selected public roads, providing preference to regional through traffic. Restricting access to other at grade roadway crossings and adjacent properties functions to preserve the mobility of regional through traffic movements and to manage the interference of vehicles or pedestrians entering, leaving, and crossing Route 58.

Figure 1-2: Existing Route 220 Roadway Characteristics



1.2.1 Segment A – North Carolina State Line to Ridgeway

Segment A includes the southern section of Route 220 from the North Carolina state line to north of the Lee Ford Camp Road/Church Street intersection, just south of Ridgeway. There are no traffic signals through this section; however, there are eight intersecting streets, eight median crossovers, and 44 driveways that connect to the roadway. The posted speed limit is 55 miles per hour (mph). The northernmost intersection in this segment is Lee Ford Camp Road/Church Street, with Church Street providing direct access to Ridgeway. The Norfolk Southern railroad parallel Route 220 on the west side through this segment.

1.2.2 Segment B – Area Near Ridgeway

Segment B covers the center of Route 220 in the study area, extending from north of Lee Ford Camp Road/Church Street to north of the Main Street/Soapstone Road intersection near Ridgeway. The only access points to and from Route 220 are at signalized intersections with Morehead Avenue and Main Street/Soapstone Road, and the posted speed limit is 55 mph. The signal at Morehead Avenue is the first traffic signal that northbound drivers traveling on existing Route 220 encounter for 28 miles, as all the major crossroads in North Carolina to Interstate 73 in Greensboro have been replaced with interchanges. North of Morehead Avenue, the railroad crosses under Route 220 and continues on the east side of the roadway through the northern part of the study area.

1.2.3 Segment C – Ridgeway to Route 58

Segment C includes the northern segment of Route 220, extending from north of Main Street/Soapstone Road, just north of Ridgeway, to the existing interchange with Route 58. The posted speed limit for this section of Route 220 is 45 mph and includes three signalized intersections, 11 intersecting side streets, two entrances to the Drewry Mason Elementary School, and 55 commercial and residential driveways. Two of the signalized intersections are the on- and off-ramps at the interchange with Route 58 and Water Plant Road/Mica Road. Residential communities access Route 220 at nine of the un-signalized side-street intersections. The commercial properties in Segment C often have multiple entrances from the roadway and, in some cases, the entire frontage of the property along Route 220 is one large driveway entrance.

2. ALTERNATIVES

2.1 ALTERNATIVES DEVELOPMENT PROCESS

The Martinsville Southern Connector study was initiated with the issuance of a Notice of Intent (NOI) to prepare an EIS for potential roadway improvements between the North Carolina state line and Route 58 near Martinsville, Virginia (83 Fed. Reg. 7841, 2018).

Upon publication of the NOI, the scoping process was initiated for the study and interested individuals, organizations, and agencies were invited to provide their ideas, comments and concerns regarding the identification of a reasonable range of alternatives to be considered for evaluation along the Route 220 corridor in Henry County, Virginia.

Based on input received through the scoping process as well as analysis of data, existing, and future conditions on the Route 220 corridor, the Purpose and Need statement for the Martinsville Southern Connector study was established. The Purpose and Need established the goals for the study and the measures by which to develop and evaluate alternatives.

Informed by scoping and the established Purpose and Need statement for the study, VDOT developed and presented a range of alignment options to the Cooperating and Participating Agencies as part of the monthly agency coordination effort that occurred throughout the development of the study[7]. During meetings with these agencies and separate public involvement efforts, several alignment options for Route 220 improvements were initially identified.

In order to evaluate them against the stated Purpose and Need to accommodate both regional and local traffic, each alignment option recommended to the agencies and the public assumed access control. Access control would provide accommodations for the primary regional through movements, while maintaining consistency with the intended function of existing Route 220 as an *other principal arterial* and CoSS. The implementation of access control would also be consistent with the access control measures on Route 58 to the north of the study area as well as Route 220 south of the study area in North Carolina.

For the purposes of evaluating transportation improvements along the Route 220 corridor in the study area, full access control[8] was assumed to represent the worst-case scenario for environmental impacts and associated costs. During initial introductions of alignment options with the agencies in November 2018, VDOT recommended that the analyses in the Draft EIS would assume full access control as a worst-case scenario but would not commit or provide specific language as to which type of control would be implemented in the future. The USACE agreed with this approach and there were no other comments or objections from other agencies. As a result, specific access management options may be determined as the environmental review process

[7] See Chapter 6 of the Draft EIS for more information regarding the public and agency coordination that occurred during the development of the study.

[8] Regulating access to a roadway is called access control. There are different degrees of access control: full control of access, partial control of access, and no control of access. The principal advantages of controlling access are improvements to the movement of vehicles and the reduction of crash frequency and severity (AASHTO, 2011). Full control of access means that preference is given to through traffic by providing access connections at interchanges with only selected public roads and by prohibiting crossings at grade and direct private driveway connections (AASHTO, 2011). Full control of access to Route 58 is provided by means of ramp connections with only selected public roads, providing preference to regional through traffic. Restricting access to other at grade roadway crossings and adjacent properties functions to preserve the mobility of regional through traffic movements and to manage the interference of vehicles or pedestrians entering, leaving, and crossing Route 58.

advances, which could be documented in the Final EIS and included in any future permit conditions. Since the Commonwealth Transportation Board (CTB) has the authority to regulate limited access highways (§33.2-401 of the Code of Virginia) and the Commonwealth Transportation Commissioner is conferred the power to apply access management standards to preserve the efficient operation of the state highway system (§33.1-198.1 of the Code of Virginia), this determination may also be deferred until a later date when more detailed design advances and funding for future phases of the project development process become available. As a result, no commitments related to specific access control measures have been made as part of the alternatives development process that has occurred in support of the Draft EIS.

The alignment options are listed in **Table 2-1** and illustrated in **Figure 2-1.**

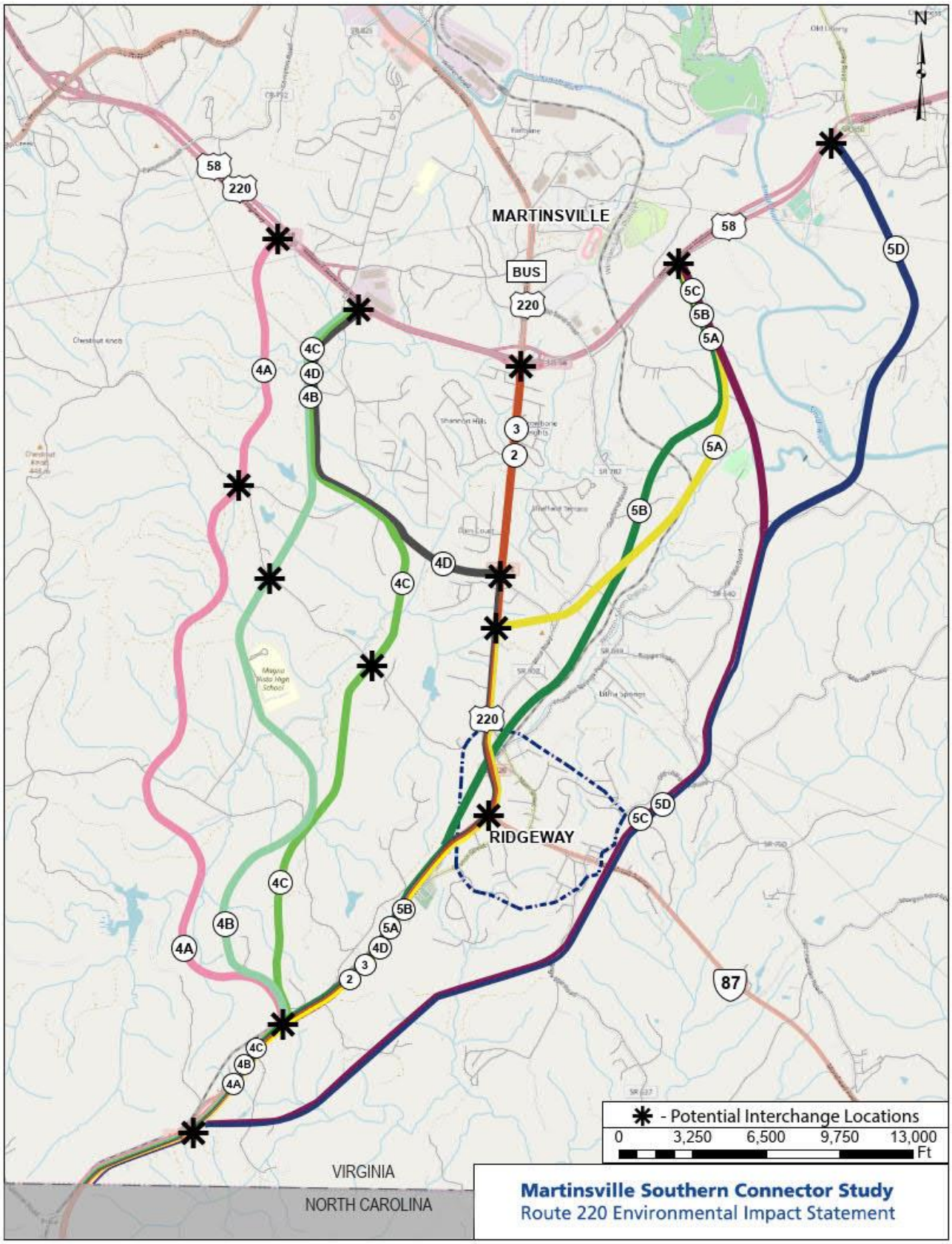
Table 2-1: Alignment Options Initially Considered

Alignment Option	Description
Alignment Option 1	No-Build option, required by NEPA to provide a baseline comparison of alternatives, assumes projects within the study area that are currently programmed in VDOT's *Six-Year Improvement Program (SYIP) for Fiscal Year (FY) 2020 – 2025* and Henry County's *Budget for FY 2019-2020*.
Alignment Option 2	Transportation System Management (TSM) and Transportation Demand Management (TDM) improvements, which may include, but are not limited to geometric improvements on the existing roadway to consolidate driveway entrances and conflict points, installation of intelligent transportation systems (ITS) devices and synchronized signal timings, or alternative intersection and interchange designs.
Alignment Option 3	Reconstruct Route 220 as an access-controlled roadway, consolidating access to Route 220 to interchanges at select locations.
Alignment Option 4A	New access-controlled alignment west of Route 220 with a new interchange with Route 220/Route 58 to the west of Route 641 (Joseph Martin Highway). Includes reconstruction of existing Route 220 alignment for 0.5 miles from the North Carolina state line.
Alignment Option 4B	New access-controlled alignment west of Route 220 and west of Magna Vista High School with reconstruction of the Joseph Martin Highway interchange at Route 220/Route 58. Includes reconstruction of existing Route 220 alignment for 0.5 miles from the North Carolina state line.
Alignment Option 4C	New access-controlled alignment to the west of Route 220 and east of Magna Vista High School with reconstruction of the Joseph Martin Highway interchange at Route 220/Route 58. Includes reconstruction of existing Route 220 alignment for 0.5 miles from the North Carolina state line.
Alignment Option 4D	Reconstruction of Route 220 to an access-controlled roadway, with a spur on new alignment to the west, north of Ridgeway, and reconstruction of the Joseph Martin interchange at Route 220/Route 58.
Alignment Option 5A	Reconstruction of Route 220 to an access-controlled roadway, with a spur on new alignment to the east, north of Ridgeway, and a new interchange with Route 58 approximately one mile east of the Route 220/Route 58 interchange.
Alignment Option 5B	Reconstruction of Route 220 to an access-controlled roadway, with a spur on new alignment near Ridgeway, following the west side of the railroad to a new interchange with Route 58 approximately 0.5 miles east of the Route 220/Route 58 interchange.
Alignment Option 5C	New access-controlled alignment east of Route 220 with a new interchange with Route 58 approximately one mile east of the Route 220/Route 58 interchange. Includes reconstruction of existing Route 220 alignment for 0.5 miles from the North Carolina state line.
Alignment Option 5D	New access-controlled alignment east of Route 220 with a new interchange with Route 58 at Route 650 (Irisburg Road). Includes reconstruction of existing Route 220 alignment for 0.5 miles from the North Carolina state line.

In order to implement an access-controlled facility, each alignment option identified potential interchange locations, as illustrated on **Figure 2-1**. Interchange locations were developed to

provide an illustrative planning level design that represents a worst-case limit of disturbance (LOD), assuming a full access control roadway for the identification of impacts and preliminary cost estimates. Should any improvements from the Martinsville Southern Connector Study advance to more detailed phases of project development, the final interchange locations and configuration would be refined.

Figure 2-1: Alignment Options Considered



Each of the alignment options were evaluated to determine whether they would address the Purpose and Need, which served as the primary criteria in the alternatives development process. Alignment options that were determined to not satisfy the Purpose and Need were not carried forward for detailed evaluation. **Table 2-2** is a summary of how the range of alignment options were evaluated relative to each element of the Purpose and Need statement.

Table 2-2: Purpose and Need Evaluation Criteria

Purpose and Need Element	How Alignment Options are Evaluated
Accommodate Regional Traffic – Current inconsistencies in access, travel speeds, and corridor composition along Route 220 inhibits mobility and creates unsafe conditions considering the high volume of truck and personal vehicle traffic traveling through the corridor to origins and destinations north and south of the study area.	Alignment options that meet this need would eliminate or reduce conflict between regional and local traffic in a manner that accommodates regional origins and destinations and the high volume of trucks and vehicle traffic that currently use and are anticipated to travel the corridor.
Accommodate Local Traffic – numerous, uncontrolled access configurations along Route 220, combined with high regional through traffic movement create traffic delays and contribute to high crash rates for travelers within the corridor accessing residences, commercial buildings, and schools.	Alignment options that meet this need would eliminate or reduce unsafe interactions between local and regional traffic, while maintaining adequate local access.
Address Geometric Deficiencies and Inconsistencies – Current geometric conditions along Route 220, such as lane widths, horizontal curves, and stopping sight distances, are below current design standards and vary along the length of the corridor, resulting in safety concerns for all users.	Alignment options that meet this need would address the current geometric deficiencies and inconsistencies on Route 220, thus improving driver safety by meeting current design standards for geometry, clear zone and access management.

Centerlines of the alignments options were developed connecting Route 220 at the North Carolina state line to various locations along Route 58 to the north. Following these centerlines, an initial 300-foot corridor analysis was conducted for each of the potential alignment roadway footprints. This bandwidth was expanded at the interchange locations to account for worst-case impacts based on preliminary traffic analysis operational needs. This estimated width was used to account for the new access controlled roadway, anticipated drainage and stormwater needs, any grading needed to tie-in with existing ground, or where frontage roads would be necessitated along reconstructed portions of Route 220. As part of the initial engineering screening, natural, socioeconomic, and cultural resources were identified within the study area. Streams, including those with threatened and endangered species, and wetlands were identified from existing databases. Additional information on the affected environment and environmental consequences is included in **Chapter 3: Affected Environment and Environmental Consequences** of the Draft EIS and the ***Natural Resources Technical Report*** (VDOT, 2020d).

Alignment options to the west of the Commonwealth Crossing Business Centre that would then continue west of existing Route 220 to Route 58 were deemed infeasible, as they each required a new interchange and a considerable amount of new roadway in North Carolina – the study's Purpose and Need limits related improvements to north of the North Carolina state line. In order to avoid impacts to the Commonwealth Crossing Business Centre as well as achieve adequate roadway grades in this portion of the study area, a much longer indirect alignment to the west side of the Commonwealth Crossing development would be necessitated, extending improvements into North Carolina. Furthermore, such improvements would not be consistent with the current transportation plans for both the North Carolina Department of Transportation (NCDOT) and Rockingham County, North Carolina. These western roadway alignment options would each require over ten miles of new roadway through more mountainous terrain, increasing

the costs of these options considerably when compared to other alignments.

Each of the alignment options were presented at the January 23, 2019 Citizen Information Meeting (CIM) and discussed at monthly agency coordination meetings (see **Chapter 6: Comments and Coordination** of the Draft EIS for more information). As a result of this initial screening in addition to monthly discussions with agencies and input from the public, VDOT recommended that Alignment Options 1, 3, 4A, 4B, and 4D be carried forward for further consideration and that Alignment Options 2, 4C, 5A, 5B, 5C, and 5D not be carried forward for consideration. Multimodal alignment options were also considered, but not carried forward for consideration as they were determined not to represent adequate solutions to address the Purpose and Need. At the March 13, 2019 agency meeting, the Concurring Agencies, informed by public comment, concurred with VDOT's recommendations to consider Alignment Options 1, 3, 4A, 4B, and 4D and further recommended that a modification to Alignment Option 4C also be carried forward for consideration.

Descriptions of the alignment options not carried forward for consideration, and the reasons for their elimination based on the Purpose and Need, are included in **Section 2.2**. Upon receiving agency concurrence on the range of alternatives, VDOT began preliminary engineering analyses and initial evaluations of the options listed below, which were formally identified as alternatives to be carried forward for potential evaluation in the Draft EIS and were renamed as follows.

- No-Build Alternative – previously named Alignment Option 1
- Alternative A – previously named Alignment Option 4A
- Alternative B – previously named Alignment Option 4B
- Alternative C – previously named Alignment Option 4C
- Alternative D – previously named Alignment Option 4D
- Alternative E – previously named Alignment Option 3

Descriptions of the alternatives carried forward for evaluation, as well as the reasons why they were carried forward for evaluation, are included in **Section 2.3**. The identification and evaluation of a reasonable range of alternatives is consistent with FHWA's Technical Advisory *T6640.8A Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987). The Recommendation on the Range of Alternatives document noting how each alignment option addresses the need elements of the purpose statement is included in **Appendix A.** This document was used as the basis for discussion with the resource agencies between October 2018 and March 2019. Agencies provided concurrence for the alternatives carried further for evaluation at the March 13, 2019 agency coordination meeting.

2.2 ALIGNMENT OPTIONS NOT CARRIED FORWARD

As discussed in **Section 2.1**, eleven total alignment options were developed and evaluated, as shown in **Figure 2-1**. Five of the alignment options were not carried forward for evaluation or estimated for costs: Alignment Options 2, 5A, 5B, 5C, and 5D. Below is a discussion of each option and the reason(s) each was not carried forward for further evaluation.

2.2.1 Alignment Option 2 – Transportation System Management (TSM) and Travel Demand Management (TDM) Improvements

Alignment Option 2 would maintain Route 220 as it exists today, with improvements to more effectively control the movement of traffic or reduce travel demand within the existing roadway footprint. Transportation System Management (TSM) improvements are primarily focused on reducing congestion or increasing mobility, while Transportation Demand Management (TDM) is intended to influence behaviors of travelers utilizing a roadway facility, through ridesharing

incentives, telework, options, or other strategies and policies to reduce or redistribute travel demand. Examples of TSM that could be implemented within the study area include, but are not limited to incorporating adaptive traffic signals or other Intelligent Transportation System (ITS) devices to better control traffic flow and provide consistent travel times through the corridor; modifying intersections to reduce the number of conflict points and improve sight distance; combining or eliminating driveways to reduce the number of access points; and constructing low-cost geometric improvements such as lengthening turn lanes and widening shoulders. TDM strategies may include constructing park-and-ride facilities within the study area, improvements (e.g., sidewalks, crosswalks) for non-motorized users, and encouraging other ways to reduce the number of daily trips in the study area, such as teleworking and carpooling.

2.2.1.1 Accommodating Regional Traffic

TSM and TDM improvements may improve localized mobility and provide some measure of improved mobility for regional traffic traveling through the study area; however, in the absence of access control, the regional traffic would still be subject to conflict points and interference with local access through the study area. Regional traffic travel times would not likely be substantially decreased through the implementation of TSM and TDM improvements, as local access conflicts would remain along Route 220 in the study area. Since focused isolated improvements would not address all elements of the identified Purpose and Need along the corridor, a TSM and TDM alternative was not carried forward. TSM and TDM improvements; however, would not be precluded from future implementation outside the scope of this study.

2.2.1.2 Accommodating Local Traffic

Considering the local and regional traffic characteristics of Route 220 in the study area, benefits to local traffic associated with the implementation of any TSM and TDM measures would be minimal as interference created by the volume of trucks and other regional traffic would continue to inhibit local mobility, even with access improvements potentially associated with TSM and TDM. Additionally, those improvements that would benefit regional traffic mobility would likely have some negative impact on local traffic by eliminating driveways and existing access on Route 220. Implementation of innovative intersections at particular locations along the corridor may result in right of way impacts to the multiple residential and commercial properties that currently have access or property frontage along existing Route 220.

2.2.1.3 Addressing Geometric Deficiencies and Inconsistencies

TSM and TDM improvements that modify intersections and traffic signals, reduce conflict points, increase sight distance, consolidate access points, or upgrade shoulders would not address geometric deficiencies and inconsistencies, as the scope of work of these minor improvements would not correct substandard curves and abrupt changes in grade that exist along Route 220.

As a standalone alternative, the TSM and TDM alignment option does not satisfy the study's Purpose and Need; however, implementation of TSM and TDM improvements is not precluded from being implemented as part of a preferred alternative that may advance from this study and/or as standalone projects along the Route 220 corridor.

2.2.1.4 Other Considerations

Alignment Option 2 was not carried forward for evaluation. TSM and TDM improvements would not address the geometric deficiencies and inconsistencies and would not separate local and regional traffic. The agencies concurred with not carrying forward this alignment option for detailed evaluation on March 13, 2019.

2.2.2 Alignment Option 5A

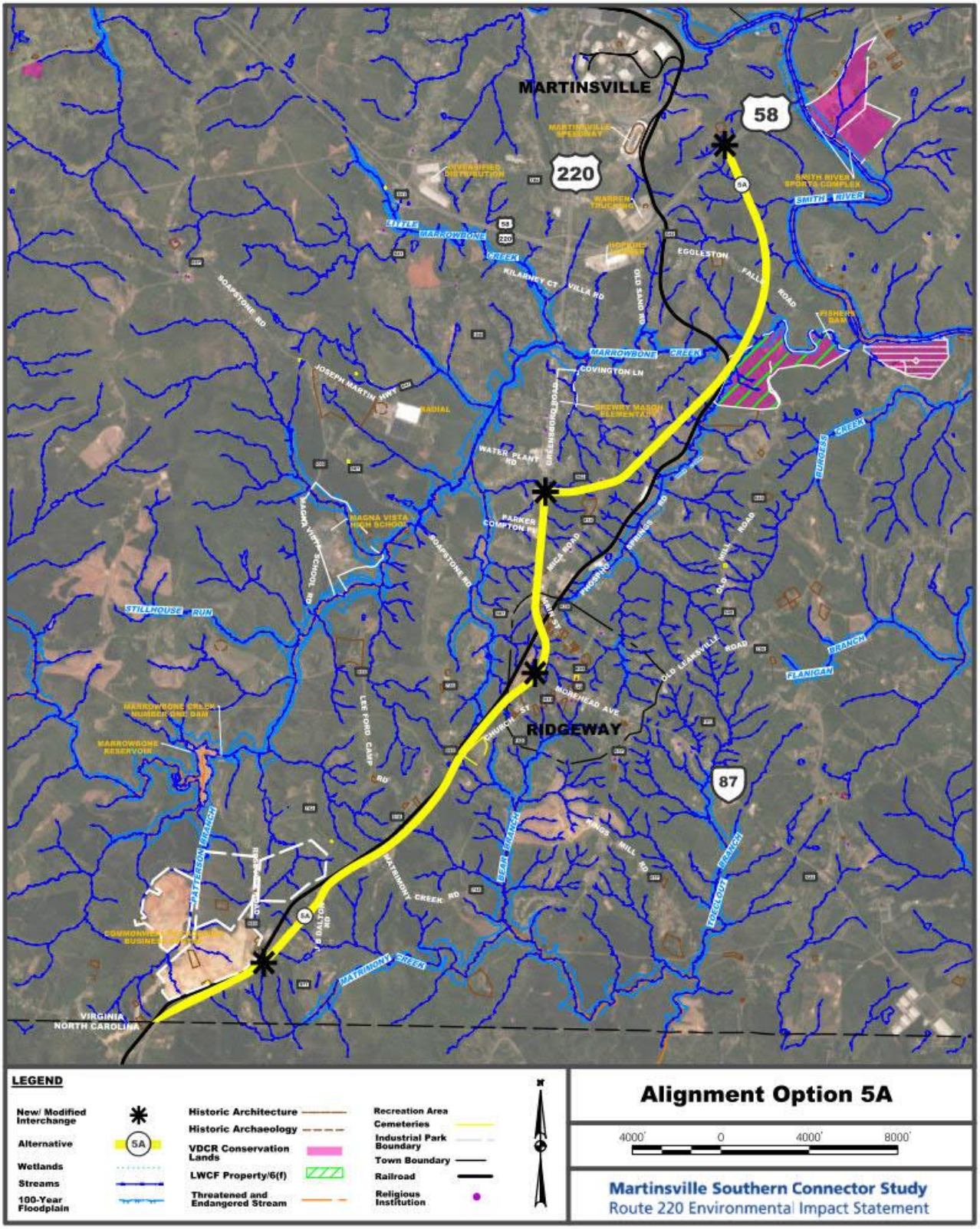
Alignment Option 5A, shown in **Figure 2-2**, would include reconstruction of existing Route 220 and the incorporation of access control for approximately five miles north of the North Carolina state line until just south of Mica Road. From just south of Mica Road, the facility would then proceeds onto new location to the east of existing Route 220, where a new interchange would be built near Route 689 (Reservoir Road). Under Alignment Option 5A, the existing at-grade railroad crossing on Reservoir Road would be maintained. Grade separations (bridges) would be built at Lee Ford Camp Road/Church Street and Main Street/Soapstone Road. A new interchange at the location where Alignment Option 5A deviates from Route 220 would provide direct access to Route 220 to the north, as well as access to Soapstone Road, Mica Road, and Morehead Ave. From this new interchange, the new alignment branches off to the northeast, crossing over Mica Road, parallel to Reds Creek before bridging over the Norfolk Southern railroad and Marrowbone Creek. The alignment continues northeast, proceeding west of Fisher Farm Park, crossing the railroad and Marrowbone Creek. After crossing Marrowbone Creek, the alignment shifts to the north, crossing Eggleston Falls Road and two minor tributaries of the Smith River before tying in to Route 58 at a new interchange approximately 1.2 miles to the east of the interchange at Route 220 and 1.3 miles to the west of the interchange at Irisburg Road.

2.2.2.1 Accommodating Regional Traffic

Existing regional traffic patterns indicate that nearly 85 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks traveling through the study area, 81 percent continue to the west on Route 58. Of the trucks traveling eastbound on Route 58 into the study area, 66 percent continue through without stopping and over two-thirds of them travel southbound on Route 220 to North Carolina. Future traffic forecasting suggests that these regional through travel demand trends" would remain relatively consistent in the 2040 design year. In 2040, 78 percent of the trucks entering Route 220 from North Carolina are anticipated to represent regional through trips traveling through the study area without stopping. Similarly, 79 percent of truck traffic on Route 58 westbound from Route 220 is expected to be through truck traffic in 2040, and 63 percent of the trucks traveling eastbound on Route 58 into the study area represent regional through trips.

Alignment Option 5A would benefit regional traffic by providing an access-controlled roadway from the North Carolina state line to Route 58 that would be free of traffic signals, cross streets, and driveways; however, the potential northern interchange located approximately 1.2 miles to the east of the current northern interchange at Route 220/Route 58 creates a more circuitous route for the majority of the regional traffic that travels to and from the west and south, adding approximately three miles to the trip. Those traveling to and from the west and south might be inclined to use Route 220 instead of the new roadway due to its shorter distance and, as a result, shorter travel time.

Figure 2-2: Alignment Option 5A



2.2.2.2 Accommodating Local Traffic

Alignment Option 5A would introduce changes to local traffic patterns. With the implementation of access control in the reconstruction existing Route 220, all cross streets and driveway entrances that currently have direct access to existing Route 220 from the North Carolina state line to north of the Main Street/Soapstone Road intersection near Ridgeway would connect to frontage roads that would divert traffic to interchanges. Where Alignment Option 5A would divert to new location east of existing Route 220, many residences and businesses from north of Main Street/Soapstone Road, just north of Ridgeway, to the existing interchange with Route 58 would maintain the current access configurations along existing Route 220. A detailed traffic analysis was not performed to determine how the frontage roads would function, as Alignment Option 5A was not carried forward for evaluation. However, 40 percent of 775 respondents to the purpose and need survey indicated that access to local destinations was a positive characteristic within the corridor, supporting the need for maintaining accommodations for local traffic on Route 220 in the study area (see **Chapter 6: Comments and Coordination** of the Draft EIS for more information). While frontage roads would separate regional traffic from local trips, this separation would be detrimental to local traffic – access to local destinations would be impaired and more circuitous routes would be required.

2.2.2.3 Addressing Geometric Deficiencies and Inconsistencies

Under Alignment Option 5A, the full reconstruction of Route 220 from the North Carolina state line to north of the Lee Ford Camp Road/Church Street intersection, just south of Ridgeway would address the geometric deficiencies on Route 220, as the new construction through this segment would bring the horizontal and vertical curves up to current design standards, providing adequate stopping sight distance through the study area. The removal of these geometric deficiencies and application of access management principles would improve safety by potentially reducing the crash rates that are currently three times higher than the statewide average through this segment. As noted in **Chapter 1: Purpose and Need** of the Draft EIS, over 50 percent of the crashes occurring within this segment can be attributed to geometric deficiencies and insufficient stopping sight distances.

2.2.2.4 Other Considerations

Alignment Option 5A would require four new interchanges to allow access to Route 220, Morehead Avenue, and Route 58; whereas many of the other alignment options considered require only three. Alignment Option 5A would require over four miles of frontage roads from the North Carolina state line to north of Main Street/Soapstone Road intersection near Ridgeway and three new bridges either over or under existing roadways where no interchanges or access would be provided. Alignment Option 5A would require the new roadway to cross over the Norfolk Southern railroad twice – each crossing requires at least 23 feet of vertical clearance from the top of the rail to the bottom of the bridge[9]. The bridge over the railroad on Route 220 north of Ridgeway is one of the two locations, which would need to be fully replaced to accommodate the reconstructed roadway. A new bridge over the railroad would be needed near Fisher Farm Park to the north. The roadway parallels Reds Creek between this new railroad bridge and the new bridge that would be required over Marrowbone Creek, approximately 900 feet to the north, and high retaining walls likely would be needed to minimize grading impacts into Reds Creek. Assuming a maximum grade of four percent the bridge span over Marrowbone Creek would also need to be approximately 70 feet over the creek.

[9] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT, 2013).

Alignment Option 5A was not carried forward for detailed evaluation in this Draft EIS. While Alignment Option 5A addresses the geometric deficiencies and inconsistencies, the other need elements, including separation of local and regional traffic and truck travel demand particularly north of Lee Ford Camp Road/Church Street to north of the Main Street/Soapstone Road intersection near Ridgeway, would not be met with this option. The anticipated design elements needed to cross the railroad and creeks would also greatly increase the cost, rendering this alignment option not to be considered prudent or practicable for further evaluation or future implementation. The agencies concurred with not carrying forward this alignment option for evaluation on March 13, 2019.

2.2.3 Alignment Option 5B

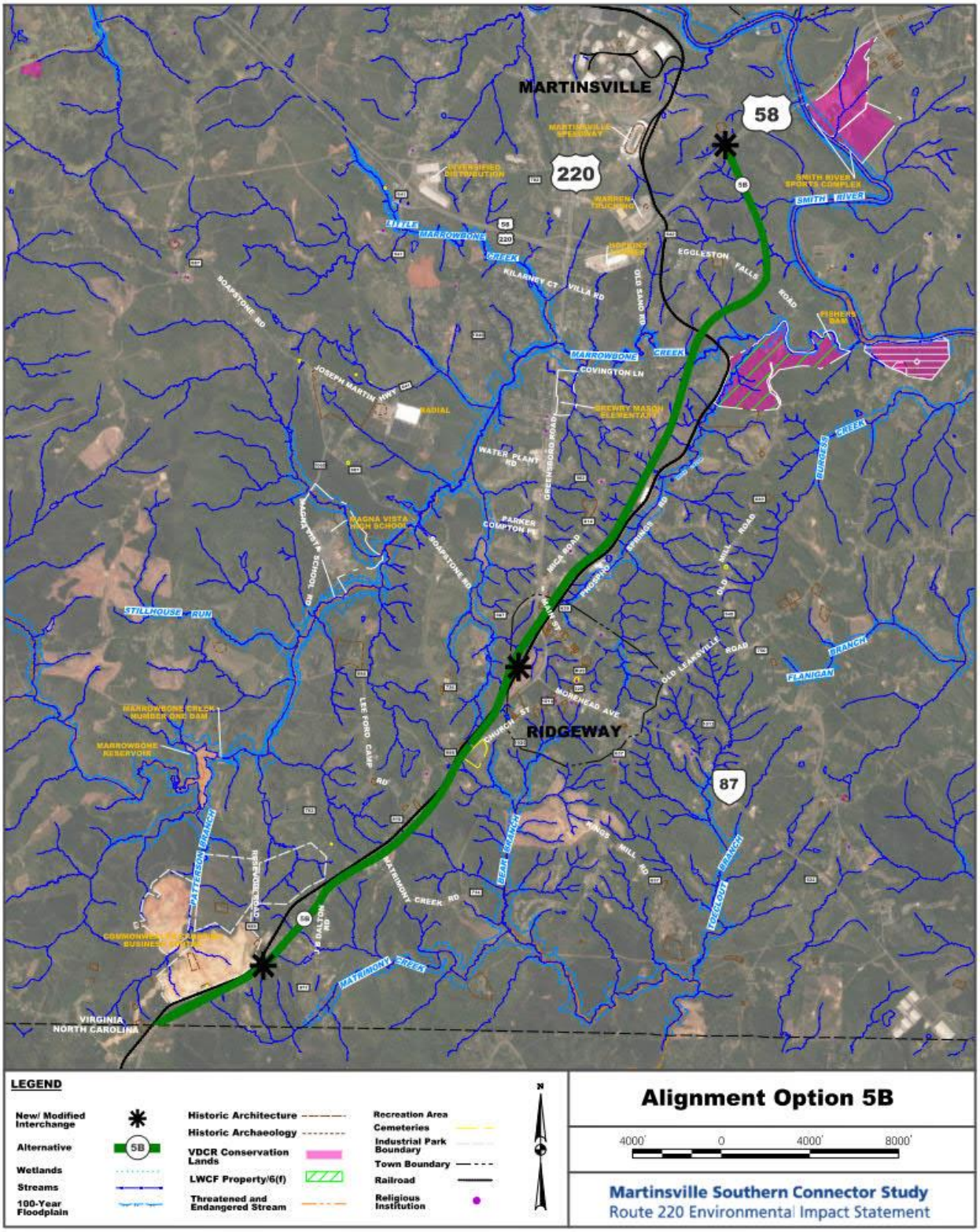
Alignment Option 5B, shown in **Figure 2-3**, would include reconstruction of existing Route 220 and the incorporation of access control for approximately 3.4 miles north of the North Carolina state line, and divert to the west to cross over the Norfolk Southern railroad, approximately 0.3 miles north of the Lee Ford Camp Road/Church Street intersection. A new interchange would be built near Reservoir Road, as well as a bridge at Lee Ford Camp Road/Church Street. The alignment would then parallel the railroad on its west side beyond Ridgeway. Morehead Avenue would be extended across the railroad to Soapstone Road and a new interchange would be built to the west; it is also assumed that the existing Route 220 roadway between the point where the alignment would split from Route 220 and Soapstone Road would be abandoned, eliminating the existing bridge over the railroad. North of Ridgeway, the alignment would cross over both Main Street and Mica Road, continuing to the northeast. The alignment would follow the railroad tracks for approximately 1.5 miles and then proceed north to cross Route 638 (Pulaski Road), Marrowbone Creek, and the railroad once again. Alignment Option 5B would then proceed to the northeast, crossing through a large farm area and forest before crossing Eggleston Falls Road. The alignment would then proceed to north and follow Alignment Option 5A to Route 58, where a new interchange would be constructed.

2.2.3.1 Accommodating Regional Traffic

Existing regional traffic patterns indicate that most of the travel is to and from the south and west of the study area. Nearly 85 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks traveling through the study area, 81 percent continue to the west on Route 58. Of the trucks traveling eastbound on Route 58 into the study area, 66 percent continue through without stopping and over two-thirds of them travel southbound on Route 220 to North Carolina. Future traffic forecasting suggests that these regional through travel demand trends would remain relatively consistent in the 2040 design year. In 2040, 78 percent of the trucks entering Route 220 from North Carolina are anticipated to represent regional through trips traveling through the study area without stopping. Similarly, 79 percent of trucks on Route 58 westbound from Route 220 are expected to be through truck traffic in 2040, and 63 percent of the trucks traveling eastbound on Route 58 into the study area represent regional through trips.

Alignment Option 5B would benefit regional traffic by providing an access-controlled roadway from the North Carolina state line to Route 58 that would be free of traffic signals, cross streets, and driveways; however, the interchange located approximately 1.2 miles to the east of the current northern interchange at Route 58 would create a more circuitous route for the majority of the regional traffic that travels to and from the west and south, adding approximately two miles to the trip. Those traveling to and from the west and south might be inclined to use existing Route 220 instead of the new roadway due to its shorter distance and travel time.

Figure 2-3: Alignment Option 5B



2.2.3.2 Accommodating Local Traffic

Local traffic along Route 220 from the North Carolina state line to north of the Lee Ford Camp Road/Church Street intersection, just south of Ridgeway would be adversely affected, as drivers would need to travel up to two miles along frontage roads to reach a conceptual interchange at Reservoir Road to access existing Route 220. The removal of regional traffic and crossovers in this segment would eliminate several conflict points and provide an overall safety benefit to both local and regional traffic. A detailed traffic analysis was not performed to determine how the frontage roads would function, as Alignment Option 5B was not carried forward for evaluation. However, 40 percent of 775 respondents to the purpose and need survey indicated that access to local destinations was a positive characteristic within the corridor, supporting the need for maintaining accommodations for local traffic on Route 220 in the study area (see **Chapter 6: Comments and Coordination** of the Draft EIS for more information). While frontage roads would separate regional from local traffic, this separation would be detrimental to local traffic – access to local destinations would be impaired and more circuitous routes, as noted previously, would be required.

2.2.3.3 Addressing Geometric Deficiencies and Inconsistencies

The full reconstruction along Route 220 from the North Carolina state line to north of the Lee Ford Camp Road/Church Street intersection, just south of Ridgeway would address the geometric deficiencies on Route 220, as the new construction through this segment would bring the horizontal and vertical curves up to current design standards, providing adequate stopping sight distance through the study area. The removal of these geometric deficiencies and reconstructing Route 220 as an access-controlled roadway would lead to a reduction of the crash rates that are currently three times higher than the statewide average through this segment.

2.2.3.4 Other Considerations

The direct connection evaluated between Soapstone Road and Morehead Avenue would require a third new structure across the Norfolk Southern railroad and considerable grading on each side of the railroad for the approach roadways. In addition to the new bridge on Morehead Avenue over the railroad, Alignment Option 5B would require the new Route 220 roadway to cross over the Norfolk Southern railroad twice, with the existing Route 220 crossing over the railroad near Ridgeway being abandoned. Most of the other alignment options initially considered would only require a single crossing.

North of Ridgeway, the new roadway parallels the railroad for approximately 1.5 miles and would cross over Main Street as well. At its highest point, the new roadway would be over 50 feet above the railroad, which would likely require retaining walls between the new roadway and the railroad or result in considerable additional right of way impacts to the west. The northern bridge over the railroad would be close to Marrowbone Creek and the bridge over Marrowbone Creek would need to be approximately 60 feet above the creek.

While Alignment Option 5B addresses the geometric deficiencies and inconsistencies, local and regional traffic would not be accommodated with this alignment option, including the primary regional through movements from the south and west of the study area. The anticipated design elements, including considerable infrastructure or anticipated right of way acquisition needed to cross the railroad and creeks would also greatly increase the cost. Based on the Purpose and Need and other considerations described above, Alignment Option 5B was not considered prudent or practicable for further evaluation or future implementation The agencies concurred with not carrying forward this alignment option for evaluation on March 13, 2019.

2.2.4 Alignment Option 5C

Alignment Option 5C, shown in **Figure 2-4**, would include reconstruction of existing Route 220 and the incorporation of access control, approximately nine miles long primarily on new alignment. Alignment 5C would reconstruct existing Route 220 alignment for 0.4 miles from the North Carolina state line. From its southern connection to existing Route 220, the alignment would proceed off the eastern side of existing Route 220 and continue in an easterly direction, paralleling Matrimony Creek. A segment of existing Route 220 would be realigned, and a new interchange would be constructed near the point where the new roadway would separate from the existing roadway. The alignment would cross J.B. Dalton Road and continue eastward for approximately one mile before turning northeasterly, crossing three minor tributaries and one larger tributary of Matrimony Creek, as well as Kings Mill Road. The alignment would then shift northward and follow a small ridge east of Surry Martin Branch before crossing Morehead Avenue near Colonnade Court. An interchange would be provided at Morehead Avenue. The alignment would pass east of Ridgeway to avoid impacting existing homes on Hanover Place, Old Leaksville Road, Old Mill Road, and Mitchell Road. From there, the alignment would continue northeasterly and cross two utility corridors to the east of an existing power substation. Alignment Option 5C would then proceed north and continue across Old Mill Road, crossing into Fisher Farm Park for approximately 0.3 miles. It would then cross Marrowbone Creek, Eggleston Falls Road, and two minor tributaries of the Smith River before tying in with Route 58 at the same location as Alignment Options 5A and 5B.

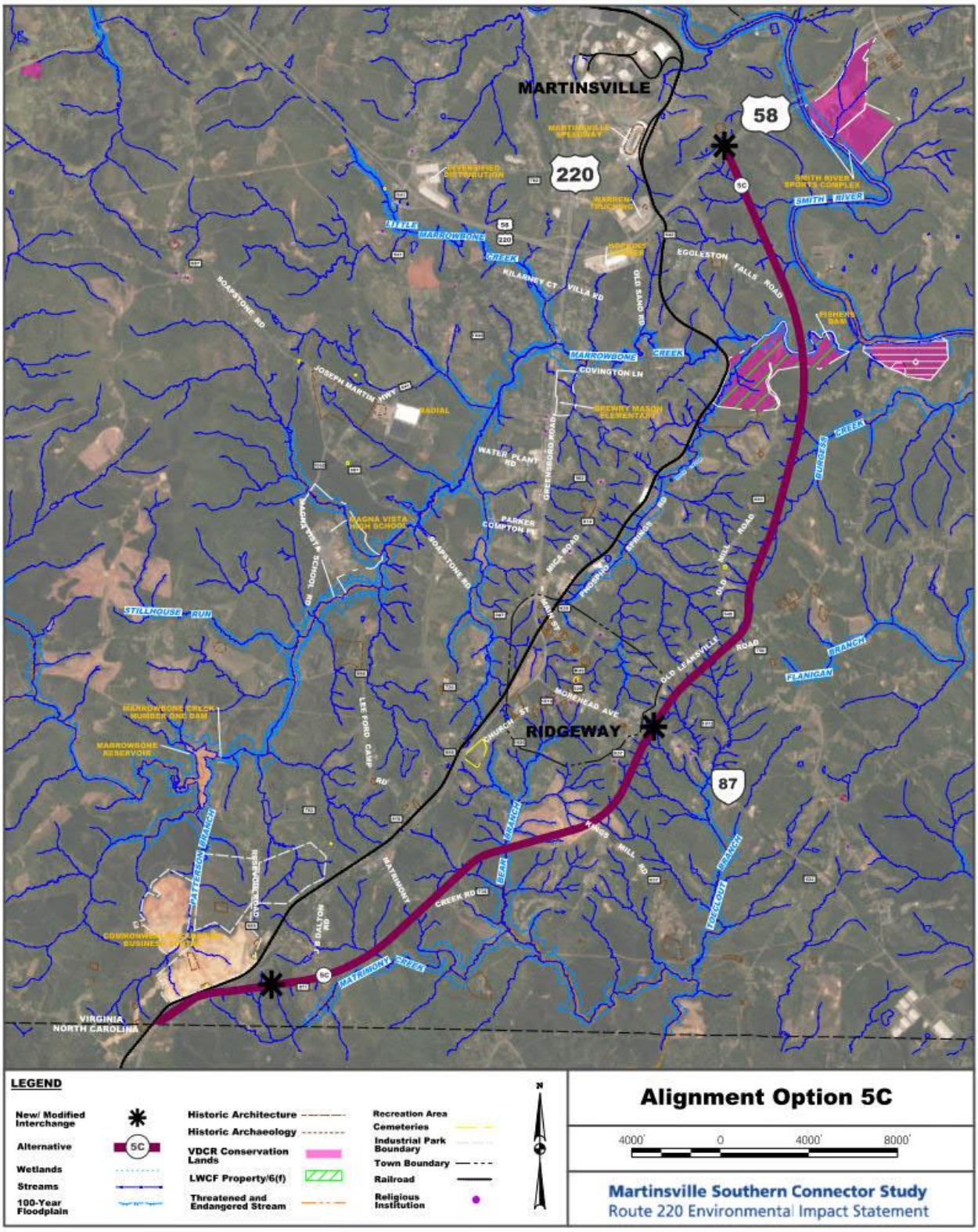
2.2.4.1 Accommodating Regional Traffic

Existing regional traffic patterns indicate that most of the travel is to and from the south and west of the study area. Nearly 85 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks traveling through the study area, 81 percent continue to the west on Route 58. Of the trucks traveling eastbound on Route 58 into the study area,66 percent continue through it without stopping and over two-thirds of them travel southbound on Route 220 to North Carolina. Future traffic forecasting suggests that these regional through travel demand trends would remain relatively consistent in the 2040 design year. In 2040, 78 percent of the trucks entering Route 220 from North Carolina are anticipated to represent regional through trips traveling through the study area without stopping. Similarly, 79 percent of trucks on Route 58 westbound from Route 220 are expected to be through truck traffic in 2040; and 63 percent of the trucks traveling eastbound on Route 58 into the study area represent regional through trips.

Alignment Option 5C would benefit regional traffic by providing an access-controlled roadway from the North Carolina state line to Route 58 that would be free of traffic signals, cross streets, and driveways; however, the interchange located approximately 1.2 miles to the east of the current northern interchange at Route 58 would create a more circuitous route for the majority of the regional traffic that travels to and from the west and south, adding approximately six miles to the trip. Those traveling to and from the west and south might be inclined to use existing Route 220 instead of the new roadway due to its shorter distance and, as a result, shorter travel time. A trip on Alignment Option 5C would be over five miles longer than traveling on existing Route 220 for these drivers.

Alignment Option 5C would provide a benefit to the regional traffic by diverting the traffic that currently travels to and from manufacturing centers in Eden, North Carolina and points south onto the new roadway, as opposed to using Morehead Avenue through Ridgeway. Traffic within Ridgeway would also benefit with reduced traffic congestion as a result of the regional traffic bypassing Morehead Avenue.

Figure 2-4: Alignment Option 5C



2.2.4.2 Accommodating Local Traffic

Alignment Option 5C would maintain most of existing Route 220 as it exists today. The only properties that would require access via frontage roads are along southbound Route 220, south of J.B. Dalton Road, as well as properties on J.B. Dalton Road that would be south of the new roadway. Residents and business owners to the north would access the roadway as they do under existing conditions. A detailed traffic analysis was not performed to determine how the frontage roads would function, as Alignment Option 5C was not carried forward for evaluation.

Traffic volumes along existing Route 220 would decrease, which would likely result in a greater ability for drivers to enter Route 220 from side streets, reduced delays at intersections, and fewer crashes; however, most of the regional traffic that travels between points south and east of the study area would still use existing Route 220, as it would provide a direct through movement for regional traffic destined for points west and south of the study area.

2.2.4.3 Addressing Geometric Deficiencies and Inconsistencies

Seven of the 14 geometric deficiencies, which include three non-compliant roadway curves and 11 substandard stopping sight distances, would be directly addressed in Alignment Option 5C, through reconstructing the Route 220 roadway and providing a new interchange on the southern end of the alignment. The number of motorists traveling in the existing southbound lanes on Route 220 would be reduced, as users of the existing southbound roadway who are traveling to and from points east of the study area would divert to the new alignment.

2.2.4.4 Other Considerations

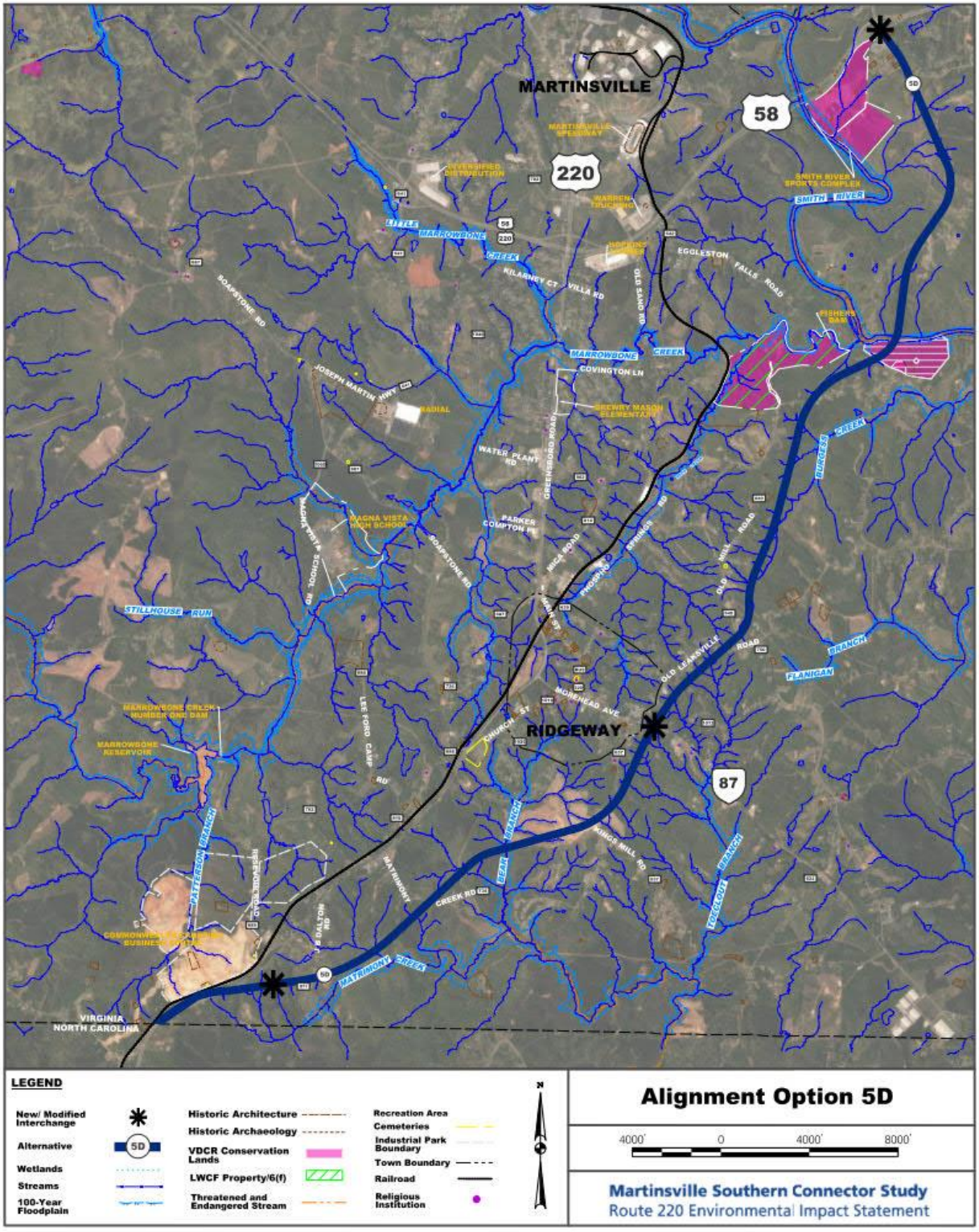
Alignment Option 5C is one of the longest alignments options, adding additional anticipated costs. The location of the interchange at Morehead Avenue would impact several existing businesses and residences to the east of Ridgeway. The new roadway alignment would closely parallel Matrimony Creek for 0.8 miles, such that retaining walls or engineered slopes may be needed to minimize impacts to this resource. Alignment Option 5C passes through Fisher Farm Park, which is protected under Section 6(f) of the Land and Water Conservation Fund Act of 1963 (LWCF), for 0.3 miles; and passes within 1,000 feet of existing athletic fields and facilities.

Alignment Option 5C would remove some of the geometric deficiencies in the existing corridor, but over half would remain on the southbound roadway. As a result of Alignment Option 5C only accommodating some of the regional traffic with limited benefits to local traffic, as well as the inability to address the geometric deficiencies on Route 220, Alignment Option 5C was not recommended to be carried forward for evaluation. The agencies concurred with the recommendation on March 13, 2019.

2.2.5 Alignment Option 5D

Alignment Option 5D, shown in **Figure 2-5**, would include the incorporation of an access-controlled, approximately ten-mile long roadway, located primarily on new alignment. Alignment Option 5D would be similar to Alignment Option 5C over much of its length, with the primary difference being the northern portion of the horizontal alignment and interchange location at Route 58. At the southern terminus, similar to Option 5C, Alignment Option 5D would deviate from Route 220 approximately 0.4 miles north of the North Carolina State line, proceeding in an easterly direction. A new interchange would be constructed to connect a realigned existing Route 220 to the new roadway. The alignment would cross J.B. Dalton Road and continue eastward for approximately one mile before turning northeasterly, crossing three minor tributaries and one larger tributary of Matrimony Creek, as well as Kings Mill Road. The alignment would then shift northward and follow a small ridge east of Surry Martin Branch before crossing Morehead Avenue near Colonnade Court. An interchange would be provided at Morehead Avenue.

Figure 2-5: Alignment Option 5D



The alignment would deviate from Alignment Option 5C just south of Old Mill Road. From this location, Alignment Option 5D would cross Old Mill Road and proceed eastward behind existing homes on Old Mill Road, in a more easterly direction than Alignment Option 5C. Alignment Option 5D would continue to proceed in an easterly direction, adjacent to Fisher Farm Park before crossing Eggleston Falls Road. This alignment would impact the Richard P. Gravely, Jr. Nature Preserve, with 0.4 miles of the alignment within the preserve, prior to crossing the Smith River. On the north side of the Smith River, the alignment would shift northeasterly crossing Beckham Church Road, then cross an existing utility easement twice before shifting northwesterly to meet Route 58 at the location of the existing interchange with Irisburg Road. The Irisburg Road interchange would be modified to provide a more direct connection between Route 58 and the new roadway, as well as reconnecting the two sides of Irisburg Road across Route 58.

2.2.5.1 Accommodating Regional Traffic

Existing regional traffic patterns indicate that most of the travel is to and from the south and west of the study area. Nearly 85 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks traveling through the study area, 81 percent continue to the west on Route 58. Of the trucks traveling eastbound on Route 58 into the study area, 66 percent of the trucks traveling eastbound on Route 58 into the study area continue through without stopping and over two-thirds of them travel southbound on Route 220 to North Carolina. Future traffic forecasting suggests that these regional through travel demand trends would remain relatively consistent in the 2040 design year. In 2040, 78 percent of the trucks entering Route 220 from North Carolina are anticipated to represent regional through trips traveling through the study area without stopping. Similarly, 79 percent of trucks on Route 58 westbound from Route 220 are expected to be regional through truck traffic in 2040; and 63 percent of the trucks traveling eastbound on Route 58 into the study area represent regional through trips.

Alignment Option 5D would benefit regional traffic by providing an access-controlled facility from the North Carolina state line to Route 58 that would be free of traffic signals, cross streets, and driveways; however, the interchange located approximately three miles to the east of the current northern interchange of Route 220 and Route 58. The interchange of Alignment Option 5D would create a more circuitous route for most of the regional traffic that travels to and from the west and south. Those traveling to and from the west and south might be inclined to use Route 220 instead of the new roadway due to its shorter distance and travel time. A trip on Alignment Option 5D would be over eight miles longer than traveling on existing Route 220 for these regional drivers.

Alignment Option 5D would provide a benefit to the regional traffic by diverting the traffic that currently travels to and from manufacturing centers in Eden, North Carolina and points south onto the new roadway, as opposed to using Morehead Avenue through Ridgeway. Traffic within Ridgeway would also benefit with reduced traffic congestion as a result of the regional traffic bypassing Morehead Avenue.

2.2.5.2 Accommodating Local Traffic

Alignment Option 5D would maintain most of Route 220 as it exists today. The only properties that would require access via frontage roads are along southbound Route 220, south of J.B. Dalton Road, as well as properties on J.B. Dalton Road that would be south of the new roadway. Residents and business owners to the north would access the roadway as they do today.

Traffic volumes along Route 220 would decrease, which would likely result in a greater ability for drivers to enter Route 220 from side streets, reduced delays at intersections, and fewer crashes; however, most of the regional traffic that travels between points south and west of the study area would still use existing Route 220.

2.2.5.3 Addressing Geometric Deficiencies and Inconsistencies

Seven of the 14 geometric deficiencies, which include three non-compliant roadway curves and 11 substandard stopping sight distances, would be directly addressed in Alignment Option 5D, through reconstructing the Route 220 roadway and providing a new interchange on the southern end of the alignment. The number of motorists traveling in the southbound lanes on Route 220 would be expected to decline, as users of the existing southbound roadway who are traveling to and from points east of the study area would divert to the new alignment.

2.2.5.4 Other Considerations

Alignment Option 5D is the longest of all the alignments located to the west, adding additional cost. In addition, Alignment Option 5D would directly impact publicly owned parks: the alignment would be adjacent to the Smith River Sports Complex but proceed through the Richard P. Gravely, Jr. Nature Preserve where there are trails and river access. The Smith River is designated as "Special Regulation Brown Trout Water" at the location of the potential crossing (VDGIF 2019a) and would require a 600-800-foot long bridge adding to the overall study cost.

When given the option of using the new roadway or the existing one, based on existing and forecasted future traffic patterns, the primary regional traffic movements traveling from the south and west ends of the study area would likely use the existing roadway. An eastern alignment option would create a more circuitous route for the majority of the regional traffic that travels to and from the west and south. Those traveling to and from the west and south might be inclined to use Route 220 instead of the new roadway due to its shorter distance and travel time. As a result, Alternative Option 5D would only improve traffic movements for regional through traffic traveling between the southern and eastern study limits (VDOT, 2020a). This is contrary to the Purpose and Need to accommodate regional traffic, as most of the traffic travels to and from the south and west. Local traffic would not be accommodated, considering that the majority of the regional traffic would remain on the existing roadway.

Alignment Option 5D, shown in **Figure 2-5**, was not carried forward primarily because it would not accommodate regional or local traffic. The only regional traffic movements captured are from Morehead Avenue and the traffic traveling between the south and east. The majority of the traffic travels between the southern and the western boundaries of the study area. The small volume of traffic diverted from Route 220 would not separate regional traffic from local traffic, and therefore does not meet the Purpose and Need. The agencies concurred with not carrying forward this alignment option for detailed evaluation on March 13, 2019.

2.2.6 Mass Transit Improvements

There is currently one mass transit service within the study area, the Piedmont Area Regional Transit (PART) shuttle service that serves Martinsville. The PART Southside Route serves the northernmost reaches of the study area, following a clockwise route every hour down Greensboro Road to a stop at Tractor Supply, then following Fisher Farm Road westward to a stop at DDI Logistics before turning northward on Joseph Martin Highway (WPPDC, 2017). However, within the study area transit services are not provided on existing Route 220 south of Route 58. There are currently no plans to expand the PART shuttle service south of Route 58 in the Henry County or West Piedmont Planning District Commission (WPPDC) long-range planning documents (WPPDC, 2017). Typically, Mass Transit would be considered a viable alternative in urban areas with populations over 200,000 (FHWA, 1987). Although the study area is considered urban (designated as growth areas), the current resident population within the study area is 7,849, while Henry County's resident population is 52,209 (see **Chapter 3: Affected Environment and Environmental Consequences** of the Draft EIS and the ***Socioeconomic and Land Use Technical Report*** [VDOT, 2020c]). As a standalone option, the Mass Transit Alternative would not satisfy the study's Purpose and Need as it would not eliminate or reduce conflict between

regional and local traffic nor would it address current geometric deficiencies and inconsistencies on Route 220. Therefore, it was not carried forward for detailed evaluation. However, the NEPA process does not preclude transit strategies from being implemented as part of a separate project in the future.

2.2.7 Non-Motorized Improvements

Improvements for non-motorized modes of transportation (e.g., bicycling, walking) do not satisfy the study's Purpose and Need. Therefore, non-motorized improvements were not carried forward for detailed evaluation. Several of the evaluated alignments would reduce the amount of traffic using Route 220, providing greater opportunities for east-west access as well as non-motorized facilities parallel to the roadway. The NEPA process does not preclude implementing these strategies as part of a separate project in the future.

3. ALTERNATIVES CARRIED FORWARD FOR EVALUATION

Following is a discussion of the alternatives carried forward for detailed evaluation, which include three Build Alternatives and a No-Build Alternative to provide a baseline for comparison. This approach is consistent with FHWA's Technical Advisory *T6640.8A Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987). The alignment options were presented at the January 23, 2019 CIM and discussed at monthly agency coordination meetings. Based on the results of this initial screening, VDOT recommended at these meetings that Alignment Options 1, 3, 4A, 4B, and 4D be carried forward for evaluation and that Alignment Options 2, 4C, 5A, 5B, 5C, and 5D not be carried forward. At the March 13, 2019 agency meeting, the Concurring Agencies, informed by public comment, concurred with VDOT's recommendations and further recommended that a modification to Alignment Option 4C also be carried forward for evaluation. These alignment options were formally identified as alternatives to be carried forward for evaluation in the Draft EIS and were renamed from the initial alignment options. Two of the alternatives that were carried forward for evaluation are no longer under consideration: Alternatives 3 (Alternative D) and 4D (Alternative E). Discussion of these alternatives is found in **Section 4**.

The design criteria used for each of the roadways are identified in **Appendix B**. The illustrative planning level limit of disturbance (LOD) for each of the alternatives that were carried forward can be found in **Appendix C**. In developing the LOD for each alternative, certain assumptions regarding interchange layouts, maximum roadway grades, median widths and lane configurations, and supporting slopes were made. These assumptions are identified in the description of each alternative. In addition, each alternative carried forward does not require any transportation improvements in North Carolina.

The four alternatives carried forward for detailed evaluation have been renamed from the initial alignment options and are identified as follows:

- No-Build Alternative – previously named Alignment Option 1
- Alternative A – previously named Alignment Option 4A
- Alternative B – previously named Alignment Option 4B
- Alternative C – previously named Alignment Option 4C

3.1 NO-BUILD ALTERNATIVE

In accordance with the regulations implementing NEPA [40 CFR §1502.14(d)], the No-Build Alternative has been included for evaluation as a basis for the comparison of future conditions and impacts. The No-Build Alternative would retain the Route 220 roadway and associated intersections and interchanges in their present configuration, allowing for routine maintenance and safety upgrades.

This alternative assumes no major improvements within the study area, except for previously committed projects that are programmed and funded in the VDOT SYIP for *Fiscal Year 2020-2025* (VDOT, 2019) and Henry County's Budget for FY 2019-2020 (County of Henry, 2018). As these other projects are independent of the evaluated alternatives, they are not evaluated in the Draft EIS.

3.1.1 Traffic Operations

This alternative would not improve mobility for local traffic and trucks to travel within the Route 220 corridor and adjacent roadways. Delays at existing signalized intersections would continue to increase and the non-recurring congestion due to crashes is anticipated to either remain the same or increase. According to AASHTO guidelines, "the frequency of traffic crashes on particular highway facilities is very strongly influenced by the traffic volumes present. Crash frequencies

generally increase with increasing traffic volumes, but this effect is generally nonlinear" (AASHTO, 2011). Consequently, under future conditions, if no additional improvements are made within study area, anticipated mobility issues would likely increase the potential for crashes along Route 220 which could increasingly lead to unexpected congestion due to the limited abilities for vehicles to bypass incidents.

3.1.2 Ability of the No-Build Alternative to Address the Purpose and Need

The No-Build Alternative would not address the Purpose and Need elements of the study, as identified in **Section 1.1** because routine maintenance and other programmed projects would not provide improved accommodation of regional and local traffic and would not address existing geometric deficiencies and inconsistencies.

3.2 ALTERNATIVE A

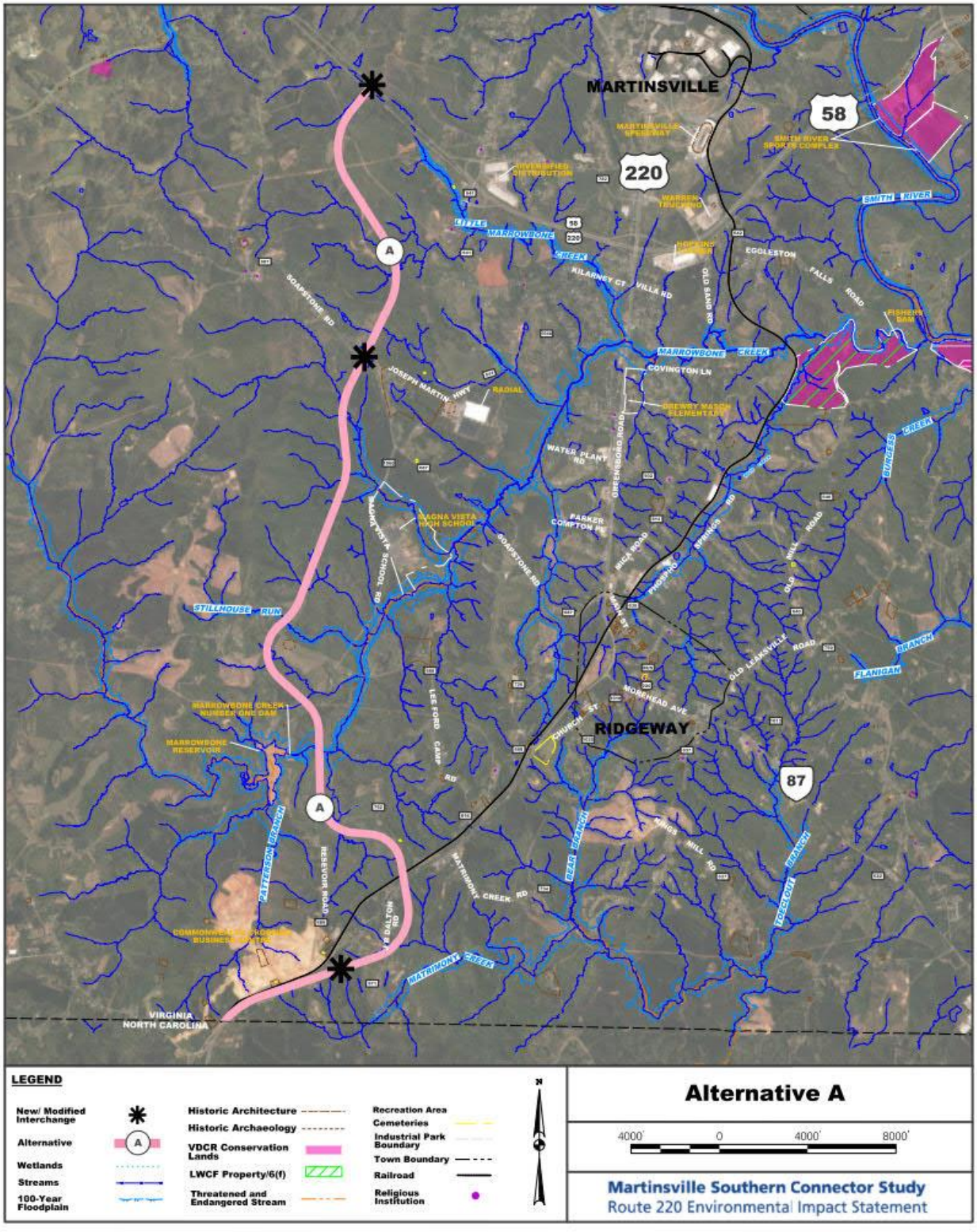
Alternative A, shown in **Figure 3-1**, would consist of a new roadway alignment that is primarily to the west of existing Route 220. Under Alternative A, access would be controlled and provided at three new interchanges. It is assumed that interchanges would be provided at both ends of the facility and one would be located along the corridor. For the purposes of the analyses in the Draft EIS, it is assumed this third interchange would occur at Soapstone Road. If this alternative were to advance to a phase of more detailed design, the final interchange locations and configuration would be refined. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control which is assumed to be limited to a new interchange at the southern connection to existing Route 220, a new interchange at Soapstone Road, and a new interchange on Route 220/Route 58 that would be 1 mile to the west of the existing interchange at Joseph Martin Highway. These conceptual interchange locations are shown as asterisks on **Figure 3-1**.

Alternative A is a divided highway with a grass median and two travel lanes in each direction over its entire length. Bridges would be required at the southern interchange of Alternative A and existing Route 220, existing Route 220 and the Norfolk Southern railroad, Marrowbone Creek, Lee Ford Camp Road, Soapstone Road, and at the new northern interchange at Route 58. A smaller structure would be required at the location where Alternative A crosses Stillhouse Run.

Beginning at the North Carolina state line, Alternative A would reconstruct Route 220 for approximately one mile, where it would shift eastward on a new alignment before turning to the north to cross over the Norfolk Southern railroad. The wide curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed and minimize potential impacts to residents in the vicinity of J.B. Dalton Road. At the Norfolk Southern railroad, Alternative A would cross at an angle that is close to perpendicular, with a minimum 23 feet of clearance above the rails in order to meet VDOT's minimum vertical clearance[10]. A new interchange to access a realigned Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. J.B. Dalton Road would be split by the new roadway; properties to the south of the roadway would have access to Route 220 via a new frontage road that would link to the new interchange and the northern section of J.B. Dalton Road would have access to existing Route 220.

[10] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT 2013).

Figure 3-1: Alternative A



After crossing the railroad, the new alignment would parallel White House Road along its south side and then shift to the northwest crossing Patterson Branch. The alignment would then shift to the north, following a small ridge between Patterson Branch and a tributary to Marrowbone Creek, before crossing Marrowbone Creek east of Marrowbone Dam. The alignment would continue north and to the west of a large farm/open field, crossing tributaries of Marrowbone Creek. The alignment would shift eastward and cross Lee Ford Camp Road, Stillhouse Run, and the floodplain. After crossing Stillhouse Run, the alignment would shift northward and continue for approximately one mile. The alignment would then continue north reaching Soapstone Road, where a conceptual interchange is located, west of the intersection with Joseph Martin Highway. An interchange with Alternative A would be constructed at Soapstone Road. The alignment would then turn to the northeast to cross three minor tributaries to Marrowbone Creek. The alignment continues in a northerly direction with a new interchange at Route 58, west of the interchange at Joseph Martin Highway.

3.2.1 Interchanges

Where interchanges have been identified as part of Alternative A, to implement access control on the new facility, the conceptual layouts and configuration have been preliminarily determined based on the anticipated traffic volumes and types of connections (i.e. service interchange to lower-order functional class roadway or system interchange to arterial facility or higher-order functionally classified roadway). The new southern interchange, where the new roadway would connect to existing Route 220 to the north, is assumed to be a standard diamond interchange. The new interchange at Soapstone Road is also assumed to be a standard diamond interchange, primarily due to the lower traffic levels forecasted at this connection. The new northern interchange at Route 58 would provide full non-stop directional movements. The Alternative A roadway would cross over Route 58 and the northbound to westbound movement would use a loop ramp with a design speed of 30 mph. Should this alternative advance for detailed engineering and design, refinements to the interchange locations and configuration would be evaluated to maximize the operational efficiency of the connection and to avoid or minimize impacts to the greatest extent practicable.

3.2.2 Limits of Disturbance

For the purposes of NEPA, a illustrative planning level LOD was established for all the alternatives carried forward for evaluation. This LOD was developed based on the study typical section and design criteria for the study. A wider footprint has been established at potential interchange locations to account for access ramps between Alternative A and the adjacent roadway. The LOD within the interchange areas has been established to conceptualize how the alternatives under evaluation would tie into existing roadway facilities and for the purposes of estimating potential impacts to environmental and human resources. The illustrative planning level LOD incorporates the limit of disturbance for the roadway construction, roadside grading and drainage, preliminary stormwater management facilities, and construction access. Additional information on the typical section and illustrative planning level LOD is included in **Section 5**. Detailed mapping for Alternative A is provided in **Appendix C**.

3.2.3 Traffic Operations

Alternative A would improve traffic flow by providing an efficient north-south connection for regional traffic between the North Carolina state line and Route 58. Route 220 is identified as a CoSS in *VTrans 2040* and is identified as an important freight route to support the region's economy (OIPI, 2015 and WPPDC, 2013). By diverting the regional traffic to an access-controlled facility, while maintaining existing Route 220 as a local business route, Alternative A would reduce travel times for most of the regional traffic while improving access for local traffic that currently

uses Route 220. The three new interchanges would support the mobility of regional traffic into and out of the study area.

The direct access configurations on existing Route 220 would remain the same for most of those living and working along the roadway. The only changes would occur in the southern part of the Route 220 corridor where access control would be implemented as part of the reconstruction of the existing facility. Along this segment, residents along northbound Route 220 would no longer have direct access to the roadway. Access would be provided by parallel frontage roads that connect to the southern interchange. Residents along J.B. Dalton Road south of the new roadway would access Alternative A from this new frontage road).

Although the access for local residents and businesses along existing Route 220 would remain generally consistent with current configurations, Alternative A would divert 12,200 average annual daily trips of the north-to-south regional vehicle trips onto the new access-controlled roadway, based on the 2040 forecasts. The regional through trips that would remain on Route 220 are part of the traffic that travels between the southern and eastern limits of the study area, as well as the traffic traveling on Morehead Avenue. As a result, overall delays would be reduced on Route 220. More detailed information on traffic data and analysis is documented in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

3.2.4 Ability of Alternative A to Address the Purpose and Need

3.2.4.1 Accommodating Regional Traffic

Under the No-Build Alternative, up to 31,900 vehicles are anticipated to travel along Route 220 within the study area in the year 2040. With the construction of Alternative A, the volumes anticipated to decrease to 22,000 vehicles. Under the 2040 forecasted traffic, Alternative A would carry up to 12,200 vehicles (VDOT, 2020a). Existing regional traffic patterns indicate that the majority of travel is to and from the south and west of the study area. Nearly 84 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks that are traveling through the study area, 75 percent continue to the west on Route 58. Of the trucks traveling westbound on Route 58 into the study area, 68 percent continue through it without stopping, and nearly two-thirds of them travel southbound on Route 220 to North Carolina, therefore a large portion of these trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative A[11].

Under Alternative A, truck volumes on existing Route 220 would be reduced by approximately 37 percent compared to the 2040 truck volumes under the No-Build Alternative. Compared to 2040 No-Build conditions, simulated average travel times under Alternative A would improve along the existing alignment in the northbound direction (13 percent and nine percent faster in the AM and PM peak period, respectively). Travel times would be 36 percent faster in the AM peak period and 29 percent faster in the PM peak period along the new alignment between the North Carolina state line and Route 58 compared to predicted travel times along existing Route 220 under the

[11] Travel patterns and forecasted travel demand have been estimated based on study-specific subarea travel demand model, developed and calibrated consistent with VDOT's *Travel Demand Modeling Policies and Procedures* as well as the methods described in the National Cooperative Highway Research Program's (NCHRP) Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* (VDOT, 2014 and TRB, 2014). Detailed discussions of the methods and findings of the travel demand modeling conducted for this study can be found in the ***Traffic and Transportation Technical Report*** (VDOT, 2019a). Final design-level traffic engineering and analysis would be conducted as part of advanced engineering and design on any improvements that advance from this study.

No-Build Alternative, thus improving regional traffic movements. Additional travel time information and operational analyses are included in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

3.2.4.2 Accommodating Local Traffic

Alternative A would carry up to 12,200 vehicles by 2040, resulting in the removal of 9,900 vehicles from existing Route 220, a reduction of approximately 31 percent compared to the No-Build Alternative (VDOT, 2020a). The lower traffic volumes on existing Route 220 would reduce delays at signalized intersections and would increase the number of gaps available for drivers on side streets to exit onto the roadway facility. The reduced regional traffic on existing Route 220 would potentially result in a decrease in crash rates. Alternative A would result in a minimal reduction in travel time along existing Route 220, when compared to the No-Build Alternative. However, while travel times along existing Route 220 under Alternative A would remain generally consistent compared to No-Build conditions, the change in traffic composition with regional traffic shifting to the new alignment would improve local traffic movements (VDOT, 2020a).

As previously mentioned, a large portion of trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative A. According to AASHTO guidelines, "trucks have a greater individual effect on highway traffic operation than do passenger vehicles. The effect on traffic operation of one truck is often equivalent to several passenger cars. The number of equivalent passenger cars equaling the effect of one truck is dependent on the roadway gradient and, for two-lane highways, on the available passing sight distance. Thus, the larger the proportion of trucks in a traffic stream, the greater the equivalent traffic demand and the greater the highway capacity needed" (AASHTO, 2011). Therefore, the reduction of trucks in the traffic system under Alternative A would decrease the potential for severe crashes and increase local connectivity by improving traffic operations on existing Route 220.

Alternative A would result in improvements to overall intersection delay on existing Route 220. As an example, the Soapstone Road/Main Street intersection currently (2018) has an overall delay during the morning peak of 29 seconds and an overall delay of 45 seconds in the afternoon peak hour. In 2040, with Alternative A constructed, the overall forecasted delay would be the same 29 seconds in the morning but reduces to 33 seconds in the afternoon – a reduction of 25 percent (VDOT, 2020a). This simulated delay may be further reduced or vary slightly depending on actual travel conditions and driver decisions and behavior.

Additionally, this travel time saving applies to emergency vehicles as well with improved access to and from communities along Route 220 through reduced delay times due to the lower volume of traffic. In addition, emergency response may be improved to the communities west of Route 220 through use of the new roadway and interchange provided at Soapstone Road. Alternative A would provide a secondary north/south roadway for emergency vehicles to access points along and within the study area. Alternative A would potentially impact an unnamed cemetery along Soapstone Road.

3.2.4.3 Addressing Geometric Deficiencies and Inconsistencies

Under Alternative A, the new roadway alignment would be constructed to meet current design standards. The southernmost portion under Alternative A, (approximately 1.7 miles) of existing Route 220 would be reconstructed, which would bring the horizontal and vertical curves up to current design standards in this section, and address the majority of the geometric deficiencies identified in this segment of existing Route 220. Two instances of substandard stopping sight distance and radii on the southbound approach to the new southern interchange are not addressed with this alternative alignment; however, these could possibly be addressed during detailed design. While allowing these deficiencies to remain is undesirable, a mitigating factor is

the reduction in the number of vehicles traveling this segment of the corridor. Currently, approximately 6,000 vehicles travel southbound from Ridgeway toward the North Carolina state line on Route 220 each day. With the construction of Alternative A, the forecasted volume using the southbound roadway in 2040 would be less than 4,000 (VDOT, 2020a).

Alternative A, as well as segments of existing roadways (e.g., Soapstone Road) that are included in the interchange or adjacent work, would be built to the latest VDOT design standards. This would reduce both the overall lane miles of substandard elements as well as the volume of drivers traversing roadway segments that are non-conforming.

3.2.5 Impacts

Since Alternative A is the westernmost alignment near more of the undeveloped land, it would have the least amount of potential property relocations. Most relocations would be residential and there would be no commercial impacts. **Table 3-1** summarizes the impacts associated with Alternative A. More detailed environmental information can be found in the ***Martinsville Southern Connector Study Natural Resources Technical Report*** (VDOT, 2020d).

Table 3-1: Impacts Summary – Alternative A

Resource	Impacts
Potential Residential Relocations	17
Potential Commercial Relocations	0
Other Potential Relocations*	1
Streams (Linear Feet)	28,998
Wetlands (Acres)	7.8
Forest (Acres)	296
Historic Sties (Number of Properties)**	4

*Includes: Industrial, Institutional, and Cemeteries
**Number of properties on or eligible for listing on the National Register of Historic Places (NRHP)

3.2.6 Cost Estimate

A preliminary estimate was developed for each alternative carried forward for evaluation to measure the quantities and costs of major items anticipated for the conceptual design. All costs were developed using the VDOT Project Cost Estimating System (PCES), Version 7.10 and published VDOT District averages of unit prices. Individual major quantities were multiplied by the unit cost, whereas major quantities that are a group of standard items were calculated using a lump sum. More details on the quantities and correlating unit prices for this alternative can be found in **Appendix E**. A more detailed description of how each section of the major items was determined can also be found in **Section 6**.

The main sections of quantities calculated can be broken down to general, grading, drainage, pavement, incidental, protective, erosion control, utility, and traffic control and safety items. This sum was then added to the total right of way, construction inspection, construction contingency, and escalation costs to develop the total estimated construction cost. Alternative A would be approximately $757,343,311 to construct. A summary of these estimated costs is provided in **Table 3-2**.

Table 3-2: Estimated Costs – Alternative A

Cost Item	Total
Construction and Preliminary Engineering	$737,222,427
Right of Way	$16,968,884
Utilities	$3,152,000
Total Cost	**$757,343,311**

3.2.7 Other Considerations

In accordance with VDOT standards, Alternative A would cross over the Norfolk Southern railroad with a minimum clearance of 23 feet between the top of the rails and bottom of the roadways structure[12]. Route 220 and the railway follow along a ridge between the Matrimony Creek and Marrowbone Creek watersheds in this area. In some areas, the new roadway would be between 40-50 feet above existing ground; for estimating purposes, it was assumed that this would be a fill material and not a structure.

Alternative A would follow along the eastern edge of the foothills near Chestnut Knob. There is a high likelihood of rock immediately below the surface. As Alternative A approaches the new interchange at Route 58 from the south, there is an existing ridge that would require rock removal for the roadway. Alternative A crosses over two existing utility easements for high tension lines and there is a third easement for a new power line connection to Commonwealth Crossing Business Centre. These unique conditions have been considered in the illustrative planning level cost estimate for Alternative A; however, a full understanding of these constraints and cost implications would be developed as part of more detailed design for this alternative.

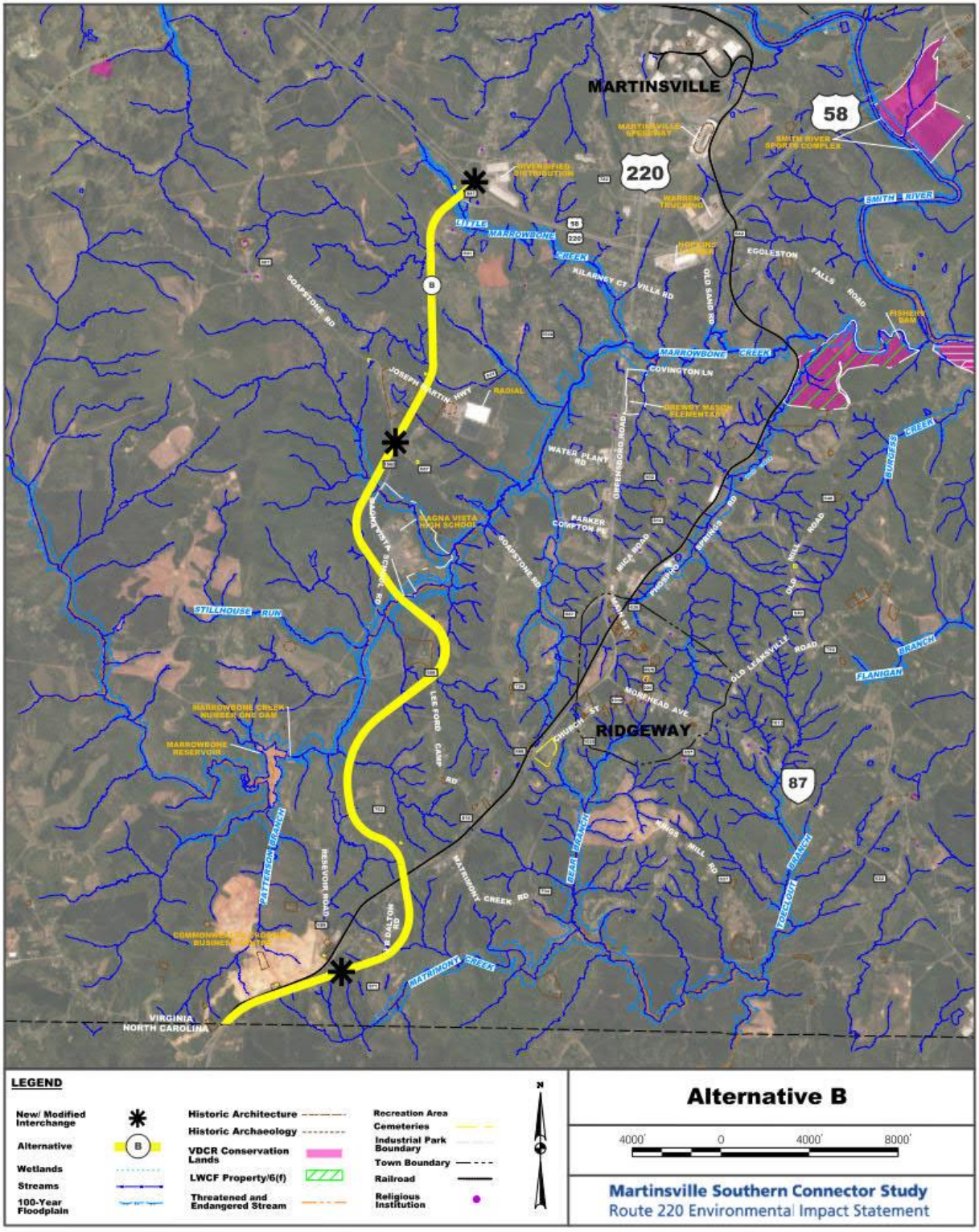
3.3 ALTERNATIVE B

Alternative B, shown in **Figure 3-2**, would consist of a new roadway alignment that is primarily to the west of existing Route 220. Under Alternative B, access would be controlled and provided at two new interchanges and a modified interchange at Route 58 and the Joseph Martin Highway. For the purposes of the analyses in this Draft EIS it is assumed that new interchanges would be provided at the southern end of the facility and at Soapstone Road. If this alternative were to advance to a phase of more detailed design, the final interchange locations and configuration would be refined. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

Alternative B is assumed to be a divided highway with a grass median and would have two travel lanes in each direction over its entire length. Bridges would be required at the southern interchange of Alternative B and existing Route 220; existing Route 220 and the Norfolk Southern railroad; Lee Ford Camp Road; Marrowbone Creek; Magna Vista School Road; Soapstone Road; Joseph Martin Highway; and at the new northern interchange at Route 58. Smaller structures, likely culverts, would be required at the location where Alternative B would cross an unnamed tributary to Marrowbone Creek and Little Marrowbone Creek.

[12] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT 2013).

Figure 3-2: Alternative B



Beginning at the North Carolina state line, Alternative B would reconstruct of Route 220 for approximately one mile, where it would shift eastward before turning to the north to cross over the Norfolk Southern railroad. The wide horizontal curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed, as well as minimize potential impacts to residents in the vicinity of J.B. Dalton Road.

A new interchange to access a realigned existing Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. J.B. Dalton Road would be split by the new roadway; properties to the south of the roadway would have access to Route 220 via a frontage road that links to the new interchange and the northern section would have access to existing Route 220. From there, Alternative B would cross over the Norfolk Southern railroad at an angle that is close to perpendicular, with a minimum 23 feet of clearance above the rails in order to meet VDOT's minimum vertical clearance[13]. After crossing the railroad, the new alignment would parallel White House Road along its south side and then shift to the northwest to cross Patterson Branch. The alignment would then gradually shift from the northwest to the northeast and cross three tributaries to Marrowbone Creek. The alignment would continue in a northeasterly direction and cross over Lee Ford Camp Road, where it would then pass to the east of the Marrowbone Plantation and Marrowbone Creek. A short section of frontage road would be provided to the east of Alternative B that connects the property to the north of Marrowbone Plantation to Lee Ford Camp Road.

After crossing Marrowbone Creek, Alternative B would continue to the northwest, crossing Magna Vista School Road south of the high school, then paralleling Magna Vista School Road to its intersection with Soapstone Road. The interchange of Alternative B with Soapstone Road would require the relocation of a portion of Magna Vista School Road. From the Soapstone Road service interchange, the alignment would continue to the northeast and cross two minor tributaries before shifting to the north. The alignment would then shift to the northeast to cross Little Marrowbone Creek and tie in with Joseph Martin Highway at its interchange with Route 58, requiring modifications to the existing interchange configuration to provide a more direct connection between Route 58 and the new roadway. The reconstructed portion of Route 220 at the southern end, along with the new alignment, would be an access-controlled facility.

3.3.1 Interchanges

Similar to Alternative A, where interchanges have been identified as part of Alternative B, to implement access control on the new facility, the conceptual layouts and configurations have been primarily determined based on the anticipated traffic volumes and types of connections (i.e. service interchange to lower-order functional class roadway or system interchange to arterial facility or higher-order functionally classified roadway). The new southern interchange, where the new roadway connects to existing Route 220 to the north, would be a standard diamond interchange. The new interchange at Soapstone Road would also be a standard diamond interchange, primarily due to the low traffic levels anticipated at this connection. The modified interchange at Joseph Martin Highway that is assumed for this study would be a combination of a diamond interchange with a flyover ramp. Joseph Martin Highway would be relocated approximately 500 feet to the east, intersecting Fisher Farm Road at a new intersection. The Alternative B roadway would cross over the bypass and connect directly to the section of Joseph Martin Highway north of Fisher Farm Road. Should this alternative advance for detailed engineering and design, refinements to the interchange locations and configuration would be

[13] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT 2013).

evaluated to maximize the operational efficiency of the connection and to avoid or minimize impacts to the greatest extent practicable.

3.3.2 Limits of Disturbance

For the purposes of NEPA, a illustrative planning level LOD was established for all the alternatives carried forward for evaluation. This LOD was developed based on the study typical section and design criteria for the study. A wider footprint has been established at potential interchange locations to account for access ramps between Alternative B and the adjacent roadway. The LOD within the interchange areas has been established to conceptualize how the alternatives under evaluation would tie into existing roadway facilities and for the purposes of estimating potential impacts to environmental and human resources. The illustrative planning level LOD incorporates the limit of disturbance for the roadway construction, roadside grading and drainage, preliminary stormwater management facilities, and construction access. Additional information on the typical section and illustrative planning level LOD is included in **Section 5**. Detailed mapping for Alternative B is provided in **Appendix C**.

3.3.3 Traffic Operations

Alternative B would improve traffic flow by providing an efficient north-south connection for regional traffic between the North Carolina state line and Route 58. Route 220 is identified as a CoSS in *VTrans 2040* and is identified as an important freight route to support the region's economy (OIPI, 2015 and WPPDC, 2013). By diverting the regional traffic to an access-controlled facility while maintaining existing Route 220 as a local business route, Alternative B would reduce travel times for most of the regional traffic while improving access for local traffic that currently uses Route 220. The two new interchanges on the new roadway, as well as the reconfigured interchange at Route 58, would support the mobility of regional traffic into and out of the study area.

The direct access configurations on existing Route 220 would remain the same for most of the population living and working along the roadway. The only changes would occur in the southern part of the Route 220 corridor where access control would be implemented as part of the reconstruction of the existing facility. Along this segment, residents along northbound Route 220 would no longer have direct access to the roadway. Access would be provided by a parallel frontage road that connects to the southern interchange. Residents along J.B. Dalton Road south of the new roadway would access Alternative B from this new frontage road.

Although the access for local residents and businesses along existing Route 220 would remain generally consistent with current configurations, Alternative B would divert 12,800 average annual daily trips of the north-to-south regional vehicle trips onto the new access-controlled roadway, based on the 2040 forecasts. The regional through trips that would remain on Route 220 are part of the traffic that travels between the southern and eastern limits of the study area, as well as the traffic traveling on Morehead Avenue. As a result, overall delays would be reduced on Route 220. More detailed information on traffic data and analysis is documented in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

3.3.4 Ability of Alternative B to Address the Purpose and Need

3.3.4.1 Accommodating Regional Traffic

Under the No-Build Alternative, up to 31,900 vehicles are anticipated to travel along Route 220 within the study area in the year 2040. With the construction of Alternative B, the volume is anticipated to decrease to 22,000 vehicles. Under the 2040 forecasted traffic, Alternative B would carry up to 12,800 vehicles (VDOT, 2020a). Existing regional traffic patterns indicate that the majority of the travel is to and from the south and west of the study area. Nearly 84 percent of the

trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks that are traveling through the study area, 75 percent continue to the west on Route 58. Of the trucks traveling westbound on Route 58 into the study area, 68 percent continue through it without stopping and nearly two-thirds of them travel southbound on Route 220 to North Carolina, therefore, a large portion of these trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative B[14].

Under Alternative B, truck volumes on existing Route 220 would be reduced by approximately 40 percent compared to the 2040 truck volumes under the No-Build Alternative. Compared to 2040 No-Build conditions, simulated average travel times under Alternative B would improve along the existing alignment in the northbound direction (15 percent and two percent faster in the AM and PM peak period, respectively). Travel times would be 27 percent faster in the AM peak period and 22 percent faster in the PM peak period along the new alignment between the North Carolina state line and Route 58 compared to predicted travel times along existing Route 220 under the No-Build Alternative, thus improving regional traffic movements. Additional travel time information and operational analyses are included in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

3.3.4.2 Accommodating Local Traffic

A Alternative B would carry up to 12,800 vehicles by 2040, resulting in the removal of 9,900 vehicles from the existing Route 220, a reduction of approximately 31 percent compared to the No-Build Alternative (VDOT, 2020a). The lower traffic volumes on existing Route 220 would reduce delays at signalized intersections and would increase the number of gaps available for drivers on side streets to exit onto the roadway facility. The reduced regional traffic on the existing Route 220 would potentially result in a decrease in crash rates. lternative B would result in a minimal reduction in travel time along existing Route 220, when compared to the No-Build Alternative. However, while travel times along existing Route 220 under Alternative B would remain generally consistent compared to No-Build conditions, the change in traffic composition with regional traffic shifting to the new alignment would improve local traffic movements (VDOT, 2020a).

As previously mentioned, a large portion of trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative B. According to AASHTO guidelines, “trucks have a greater individual effect on highway traffic operation than do passenger vehicles. The effect on traffic operation of one truck is often equivalent to several passenger cars. The number of equivalent passenger cars equaling the effect of one truck is dependent on the roadway gradient and, for two-lane highways, on the available passing sight distance. Thus, the larger the proportion of trucks in a traffic stream, the greater the equivalent traffic demand and the greater the highway capacity needed” (AASHTO, 2011). Therefore, the reduction of trucks in the traffic system under Alternative B would decrease the potential for severe crashes and increase local connectivity by improving traffic operations on existing Route 220.

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[14] Travel patterns and forecasted travel demand have been estimated based on study-specific subarea travel demand model, developed and calibrated consistent with VDOT’s *Travel Demand Modeling Policies and Procedures* as well as the methods described in the NCHRP Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* (VDOT, 2014 and TRB, 2014). Detailed discussions of the methods and findings of the travel demand modeling conducted for this study can be found in the ***Traffic and Transportation Technical Report*** (VDOT, 2019a). Final design-level traffic engineering and analysis would be conducted as part of advanced engineering and design on any improvements that advance from this study.

Alternative B would result in improvements to overall intersection delay on existing Route 220. As an example, the Soapstone Road/Main Street intersection currently (2018) has an overall delay during the morning peak of 29 seconds and an overall delay of 45 seconds in the afternoon peak hour. In 2040, with Alternative B constructed, the overall delay reduces to 14 seconds in the morning and reduces to 31 seconds in the afternoon – a reduction of over 50 percent in the morning and 30 percent in the afternoon (VDOT, 2020a). This simulated delay may be further reduced or vary slightly depending on actual travel conditions and driver decisions and behavior.

Additionally, the reduction in traffic would decrease community fragmentation through reduced delay times and would improve community cohesion. This travel time saving applies to emergency vehicles as well with improved access to and from communities along Route 220 through reduced delay times due to the lower volume of traffic. In addition, emergency response may be improved to the communities west of Route 220 through use of the new roadway and interchange provided at Soapstone Road. Alternative B would provide a secondary north/south roadway for emergency vehicles to access points along and within the study area.

3.3.4.3 Addressing Geometric Deficiencies and Inconsistencies

Under Alternative B, the new roadway alignment would be constructed to meet current design standards. The southernmost portion under Alternative B, (approximately 1.7 miles) of existing Route 220 would be reconstructed, which would bring the horizontal and vertical curves up to current design standards in this section and would address the majority of the geometric deficiencies identified in this segment of existing Route 220. Two instances of substandard stopping sight distances and radii on the southbound approach to the new southern interchange are not addressed with this alternative alignment; however, these could possibly be addressed during detailed design. While allowing these deficiencies to remain is undesirable, a mitigating factor is the reduction in the number of vehicles traveling this segment of the corridor. Currently, approximately 6,000 vehicles travel southbound from Ridgeway toward the North Carolina state line on Route 220 each day. With the construction of Alternative B, the forecasted volume using the southbound roadway in 2040 would be less than 4,000 (VDOT, 2020a).

Alternative B, as well as segments of existing roadways (e.g., Soapstone Road) that are included in the interchange or adjacent work, would be built to the latest VDOT design standards. This would reduce both the overall lane miles of substandard elements as well as the volume of drivers traversing roadway segments that are non-conforming.

3.3.5 Impacts

Alternative B's alignment shifts more toward the developed areas to connect to the existing interchange at Joseph Martin Highway – this makes it have more potential property relocations than Alternatives A or C. Most of the relocations would be residential, except for five other non-residential relocations (i.e. industrial, institutional, or cemeteries). **Table 3-3** summarizes the impacts associated with Alternative B. More detailed environmental information can be found in the ***Martinsville Southern Connector Study Natural Resources Technical Report*** (VDOT, 2020d).

Table 3-3: Impacts Summary – Alternative B

Resource	Impacts
Potential Residential Relocations	26
Potential Commercial Relocations	0
Other Potential Relocations*	5
Streams (Linear Feet)	20,548
Wetlands (Acres)	5.9
Forest (Acres)	259
Historic Sties (Number of Properties)**	5

*Includes: Industrial, Institutional, and Cemeteries
**Number of properties on or eligible for listing on the National Register of Historic Places (NRHP)

3.3.6 Cost Estimate

A preliminary estimate was developed for each alternative carried forward for evaluation to measure the quantities and costs of major items anticipated to be in the conceptual design. All costs were developed using the VDOT PCES, Version 7.10, and published VDOT District averages of unit prices. Individual major quantities were multiplied by the unit cost, whereas major quantities that are a group of standard items were calculated using a lump sum. More details on the quantities and correlating unit prices for this alternative can be found in **Appendix E**. A more detailed description of how each section of the major items was determined can also be found in **Section 6**.

The main sections of quantities calculated can be broken down to general, grading, drainage, pavement, incidental, protective, erosion control, utility, and traffic control and safety items. This sum was then added to the total right of way, construction inspection, construction contingency, and escalation costs to develop the total estimated construction cost. Alternative B would be approximately $745,841,928 to construct. A summary of these estimated costs is provided in **Table 3-4**.

Table 3-4: Estimated Costs – Alternative B

Cost Item	Total
Construction and Preliminary Engineering	$713,020,442
Right of Way	$29,855,486
Utilities	$2,966,000
Total Cost	**$745,841,928**

3.3.7 Other Considerations

In accordance with VDOT standards, Alternative B would cross over the Norfolk Southern railroad with a minimum clearance of 23 feet between the top of the rails and bottom of the roadway structure[15]. Route 220 and the railroad follow along a ridge between the Matrimony Creek and Marrowbone Creek watersheds in this area. In some areas, the new roadway would be between 40-50 feet above existing ground; for estimating purposes it was assumed that this would be a fill material and not a structure.

Alternative B would intersect two existing utility easements for high tension lines and there is a third easement for a new power line connection to Commonwealth Crossing Business Centre.

[15] Minimum vertical clearance acceptable for roadway sections crossings of the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT 2013).

These unique conditions have been considered in the illustrative planning level cost estimate for Alternative B; however, a full understanding of these constraints and cost implications would be developed as part of more detailed design for this alternative.

3.4 ALTERNATIVE C (PREFERRED ALTERNATIVE)

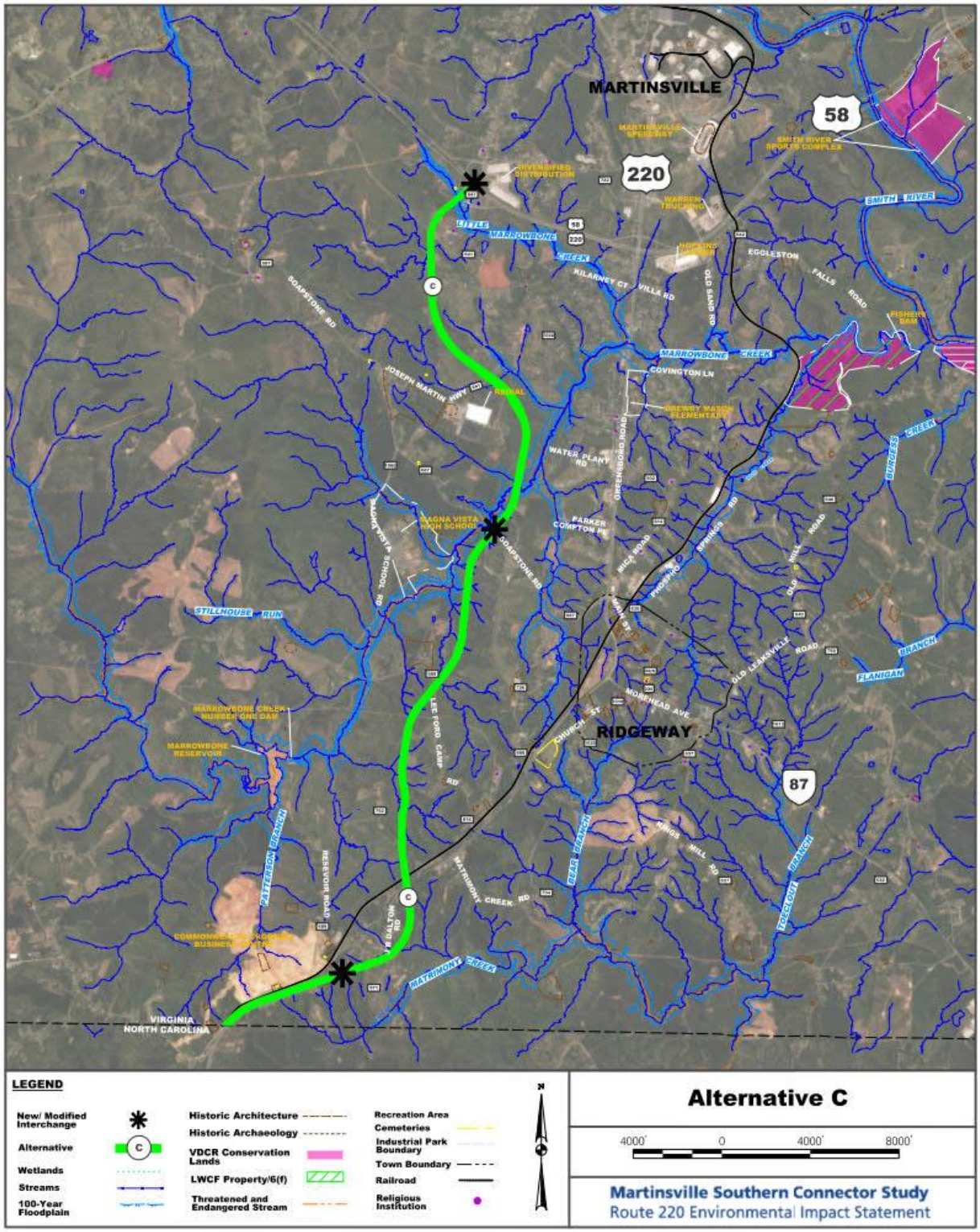
Alternative C, shown in **Figure 3-3**, would consist of a roadway alignment that is primarily to the west of existing Route 220. Alternative C was developed as a modification of the initially considered Alignment Option 4C based on agency comments, with the primary changes occurring north of Soapstone Road. Alignment Option 4C originally included an interchange located between Joseph Martin Highway and Route 220, however, adequate spacing could not be provided to accommodate all movements. Therefore, the alignment was shifted to tie in at the location of the existing Joseph Martin Highway interchange. Under Alternative C, access would be controlled and provided at two new interchanges and a modified interchange at Route 220/Route 58 and Joseph Martin Highway. For the purposes of the analyses in the Draft EIS it is assumed that new interchanges would be provided at the southern end of the facility and at Soapstone Road. If this alternative were to advance to a phase of more detailed design, the final interchange locations and configuration would be refined. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

Alternative C is assumed to be a divided highway with a grass median and would have two travel lanes in each direction over its entire length. Bridges would be required at the southern interchange of Alternative C and existing Route 220; existing Route 220 and the Norfolk Southern railroad; White House Road; Lee Ford Camp Road; Soapstone Road; Marrowbone Creek; Joseph Martin Highway; and at the new northern interchange at Route58. A smaller structure, likely a culvert, would be required at the location where Alternative C crosses Little Marrowbone Creek.

Beginning at the North Carolina state line, Alternative C would reconstruct Route 220 for approximately one mile, where it would shift eastward on a new alignment before turning to the north to cross over the Norfolk Southern railroad at an angle that is close to perpendicular, with at least 23 feet of clearance above the rails. The wide curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed and minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. J.B. Dalton Road would be split by the new roadway; properties to the south of the roadway would have access to Route 220 via a frontage road that links to the new interchange and the northern section would have access to existing Route 220.

After crossing the railroad, the new alignment would continue northward for approximately 1.5 miles, crossing White House Road and a minor tributary to Marrowbone Creek. Alternative C would then shift to the northeast to cross Lee Ford Camp Road and a minor tributary. The alternative would then shift northward and parallel Marrowbone Creek (which is to the west) and the existing Pace airport runway to the east. The alignment would then shift to the northeast and cross Soapstone Road to the east of Marrowbone Creek. An interchange would be constructed at Soapstone Road. North of Soapstone Road, Alternative C would cross Marrowbone Creek on a new bridge. The alignment would then shift eastward and cross Joseph Martin Highway near the Radial Fulfillment Center. The alignment would continue to the northeast and crosses two minor tributaries before shifting to the north. The alignment would then shift to the northeast to cross Little Marrowbone Creek and tie in with Joseph Martin Highway at its existing interchange location with Route 58. This would require modifications to the existing interchange to provide a more direct connection between Route 58 and the new roadway.

Figure 3-3: Alternative C


MARTINSVILLE
RIDGEWAY
58
220
87
LEGEND
New/ Modified Interchange
Alternative
Wetlands
Streams
100-Year Floodplain
Historic Architecture
Historic Archaeology
VDCR Conservation Lands
LWCF Property/6(f)
Threatened and Endangered Stream
Recreation Area
Cemeteries
Industrial Park Boundary
Town Boundary
Railroad
Religious Institution
Alternative C
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

3.4.1 Interchanges

Similar to Alternative A and B, where interchanges have been identified as part of Alternative C, to implement access control on the new facility, the conceptual layouts and configurations have been primarily determined based on the anticipated traffic volumes and types of connections (i.e. service interchange to lower-order functional class roadway or system interchange to arterial facility or higher-order functionally classified roadway). The new southern interchange, where the new roadway connects to existing Route 220 to the north, would be a standard diamond interchange. The new interchange at Soapstone Road would also be a standard diamond interchange, primarily due to the low traffic levels anticipated at this connection. The modified interchange at Joseph Martin Highway that is assumed for this study would be a combination of a diamond interchange with a flyover ramp and cloverleaf for the traffic movements from Alternative C onto Route 58 westbound and the westbound Route 58 traffic onto southbound Alternative C, respectively. Joseph Martin Highway would be relocated to the east, intersecting with Fisher Farm Road at a new intersection. The Alternative C roadway would cross over the bypass and connect directly to the section of Joseph Martin Highway north of Fisher Farm Road. Should this alternative advance for detailed engineering and design, refinements to the interchange locations and configuration would be evaluated to maximize the operational efficiency of the connection and to avoid or minimize impacts to the greatest extent practicable.

3.4.2 Limits of Disturbance

For the purposes of NEPA, a illustrative planning level LOD was established for all the alternatives carried forward for evaluation. This LOD was developed based on the study typical section and design criteria for the study. A wider footprint has been established at potential interchange locations to account for access ramps between Alternative C and the adjacent roadway. The LOD within the interchange areas has been established to conceptualize how the alternatives under evaluation would tie into existing roadway facilities and for the purposes of estimating potential impacts to environmental and human resources. The illustrative planning level LOD incorporates the limit of disturbance for the roadway construction, roadside grading and drainage, preliminary stormwater management facilities, and construction access. Additional information on the typical section and illustrative planning level LOD is included in **Section 5**. Detailed mapping for Alternative C is provided in **Appendix C**.

3.4.3 Traffic Operations

This alternative would improve traffic flow by providing an efficient north-south connection for regional traffic between the North Carolina state line and Route 58. Route 220 is identified as a CoSS in *VTrans 2040* and is identified as an important freight route to support the region's economy (OIPI, 2015 and WPPDC, 2013). By diverting the regional traffic to an access-controlled facility, while maintaining existing Route 220 as a local business route, Alternative C would reduce travel times for most of the regional traffic while improving access for local traffic that currently uses Route 220. The two new interchanges on the new roadway, in addition to the reconfigured interchange with Joseph Martin Highway and Route 58 would support the mobility of regional traffic into and out of the study area.

The direct access configurations on existing Route 220 would remain the same for most of those living and working along the roadway. The only changes would occur in the southern part of the Route 220 corridor where access control would be implemented as part of the reconstruction of the existing facility. Along this segment, residents along northbound Route 220 would no longer have direct access to the roadway. Access would be provided by a parallel frontage road that connects to the southern interchange. Residents along J.B. Dalton Road south of the new roadway would also access Alternative C from this new frontage road.

Although the access for local residents and businesses along existing Route 220 would remain generally consistent with current configurations, Alternative C would divert 12,800 average annual daily trips of the north-to-south regional through traffic onto the new access-controlled roadway, based on the 2040 forecasts. The regional through trips that would remain on Route 220 are part of the traffic that travels between the southern and eastern limits of the study area, as well as the traffic traveling on Morehead Avenue. As a result, overall delays would be reduced on Route 220. More detailed information on traffic data and analysis is documented in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

3.4.4 Ability of Alternative C to Address the Purpose and Need

3.4.4.1 Accommodating Regional Traffic

Under the No-Build Alternative, up to 31,900 vehicles are anticipated to travel along Route 220 within the study area in the year 2040. With the construction of Alternative C, the volume is anticipated to decrease to 22,000 vehicles. Under the 2040 forecasted traffic, Alternative C would carry up to 12,800 vehicles (VDOT, 2020a). Existing regional traffic patterns indicate that the majority of travel is to and from the south and west of the study area. Nearly 84 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks that are traveling through the study area, 75 percent continue to the west on Route 58. Of the trucks traveling westbound on Route 58 into the study area, 68 percent continue through without stopping and nearly two-thirds of them travel southbound on Route 220 to North Carolina; therefore, a large portion of these trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative C[16].

Under Alternative C, truck volumes on existing Route 220 would be reduced by approximately 40 percent compared to the 2040 truck volumes under the No-Build Alternative. Compared to 2040 No-Build conditions, simulated average travel times under Alternative C would improve along the existing alignment in both directions, except in the PM peak period during which travel times would remain similar to the No-Build scenario (0.5 percent faster in the southbound direction and 13 percent faster in the southbound direction during the AM peak period). Travel times would be 33 percent faster in the AM peak period and 28 percent faster in the PM peak period along the new alignment between the North Carolina state line and Route 58 compared to predicted travel times along existing Route 220 under the No-Build Alternative, thus improving regional traffic movements. Additional travel time information and operational analyses are included in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

3.4.4.2 Accommodating Local Traffic

Alternative C would carry up to 12,800 vehicles by 2040, resulting in the removal of 9,900 vehicles from the existing Route 220, a reduction of approximately 31 percent compared to the No-Build Alternative (VDOT, 2020a). The lower traffic volumes on existing Route 220 would reduce delays at signalized intersections and would increase the number of gaps available for drivers on side streets to exit onto the roadway facility. The reduced regional traffic on existing Route 220 would potentially result in a decrease in crash rates. Alternative C would result in a minimal reduction in travel time along existing Route 220, when compared to the No-Build Alternative. However, while

[16] Travel patterns and forecasted travel demand have been estimated based on study-specific subarea travel demand model, developed and calibrated consistent with VDOT's *Travel Demand Modeling Policies and Procedures* as well as the methods described in the National Cooperative Highway Research Program's (NCHRP) Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* (VDOT, 2014 and TRB, 2014). Detailed discussions of the methods and findings of the travel demand.

travel times along existing Route 220 under Alternative C would remain generally consistent compared to No-Build conditions, the change in traffic composition with regional traffic shifting to the new alignment would improve local traffic movements (VDOT, 2020a).

As previously mentioned, a large portion of trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative C. According to AASHTO guidelines, "trucks have a greater individual effect on highway traffic operation than do passenger vehicles. The effect on traffic operation of one truck is often equivalent to several passenger cars. The number of equivalent passenger cars equaling the effect of one truck is dependent on the roadway gradient and, for two-lane highways, on the available passing sight distance. Thus, the larger the proportion of trucks in a traffic stream, the greater the equivalent traffic demand and the greater the highway capacity needed" (AASHTO, 2011). Therefore, the reduction of trucks in the traffic system under Alternative C would decrease the potential for severe crashes and increase local connectivity by improving traffic operations on existing Route 220.

Alternative C would result in improvements to overall intersection delay on existing Route 220. As an example, the Soapstone Road/Main Street intersection currently (2018) has an overall delay during the morning peak of 29 seconds and an overall delay of 45 seconds in the afternoon peak hour. In 2040, with Alternative C constructed, the overall forecasted delay reduces to 14 seconds in the morning and reduces to 31 seconds in the afternoon – a reduction of over 50 percent in the morning and 30 percent in the afternoon (VDOT, 2020a). This simulated delay may be further reduced or vary slightly depending on actual travel conditions and driver decisions and behavior.

Additionally, this travel time saving applies to emergency vehicles as well with improved access to and from communities along Route 220 through reduced delay times due to the lower volume of traffic. In addition, emergency response may be improved to the communities west of Route 220 through use of the new roadway and interchange provided at Soapstone Road. Alternative C would provide a secondary north/south roadway for emergency vehicles to access points along and within the study area.

3.4.4.3 Addressing Geometric Deficiencies and Inconsistencies

Under Alternative C, the new roadway alignment would be constructed to meet current design standards. The southernmost portion under Alternative C, (approximately 1.7 miles) of existing Route 220 would be reconstructed, which would bring the horizontal and vertical curves up to current design standards in this section, which would address the majority of the geometric deficiencies in this segment of existing Route 220. Two instances of substandard stopping sight distance and radii on the southbound approach to the new southern interchange are not addressed with this alternative alignment; however, these could possibly be addressed during detailed design. While allowing these deficiencies to remain is undesirable, a mitigating factor is the reduction in the number of vehicles traveling this segment of the corridor. Currently, approximately 6,000 vehicles travel southbound from Ridgway toward the North Carolina state line on Route 220 each day. With the construction of Alternative C, the forecasted volume using the southbound roadway in 2040 would be less than 4,000 (VDOT, 2020a).

Alternative C, as well as segments of existing roadways (e.g., Soapstone Road) that are included in the interchange or adjacent work, would be built to the latest VDOT design standards. This would reduce both the overall lane miles of substandard elements as well as the volume of drivers traversing roadway segments that are non-conforming.

3.4.5 Impacts

Alternative C's alignment would shift more toward the developed areas to connect to the existing interchange at Joseph Martin Highway, affecting mostly residential properties with the exception of four other non-residential relocations (i.e. industrial, institutional, or cemeteries). **Table 3-5** summarizes the impacts associated with Alternative C. More detailed environmental information can be found in the ***Martinsville Southern Connector Study Natural Resources Technical Report*** (VDOT, 2020d).

Table 3-5: Impacts Summary – Alternative C

Resource	Impacts
Potential Residential Relocations	25
Potential Commercial Relocations	0
Other Potential Relocations*	4
Streams (Linear Feet)	21,882
Wetlands (Acres)	3.7
Forest (Acres)	219
Historic Sties (Number of Properties)**	3

*Includes: Industrial, Institutional, and Cemeteries
**Number of properties on or eligible for listing on the National Register of Historic Places (NRHP)

3.4.6 Cost Estimate

A preliminary estimate was developed for each alternative carried forward for evaluation to measure the quantities and costs of major items anticipated to be in the conceptual design. All costs were developed using the VDOT PCES, Version 7.10, and published VDOT District averages of unit prices. Individual major quantities were multiplied by the unit cost, whereas major quantities that are a group of standard items were calculated using a lump sum. More details on the quantities and correlating unit prices for this alternative can be found in **Appendix E**. A more detailed description of how each section of the major items was determined can also be found in **Section 6**.

The main sections of quantities calculated can be broken down to general, grading, drainage, pavement, incidental, protective, erosion control, utility, and traffic control and safety items. This sum was then added to the total right of way, construction inspection, construction contingency, and escalation costs to develop the total estimated construction cost. Alternative C would be approximately $615,905,708 to construct. A summary of these estimated costs is provided in **Table 3-6**.

Table 3-6: Estimated Costs – Alternative C

Cost Item	Total
Construction and Preliminary Engineering	$584,545,045
Right of Way	$28,980,663
Utilities	$2,380,000
Total Cost	**$615,905,708**

3.4.7 Other Considerations

In accordance with VDOT standards, Alternative C would cross over the Norfolk Southern railroad with a minimum clearance of 23 feet between the top of the rails and bottom of the roadway structure[17]. Route 220 and the railway follow along a ridge between the Matrimony Creek and Marrowbone Creek watersheds in this area. In some areas the new roadway would be between 40-50 feet above existing ground; for estimating purposes it was assumed that this would be a fill material and not a structure. Alternative C crosses over two existing utility easements for high tension lines and there is a third easement for a new power line connection to Commonwealth Crossing Business Centre. These unique conditions have been considered in the illustrative planning level cost estimate for Alternative C; however, a full understanding of these constraints and cost implications would be developed as part of more detailed design for this alternative.

[17] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT 2013).

4. ALTERNATIVES NOT RETAINED

Alternatives D and E were eliminated from further consideration and detailed evaluation based on context and intensity[18] of the anticipated property impacts.

As the alternative development process outlined in **Section 2-1** progressed, and through agency coordination (see **Chapter 6: Comments and Coordination**) efforts; FHWA, VDOT and the Concurring agencies concurred in March 2019 to carry forward a range of alternatives, including Alternatives D and E, for evaluation in the Draft EIS. However, as part of this concurrence, VDOT informed the agencies that there were concerns with the potential number of private property impacts that could occur under Alternatives D and E and the concurrence included stipulations regarding the potential elimination of Alternatives carried forward based on preliminary right of way information. As each alternative in the study is assumed to be a controlled access facility, frontage roads would need to be constructed along Route 220 under either of these alternatives to maintain access to private properties along the corridor. The addition of frontage roads to reconstructing Route 220 as an access-controlled facility would require a considerable amount of additional right of way as discussed in **Section 2.4.1**. The minimum right of way width required for a new locations alternative without frontage roads is 168 feet, whereas Alternative D and E would require a minimum right of way width of 275 feet along the entire corridor.

VDOT noted that once preliminary right of way impacts were understood, a recommendation would be brought to the agencies as to if these alternatives should be considered feasible and be evaluated as a potential preferred alternative. This approach was documented in the concurrence on the range of alternatives following the March 2019 agency coordination meeting (see **Appendix D** and **Chapter 6: Comments and Coordination**).

During the next several agency meetings, the agencies continued to discuss these alternatives and, during the June 2019 agency coordination meeting, VDOT reported that additional analysis indicated both alternatives would require large numbers of residential and commercial relocations (see **Table 2-6 thru 2-9**). Alternative D would require 84 relocations and Alternative E would require 130 relocations. Based on the limited number of suitable and comparable properties available in the area, it would be logistically infeasible to implement either of these two Build Alternatives. Therefore, considering the context and severity of these anticipated impacts, FHWA and VDOT determined that Alternatives D and E would not be retained in this Draft EIS for detailed evaluation. Following the June 2019 agency meeting, the Concurring Agencies did not object to this determination. These alternatives and a summary of the rationale for eliminating them are discussed in further detail below.

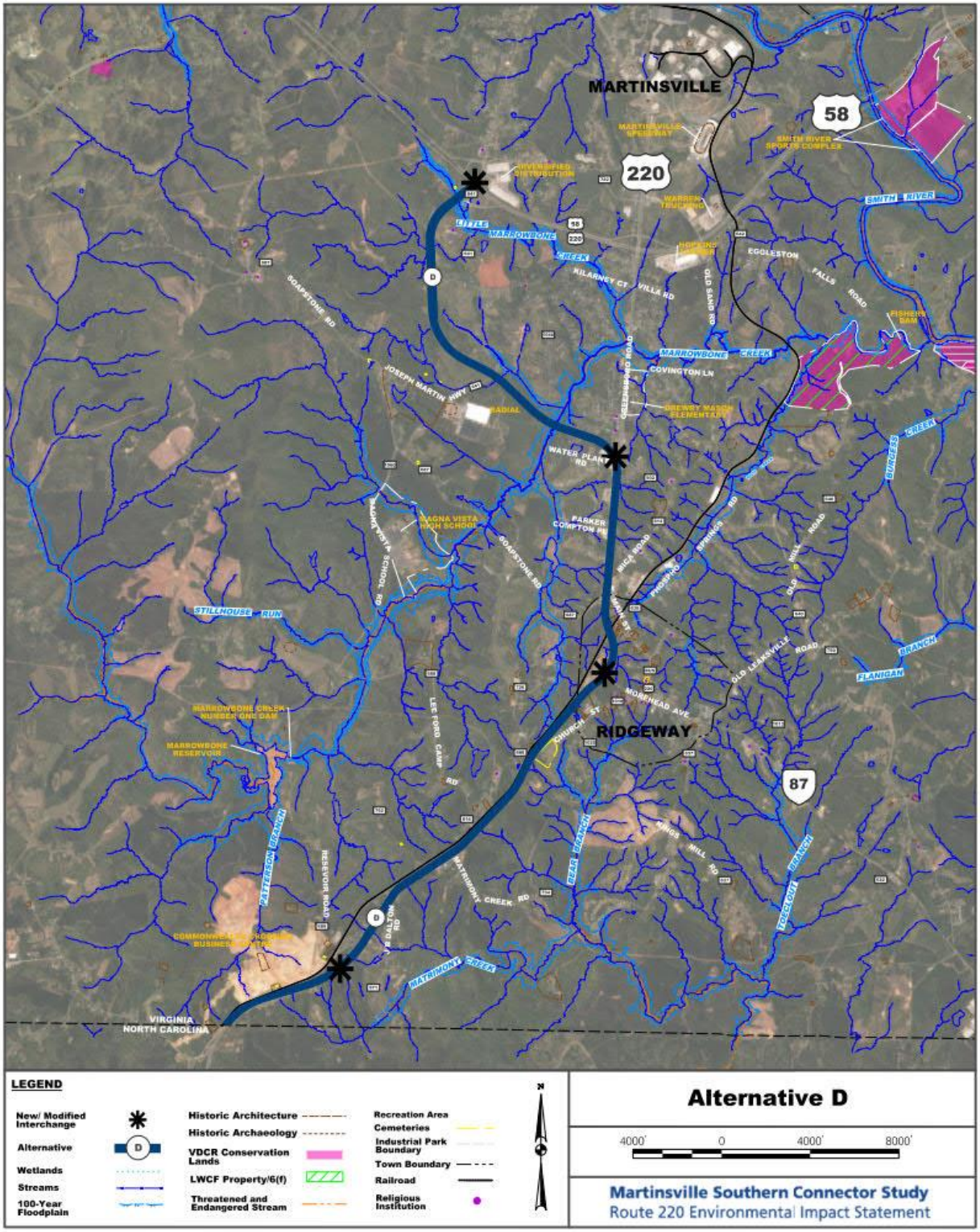
4.1 ALTERNATIVE D

Alternative D, shown in **Figure 4-1**, would consist of reconstructing existing Route 220 as an access-controlled roadway for approximately 5.6 miles from the North Carolina state line where it would then divert to the west on a new access-controlled roadway just north of Water Plant Road. Under Alternative D, access would be controlled and provided at three new interchanges and a modified interchange at Route 58 and the Joseph Martin Highway. South of Water Plant Road, access to the new roadway would be made via frontage roads and new interchanges near Reservoir Road and at Morehead Avenue. A new structure providing access to Route 220 would be provided at Lee Ford Camp Road/Church Street. At Water Plant Road an interchange

[18] Context refers to significance of an impact by geography (national, regional, or local) – where the impact occurs. Intensity refers to the severity of the impact, in whatever context(s) it occurs. See 40 CFR § 1508.27.

suggested where the new roadway branches from Route 220 to provide direct access between the new roadway and Route 220 to the north.

Figure 4-1: Alternative D



From this interchange, the new alignment travels northwest, crossing Marrowbone Creek and then parallels a tributary of Marrowbone Creek to beyond Joseph Martin Highway. The alignment then shifts northward and follows the same alignments as Alternatives B and C just north of the Radial warehouse site to the tie-in location with Route 58. Modifications to the interchange at Route 58 and Joseph Martin Highway would be required with this alternative. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

Alternative D was assumed to be a divided highway with a grass median and would have two travel lanes in each direction over its entire length. Bridges would be required at the interchange of Alternative D and Reservoir Road; Church Street; the Morehead Avenue interchange; the new interchange at existing Route 220; Marrowbone Creek; Joseph Martin Highway; and at the new northern interchange at Route 58. The existing bridge over the Norfolk Southern railroad would need to be removed and replaced with this alternative. A smaller structure, likely a culvert, would be required at the location where Alternative D crosses Little Marrowbone Creek.

Beginning at the North Carolina state line, Alternative D would follow existing Route 220 for approximately 1.2 miles, where the alignment would shift slightly to the east, away from the Norfolk Southern railroad. This shift would be necessary to provide space for interchange ramps at Reservoir Road as well as frontage roads to provide access to White House Road, J.B. Dalton Road, and Matrimony Creek Road. The frontage roads would parallel the roadway and interchange ramp. Traveling northward, Alternative D would shift back onto the existing Route 220 alignment and cross over Lee Ford Camp Road/Church Street on a new bridge. Retaining walls would be required at this location to avoid impacts to the Norfolk Southern railroad and the cemetery to the east. Church Street would be nearly parallel to Route 220 at this location and a longer bridge is assumed at this location to provide additional sight distance.

Alternative D would then shift slightly eastward to minimize the need for retaining walls adjacent to the Norfolk Southern railroad as it approaches the new interchange at Morehead Avenue that replaces the existing traffic signal. Morehead Avenue would be realigned slightly to the north to maintain traffic during construction. The existing bridge over the Norfolk Southern railroad would not be wide enough to accommodate the acceleration and deceleration lanes for the Morehead Avenue ramps and, based on as-builts, they do not provide 23 feet of clearance underneath; it was assumed that they would be fully reconstructed with Alternative D[19].

The existing intersection at Soapstone Road/Main Street was assumed to be removed. Soapstone Road would extend northward to the new interchange at existing Route 220. To the east, the intersection of Main Street/Mica Road would be removed; Mica Road and Main Street would simply continue as a combined roadway. Between Soapstone Road and Water Plant Road on Route 220, access to Route 220 from all driveways and side streets would be provided via frontage roads. The frontage road on the west side of Route 220 would be an extension of Soapstone Road and was assumed to be designed as a minor arterial roadway. The frontage road on the east would only serve two businesses and would be built as a local street. Andra Lane, Parker Compton Place, and Water Plant Road would have direct access to Soapstone Road but not Route 220.

An interchange would be constructed at the location where the new roadway branches from existing Route 220 to provide direct access between Alternative D, existing Route 220 to the north, and the extension of Soapstone Road to the south. It was assumed that Alternative D would cross over the existing roadways. Mica Road would be realigned to connect to existing Route 220 approximately 800 feet north of its current intersection location.

[19] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT, 2013).

Through this interchange, Alternative D would curve from the north to the northwest, crossing Marrowbone Creek on a new bridge and would then parallel a tributary of Marrowbone Creek. The alignment would then cross Joseph Martin Highway north of the Radial Fulfillment Center, before shifting northward. Alternative D would continue to the north for a little over one mile before shifting to the northeast to the existing interchange at Route 58. Modifications to the existing interchange at Route 58 and Joseph Martin Highway would be required with this alternative.

4.1.1 Interchanges

The conceptual interchange layouts and configurations for Alternative D were developed with an effort to accommodate anticipated traffic volumes and types of connections (i.e. service interchange to lower-order functional class roadway or system interchange to arterial facility or higher-order functionally classified roadway). Under Alternative D, the interchange at Reservoir Road would be a standard diamond interchange with frontage roads on both the northbound and southbound sides. The existing railroad crossing at Reservoir Road was assumed to remain in place. The new interchange at Morehead Avenue was also assumed to be a standard diamond interchange with no roadway connection to the west across the Norfolk Southern railroad. The new interchange at the extended Soapstone Road and existing Route 220 was also assumed to be a standard diamond interchange. Water Plant Road and Mica Road would be realigned to meet the minimum intersection spacing requirements from the new ramp intersections. The modified interchange at Joseph Martin Highway that was assumed for this study would be a combination of a diamond interchange and a flyover ramp. Joseph Martin Highway would be relocated approximately 500 feet to the east and would intersect Fisher Farm Road at a new intersection. The Alternative D roadway would cross over the bypass and connect directly to the section of Joseph Martin Highway north of Fisher Farm Road. Although Alternative D was not retained for detailed evaluation, should this alternative advance for detailed engineering and design, refinements to the interchange locations and configuration would be evaluated to maximize the operational efficiency of the connection and to avoid or minimize impacts to the greatest extent practicable.

4.1.2 Limits of Disturbance

For the purposes of NEPA, a illustrative planning level LOD was established for all the alternatives carried forward for evaluation. This LOD was developed based on the study typical section and design criteria for the study. A wider footprint was established at potential interchange locations to account for access ramps between Alternative D and the adjacent roadway. The LOD within the interchange areas was established to conceptualize how the alternatives under evaluation would tie into existing roadway facilities and for the purposes of estimating potential impacts to environmental and human resources. The illustrative planning level LOD incorporated the limit of disturbance for the roadway construction, roadside grading and drainage, preliminary stormwater management facilities, and construction access. Additional information on the typical section and illustrative planning level LOD is included in **Section 5**. Detailed mapping for Alternative D is provided in **Appendix C**.

4.1.3 Traffic Operations

This alternative would improve traffic flow by providing an efficient north-south connection for regional traffic to travel between the North Carolina state line and Route 58. Route 220 is identified as a CoSS in *VTrans 2040* and is identified as an important freight route to support the region's economy (OIPI, 2015 and WPPDC, 2013).

By diverting the regional traffic to a access-controlled facility while maintaining existing Route 220 as a local business route, Alternative D would reduce travel times for most of the regional traffic while improving access for local traffic that currently uses Route 220. The three new interchanges and the modified interchange at Route 58 and the Joseph Martin Highway would support the mobility of the regional traffic into and out of the study area. The direct access configurations on existing Route 220 from the North Carolina state line to Ridgeway would be shifted to frontage roads. Access to and from the following local roads would be provided via the new interchange at Reservoir Road: Reservoir Road, White House Road, J.B. Dalton Road, Matrimony Creek Road, and Route 220 south of Lee Ford Camp Road and Main Street. Access between Lee Ford Camp Road and Route 220 would be made by crossing under the Alternative D roadway, following Main Street into Ridgeway, and then using Morehead Avenue to reach the new interchange at Morehead Avenue and Alternative D. Access to Route 220 from Ridgeway and points east would use the new interchange at Morehead Avenue. Access from Soapstone Road, as well as properties on Andra Drive, Parker Compton Place, Water Plant Road, and the southbound side of Route 220 would occur via an extension of Soapstone Road that parallels on the east side of Alternative D to a new interchange north of Water Plant Road. Soapstone Road would continue northward to Route 220. All access from Mica Road and intersections to the north would remain as they exist today. The reconfigured northern interchange is anticipated to improve access to and from Martinsville by providing a direct connection from Alternative D to Joseph Martin Highway to the north.

Although the access for local residents and businesses along existing Route 220 from the North Carolina state line to Ridgeway would be shifted to frontage roads, Alternative D would divert 12,800 average annual daily trips of the north-to-south regional vehicle trips onto the new access-controlled roadway, based on the 2040 forecasts. The regional through trips that would remain on Route 220 are part of the traffic that travels between the southern and eastern limits of the study area, as well as the traffic traveling on Route 87. As a result, overall delays would be reduced on Route 220. More detailed information on traffic data and analysis is documented in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a). The reconfigured northern interchange is anticipated to improve access to and from Martinsville by providing a direct connection from Alternative D to Joseph Martin Highway to the north.

4.1.4 Ability of Alternative D to Address the Purpose and Need

4.1.4.1 Accommodating Regional Traffic

Under the No-Build Alternative up to 31,900 vehicles were anticipated to travel along Route 220 within the study area in the year 2040. With the construction of Alternative D, the volume is anticipated to decrease to 20,500 vehicles. Under the 2040 No-Build forecasted traffic, Alternative D would carry up to 12,800 vehicles (VDOT, 2020a). Existing regional traffic patterns indicate that the majority of travel is to and from the south and west of the study area. Nearly 84 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks that are traveling through the study area, 75 percent continue to the west on Route 58.

Of the trucks traveling westbound on Route 58 into the study area, 68 percent continue through it without stopping, and nearly two-thirds of them travel southbound on Route 220 to North Carolina, therefore, a large portion of these trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative D[20].

This reconfigured northern interchange with Route 58 would be approximately 1.4 miles to the west of the Route 220 interchange at Route 58. As a result, the regional traffic traveling to or from the east on Route 58 may be more likely to use Route 220 instead of the new roadway; however, this volume would be much less than the volume that enters or leaves the study area to the west – most of the traffic travels between the southern and western limits of the study area.

In 2018, only four percent of the commercial vehicles crossing into the study area from North Carolina traveled east on Route 58, compared to 62 percent traveling to the west. Only eight percent of the westbound commercial vehicles entering the study area at Route 58 turned southward toward North Carolina, while 42 percent of the commercial vehicles from the west turned to the south. The dominant movement is between the south and west. The fastest path between Morehead Avenue or Route 58 and the North Carolina state line would be to use Route 220; however, as a result of the 12,800 vehicles diverting to the new roadway, the anticipated volumes on Route 220 north of Ridgeway C would be decreased such that travel times in the corridor would be improved when compared to the No-Build condition.

Under Alternative D, truck volumes on existing Route 220 would be reduced by approximately 38 percent compared to the 2040 truck volumes under the No-Build Alternative. Compared to 2040 No-Build conditions, simulated average travel times under Alternative D would improve along the existing alignment in both directions (23 percent and 26 percent faster in the AM and PM peak period, respectively). Travel times would be seven percent faster in the AM peak period and nine percent faster in the PM peak period along the new alignment between the North Carolina state line and Route 58 compared to predicted travel times along existing Route 220 under the No-Build Alternative, thus improving regional traffic movements. Additional travel time information and operational analyses are included in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

4.1.4.2 Accommodating Local Traffic

Alternative D would carry up to 12,800 vehicles by 2040, resulting in the removal of 11,400 vehicles from Route 220, a reduction of approximately 35 percent compared to the No-Build Alternative (VDOT, 2020a). The lower traffic volumes on existing Route 220 would reduce delays at the signalized and unsignalized intersections and would increase the number of gaps available for drivers on side streets to exit onto the roadway facility. The reduced regional traffic on the existing Route 220 would potentially result in a decrease in crash rates. Alternative D would result in a minimal reduction in travel time along existing Route 220, when compared to the No-Build Alternative. However, while travel times along existing Route 220 under Alternative D would remain generally consistent compared to No-Build conditions, the change in traffic composition

[20] Travel patterns and forecasted travel demand have been estimated based on study-specific subarea travel demand model, developed and calibrated consistent with VDOT's Travel Demand Modeling Policies and Procedures as well as the methods described in the National Cooperative Highway Research Program's (NCHRP) Report 765: Analytical Travel Forecasting Approaches for Project-Level Planning and Design (VDOT 2014 and TRB 2014). Detailed discussions of the methods and findings of the travel demand modeling conducted for this study can be found in the Traffic and Transportation Technical Report (VDOT, 2020a). Final design-level traffic engineering and analysis would be conducted as part of advanced engineering and design on any improvements that advance from this study.

with regional traffic shifting to the new alignment would improve local traffic movements (VDOT, 2020a).

As previously mentioned, a large portion of trucks would be expected to diverge from existing Route 220 and onto the new alignment of Alternative D. According to AASHTO guidelines, "trucks have a greater individual effect on highway traffic operation than do passenger vehicles. The effect on traffic operation of one truck is often equivalent to several passenger cars. The number of equivalent passenger cars equaling the effect of one truck is dependent on the roadway gradient and, for two-lane highways, on the available passing sight distance. Thus, the larger the proportion of trucks in a traffic stream, the greater the equivalent traffic demand and the greater the highway capacity needed" (AASHTO, 2011). Therefore, the reduction of trucks in the traffic stream under Alternative D would decrease the potential for more severe crashes and increase local connectivity by improving traffic operations on existing Route 220.

Alternative D would result in improvements to overall intersection delay on existing Route 220. As an example, the intersection of Route 220 and the off-ramp from eastbound Route 58 currently has an overall delay during the morning peak of 45 seconds and an overall delay of 177 seconds in the afternoon peak hour. In 2040, with Alternative D constructed, the overall delay would be reduced to 12 seconds in the morning and reduced to 15 seconds in the afternoon – a reduction of over 70 percent in the morning and 92 percent in the afternoon (VDOT, 2020a). This simulated delay may be further reduced or vary slightly depending on actual travel conditions and driver decisions and behavior.

4.1.4.3 Addressing Geometric Deficiencies and Inconsistencies

Under Alternative D, the new roadway alignment would be constructed to meet current design standards. The southernmost portion under Alternative D (approximately 5.6 miles) of existing Route 220 would be reconstructed, which would correct all 14 of the identified geometric deficiencies. Alternative D, as well as segments of existing roadways (e.g., Soapstone Road) that were included in the interchange or adjacent work would be built to the latest VDOT design standards. This would bring the horizontal and vertical curves up to current design standards in this section, which would address the geometric deficiencies identified in this segment of existing Route 220.

4.1.5 Impacts

Table 4-1 summarizes the impacts associated with Alternative D. More detailed environmental information can be found in the ***Martinsville Southern Connector Study Natural Resources Technical Report*** (VDOT, 2020d).

Table 4-1: Impacts Summary – Alternative D

Resource	Impacts
Potential Residential Relocations	56
Potential Commercial Relocations	21
Other Potential Relocations*	7
Streams (Linear Feet)	16,289
Wetlands (Acres)	4.7
Forest (Acres)	113
Historic Sties (Number of Properties)**	1

*Includes: Industrial, Institutional, and Cemeteries
**Number of properties on or eligible for listing on the National Register of Historic Places (NRHP)

4.1.6 Cost Estimate

A preliminary estimate was developed for each alternative carried forward for evaluation to measure the quantities and costs of major items anticipated to be in the conceptual design. All costs were developed using the VDOT PCES, Version 7.10, and published VDOT District averages of unit prices. Individual major quantities were multiplied by the unit cost, whereas major quantities that are a group of standard items were calculated using a lump sum. More details on the quantities and correlating unit prices for this alternative can be found in **Appendix E**. A more detailed description of how each section of the major items was determined can also be found in **Section 6**.

The main sections of quantities calculated can be broken down to general, grading, drainage, pavement, incidental, protective, erosion control, utility, and traffic control and safety items. The sums of these items for Alternative D was estimated to be $451,785,515. This sum was then added to the total right of way, construction inspection, construction contingency, and escalation costs to develop the total estimated construction cost. Alternative D would be approximately $793,546,207 to construct. A summary of these estimated costs is provided in **Table 4-2**.

Table 4-2: Estimated Costs – Alternative D

Cost Item	Total
Construction and Preliminary Engineering	$739,934,191
Right of Way	$43,833,016
Utilities	$9,779,000
Total Cost	**$793,546,207**

4.1.7 Other Considerations

Alternative D would have a considerable number of residential and business displacements, primarily due to the need to build both a southern interchange at Reservoir Road and a new interchange near Water Plant Road. Both locations are in developed areas with numerous commercial or residential properties that are close to the existing Route 220 roadway. At the May, 2019 agency meeting, VDOT presented estimated relocations for all the alternatives carried forward for evaluation. **Table 4-3** illustrates the potential relocations for Alternative D as presented during the monthly agency meeting. VDOT explained that these numbers were derived by counting the properties within the LOD and noting the property type indicated in the Henry County tax records. No investigations were completed to determine if a residential unit was inhabited by more than one family or if a commercial property housed more than one business. These numbers were considered to be a lower range of what may have actually been impacted as additional relocations may have been necessary if Alternative D advanced to more detailed design. While Alternative D satisfies the study's Purpose and Need elements, the magnitude of property impacts associated with this alternative would be greater than many of the other alternatives.

Table 4-3: Property Impacts – Alternative D

	Residential	Commercial	Industrial	Institutional	Cemetery	Total
Number of Impacted Properties	56	21	4	1	2	84

Preliminary cost estimates have been completed for all alternatives retained for evaluation, including Alternative D. While these estimates are considered preliminary, they offer some distinct breakdowns in cost, as discussed in **Section 6**. Alternative D would be less costly for grading and

drainage than other alternatives, as it would be on an existing roadway prism; however, Alternative D would have measurably higher costs associated with right of way. Additionally, the number of residential and commercial relocations required and the limited number of suitable and comparable properties available rendered Alternative D logistically infeasible. As noted earlier, the level of displacements and/or relocations to residential and commercial properties would only further challenge the economic tax base of Henry County, already impacted by the downsize within the textile and furniture sectors[21]. Additional information regarding the socioeconomic history of the study area can be found in **Chapter 3: Affected Environment and Environmental Consequences** of the Draft EIS and the ***Socioeconomic and Land Use Technical Report*** [VDOT, 2020c]).

In addition to the higher cost associated with Alternative D, there would also be immeasurable logistical challenges related to implementing this alternative compared to Alternatives A, B, or C. **Table 4-4** lists the number of residential properties on the market in different geographic ranges. As illustrated in this table, there are not enough properties within the Drewry Mason Elementary School zone or Ridgeway to implement Alternative D. While the numbers exist (as of June 2, 2019) within the Martinsville area to support the relocations assumed under this alternative, it may not be realistic to assume that all the relocated households could accept moving away from their school or other community facilities, as the anticipated relocations would exceed the number of available residential properties within the study area (near Drewry Mason Elementary or Ridgeway). In addition, the available properties may not be functionally equivalent to the residences that would be impacted.

Table 4-4: Available Residential Properties – Alternative D

	Residential Relocations	Near Drewry Mason Elementary	Near Ridgeway	In Martinsville
Number of Properties	56	18	27	184

Source: Remax.com (June 2, 2019. Note: These searches may result in overlapping results. It should not be assumed that there are 229 unique properties available in the region).

Alternative D would also cross over an existing utility easement for high tension lines, and there is a second easement proposed for a new power line connection to Commonwealth Crossing Business Centre.

VDOT evaluated opportunities to optimize Alternative D and reduce impacts by realigning the portion of Alternative D on new alignment, shifting the alignment to new location further south and modifying the interchange configuration with Joseph Martin Highway. However, the impacts were still considered too great for VDOT to recommend that the alternative be considered further or carried through for detailed study. Therefore, considering the context and severity of these anticipated costs and logistical challenges of these property impacts, VDOT determined that Alternative D would not be feasible and recommended that it be eliminated from further consideration. There were no objections to this recommendation from the agencies involved in the study and, as a result, Alternative D was eliminated from further consideration following the June 2019 agency coordination meeting.

4.2 ALTERNATIVE E

[21] According to local area unemployment statistical data obtained from the Bureau of Labor Statistics, the unemployment rate in Henry County has remained consistently higher than that of Virginia and the U.S. Between 2008 and 2018, the average unemployment rate in Henry County was 8.7 percent, whereas the statewide average was 6.0 and the nationwide average was 6.9 (BLS, 2019).

Alternative E, shown in **Figure 4-2**, would consist of fully reconstructing existing Route 220 as a access-controlled roadway between the North Carolina state line and Route 58, removing all direct connections of existing driveways and side streets to Route 220.

Under Alternative E, access would be controlled and provided only at interchanges at various locations in the corridor. Existing residential and commercial driveways would be directed to frontage roads that parallel the roadway, ultimately connecting to Route 220 at interchanges.

New interchanges to provide frontage road access to Route 220 are located at Reservoir Road and at Morehead Avenue. Structures over or under the new Route 220 roadway are included at Lee Ford Camp Road/Church Street and Soapstone Road/Main Street to maintain east-west connectivity. The Route 220 interchange at Route 58 would be modified to provide direct access between the new roadway, Route 58, and Business 220 to the north.

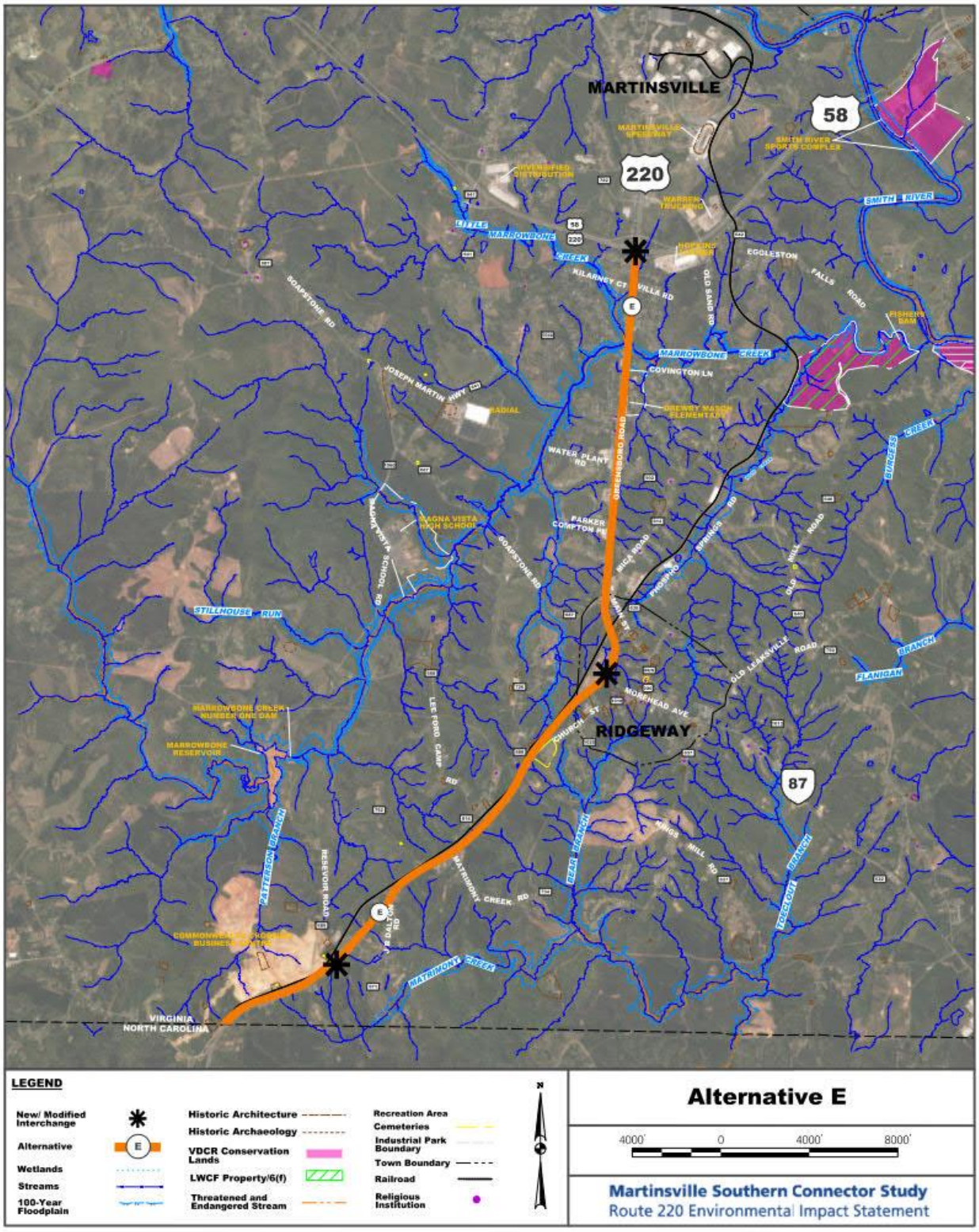
Alternative E was assumed to be a divided highway with a grass median and would have two travel lanes in each direction over its entire length. Bridges would be required at the Reservoir Road interchange; Church Street; Morehead Avenue; Soapstone Road/Main Street; and the reconfigured interchange at Route 58. The existing bridge over the Norfolk Southern railroad would need to be removed and replaced as it would not be wide enough to accommodate the acceleration and deceleration lanes for the Morehead Avenue interchange ramps and did not appear to provide the necessary 23-foot clearance between the top of the rail and the bottom of the structure[22].

Beginning at the North Carolina state line, Alternative E would follow existing Route 220 for approximately 1.2 miles, where the alignment would shift slightly to the east, away from the Norfolk Southern railroad. This shift would be necessary to provide space for interchange ramps at Reservoir Road, as well as frontage roads to provide access to White House Road, J.B. Dalton Road, and Matrimony Creek Road. The frontage roads would parallel the roadway and interchange ramps. Traveling northward, Alternative E would shift back onto the existing Route 220 alignment and cross over Lee Ford Camp Road/Church Street on a new bridge. Retaining walls would be required at this location to avoid impacts to the Norfolk Southern railroad and the cemetery to the east. Church Street would be nearly parallel to Route 220 at this location, and a longer bridge was assumed at this location to provide additional sight distance on Church Street.

Alternative E would then shift slightly eastward to minimize the need for retaining walls adjacent to the Norfolk Southern railroad as it approaches a new interchange to be located at Morehead Avenue, which would replace the existing signalized intersection. Morehead Avenue would be realigned slightly to the north to maintain traffic during construction. The existing bridge over the Norfolk Southern railroad would not be wide enough to accommodate the acceleration and deceleration lanes for the VA 87 ramps and based on as-builts they did not provide 23 feet of clearance underneath; it was assumed that they are fully reconstructed with Alternative E.

[22] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT 2013).

Figure 4-2: Alternative E



The existing intersection at Soapstone Road and Main Street was assumed to be removed, with the two connected roadways and the new Alternative E separated by a bridge. A new frontage road connecting to Soapstone Road and extending northward would provide access to all the side streets on the west side of existing Route 220: Andra Drive, Parker Compton Place, Water Plant Road, Steve Drive, Shamrock Drive, and Kilarney Court. The Mica Road intersection with Main Street would be shifted to the southeast. On the east side of Route 220, Garden Drive would be cut off from Alternative E, and a frontage road would extend northward from Mica Road. This frontage road would provide access to all the side streets on the east side of existing Route 220: Drewry Mason School Road, Covington Lane, Marrowbone Circle, and Villa Road. Both frontage roads would be designed as local streets.

4.2.1 Interchanges

The conceptual interchange layouts and configurations for Alternative E were developed with an effort to accommodate anticipated traffic volumes and types of connections (i.e. service interchange to lower-order functional class roadway or system interchange to arterial facility or higher-order functionally classified roadway). Under Alternative E, the interchange at Reservoir Road would be a standard diamond interchange with frontage roads on both the northbound and southbound sides. The existing railroad crossing at Reservoir Road was assumed to remain in place. The new interchange at Morehead Avenue would also be assumed as a standard diamond interchange. The existing interchange at Route 58 was assumed to be reconfigured as a freeway-to-freeway connection, without traffic signals. The LOD for this interchange was established assuming that the redesigned interchange would have a cloverleaf configuration with outer ramps designed for 50 mph speeds and the inner loop ramps designed for 30 mph. A flyover ramp would provide a higher speed connection between the northbound Alternative E alignment and westbound Route 58. Although Alternative E was not retained for detailed evaluation, should this alternative advance for detailed engineering and design, refinements to the interchange locations and configuration would be evaluated to maximize the operational efficiency of the connection and to avoid or minimize impacts to the greatest extent practicable.

4.2.2 Limits of Disturbance

For the purposes of NEPA, a illustrative planning level LOD was established for all the alternatives carried forward for evaluation. This LOD was developed based on the typical section and design criteria for the study. A wider footprint was established at potential interchange locations to account for access ramps between Alternative E and the adjacent roadway. The LOD within the interchange areas has been established to conceptualize how the alternatives under evaluation would tie into existing roadway facilities and for the purposes of estimating potential impacts to environmental and human resources. The illustrative planning level LOD incorporated the limit of disturbance for the roadway construction, roadside grading and drainage, preliminary stormwater management facilities, and construction access. Additional information on the typical section and illustrative planning level LOD is included in **Section 5**. Detailed mapping for Alternative D is provided in **Appendix C**.

4.2.3 Traffic Operations

Alternative E would improve traffic flow by providing an efficient north-south connection for regional traffic to travel between the North Carolina state line and Route 58. Route 220 is identified as a CoSS in *VTrans 2040* and is identified as an important freight route to support the region's economy (OIPI, 2015 and WPPDC, 2013). Alternative E would include the full reconstruction of Route 220 to an access-controlled facility and include two new interchanges, an extensive network of frontage roads to provide local access and connections to interchanges, and modification of an interchange at Route 220/Route 58. Alternative E would provide an access-controlled facility for all the potential regional traffic within the study area and minimize the north-

south travel time of through traffic; however, there are considerable impacts to local access and mobility. East-west connectivity within the study area is made primarily by grade separations at Lee Ford Camp Road/Church Street and at Soapstone Road/Main Street over Route 220.

All direct access to Route 220 would be shifted to frontage roads. Access to Reservoir Road, White House Road, J.B. Dalton Road, Matrimony Creek Road, and Route 220 south of Lee Ford Camp Road and Main Street would occur via frontage roads to the new interchange at Reservoir Road. Access from Lee Ford Camp Road to Route 220 would occur via crossing under the new roadway, following Main Street into Ridgeway, and then using Morehead Avenue west to a new interchange at Morehead Avenue/Route 220. Drivers accessing the roadway from Ridgeway and points east would also use this new interchange at Morehead Avenue/Route 220.

Access from side streets or driveways adjacent to Route 220 in north of Ridgway would be provided by frontage roads that parallel the reconstructed Route 220. Access from Kilarney Court, Villa Road, Shamrock Drive, Covington Lane, Marrowbone Circle, Steve Drive, Water Plant Road, Mica Road, Parker Compton Place, Andra Drive, Soapstone Road, or Main Street would be made by travelling south along the frontage roads, following Main Street into Ridgeway, and accessing the new interchange at Morehead Avenue/Route 220. More detailed information on traffic data and analysis is documented in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

4.2.4 Ability of Alternative E to Address the Purpose and Need

4.2.4.1 Accommodating Regional Traffic

Under the No-Build Alternative up to 31,900 vehicles were anticipated to travel along Route 220 within the study area in the year 2040. With the construction of Alternative E, the volume is anticipated to decrease to 20,400 vehicles (VDOT, 2020a). This reduction appears to have been a result of the direct local roadway connections to Route 220 being cut off; it would be more convenient for local users to use the adjacent local roadway network to move about the study area instead of using Route 220. Regional traffic traveling to and from the south at the North Carolina state line on Route 220, as well as the regional traffic that uses Morehead Avenue to travel to and from the southeast and the manufacturing center of Eden, North Carolina would use Alternative E. Existing regional traffic patterns indicate that the majority of travel is to and from the south and west of the study area. Nearly 84 percent of the trucks entering Route 220 from North Carolina travel through the study area without stopping (VDOT, 2020a). Of these trucks that are traveling through the study area, 75 percent continue to the west on Route 58. Of the trucks traveling westbound on Route 58 into the study area, 68 percent continue through without stopping, and nearly two-thirds of them travel southbound on Route 220 to North Carolina, therefore, a large portion of these trucks would be expected to utilize the reconstructed Route 220 under Alternative E[23].

[23] Travel patterns and forecasted travel demand have been estimated based on study-specific subarea travel demand model, developed and calibrated consistent with VDOT's *Travel Demand Modeling Policies and Procedures* as well as the methods described in the NCHRP Report 765: *Analytical Travel Forecasting Approaches for Project-Level Planning and Design* (VDOT, 2014 and TRB, 2014). Detailed discussions of the methods and findings of the travel demand modeling conducted for this study can be found in the Traffic and Transportation Technical Report (VDOT, 2019a). Final design-level traffic engineering and analysis would be conducted as part of advanced engineering and design on any improvements that advance from this study.

Compared to 2040 No-Build conditions, simulated average travel times under Alternative E would mostly increase along the Route 220 corridor in both directions (15 percent and 254 percent slower in the AM and PM peak period, respectively). Travel time information and operational analyses are included in the ***Traffic and Transportation Technical Report*** (VDOT, 2020a).

4.2.4.2 Accommodating Local Traffic

Shifting the regional traffic to a new access-controlled roadway would greatly reduce the likelihood of severe crashes at side streets; however, the added time and cost for local roadway users to access businesses, cross Route 220 from east to west, and the need to drive out of their way to reach an interchange ramp were negative effects of Alternative E.

Overall intersection delays would be reduced considerably, as the local traffic that would be waiting for gaps in the traffic along Route 220 would be diverted to frontage roads and intersections at interchanges. As an example, in the No-Build condition the intersection delay at the Drewry Mason Elementary School exit at Route 220 in the afternoon was over 300 seconds. With the frontage roads filtering traffic to Main Street, the intersection delay at the new Main Street intersection with the frontage road would be only 82 seconds. While delays would typically be reduced, local traffic would have to travel farther in order to reach destinations.

Alternative E would change local traffic patterns and restrict east-west connectivity. As an example, access to northbound Route 220 from Covington Lane north of Ridgeway is made in the existing condition by simply making a right turn. To travel southbound, drivers would wait for a gap in traffic, proceed to the median crossover, and then make a left turn once the roadway is clear. Alternative E would require all drivers wishing to access Route 220 to turn left from Covington Lane, travel south on a new frontage road, south on Mica Road and Main Street into Ridgeway, and then onto Morehead Avenue to the new interchange. This would add three miles to each trip, one way. Residents and business owners along the many other side streets with direct access to Route 220 within the study area would have similar experiences albeit with varying travel times and distances to interchanges. Businesses that are reliant on drive-by visibility, such as restaurants and automotive uses, would still have visibility to the access-controlled roadway; however, direct access would be eliminated. While this alternative would have considerable safety benefits for those who live and work in the study area, it would require additional time and fuel to reach most destinations both within and beyond the study area.

Additionally, emergency vehicle response would likely be impeded by increased travel times along Route 220 for these users under Alternative E.

4.2.4.3 Addressing Geometric Deficiencies and Inconsistencies

Under Alternative E, the new roadway alignment would be constructed to meet current design standards. The entire length of Route 220 was assumed to be reconstructed with Alternative E, which would directly remove all 14 of the southbound geometric deficiencies, as well as remove all the substandard turn lanes and roadside shoulders along Route 220. Alternative E, as well as segments of existing roadways (e.g., Soapstone Road) that would be included in the interchange or adjacent work would be built to the latest VDOT design standards. Overall, this would reduce both the overall lane miles of substandard elements as well as the volume of drivers traversing roadway segments that are non-conforming.

4.2.5 Impacts

Table 4-5 summarizes the impacts associated with Alternative E. More detailed environmental information can be found in the ***Martinsville Southern Connector Study Natural Resources Technical Report*** (VDOT, 2020d).

Table 4-5: Impacts Summary – Alternative E

Resource	Impacts
Potential Residential Relocations	97
Potential Commercial Relocations	27
Other Potential Relocations*	6
Streams (Linear Feet)	12,411
Wetlands (Acres)	4.5
Forest (Acres)	77
Historic Sties (Number of Properties)**	1

*Includes: Industrial, Institutional, and Cemeteries
**Number of properties on or eligible for listing on the National Register of Historic Places (NRHP)

4.2.6 Cost Estimate

A preliminary cost estimate was developed for each alternative carried forward for evaluation to measure the quantities and costs of major items anticipated to be in the conceptual design. All costs were developed using the VDOT PCES, Version 7.10, and published VDOT District averages of unit prices. Individual major quantities were multiplied by the unit cost, whereas major quantities that are a group of standard items were calculated using a lump sum. A more detailed description of how each section of the major items was determined can also be found in **Section 6**.

The main sections of quantities calculated can be broken down to general, grading, drainage, pavement, incidental, protective, erosion control, utility, and traffic control and safety items. This sum was then added to the total right of way, construction inspection, construction contingency, and escalation costs to develop the total estimated construction cost. Alternative E would be approximately $718,823,065 to construct. A summary of these estimated costs is provided in **Table 4-6**.

Table 4-6: Estimated Costs – Alternative E

Cost Item	Total
Construction and Preliminary Engineering	$644,060,095
Right of Way	$60,266,970
Utilities	$14,496,000
Total Cost	**$718,823,065**

4.2.7 Other Considerations

Given the scope of the geometric deficiencies present in the southern section of the Route 220 corridor within the study area, coupled with the rolling topography in the region as noted in **Section 2.1**, an option to simply improve the existing roadway was not appropriate, and a full reconstruction was assumed to develop the worst-case scenario for the impacts associated with Alternative E. Alternative E would address regional traffic needs by eliminating the numerous driveways and local access points that interfered with through traffic, providing an access-controlled facility between the North Carolina state line and Route 58. Access to the new roadway would be limited to three interchanges with sufficient acceleration and deceleration lanes to decrease delays and travel times for freight carriers and those traveling through the study area on Route 220 and Route 58.

As noted in **Section 4.2.5,** Alternative E would have a considerable number of residential and business relocations, primarily due to the need to build two new interchanges and reconfigure the existing interchange at Route 58. The interchange at Morehead Avenue could be built with

minimal impacts to resources; however, the modified interchange at Route 58 and the new interchange at Reservoir Road were in well-established communities. The need to provide over ten miles of frontage roads also contributed additional cost and impacts.

At the May 8, 2019 agency meeting, VDOT presented estimated relocations for all the alternatives retained for evaluation. **Table 4-7** illustrates the potential relocations for Alternative E as presented during the monthly agency meeting. In reviewing the numbers, VDOT explained that these numbers were derived by counting the properties within the LOD and noting the property type indicated in the Henry County tax records. No investigations were completed to determine if a residential unit was inhabited by more than one family or if a commercial property housed more than one business. The numbers also only assume relocations per the methodologies agreed upon for the study (See **Chapter 3: Affected Environment and Environmental Consequences** of the Draft EIS for additional information). Therefore, these numbers were considered to be a lower range of what may have actually been impacted as additional relocations may have been necessary if Alternative E advanced to more detailed design. While Alternative E satisfies the study's Purpose and Need elements, the magnitude of relocations associated with this alternative would be greater than many of the other alternatives.

Table 4-7: Property Impacts – Alternative E

	Residential	Commercial	Industrial	Institutional	Cemetery	Total
Number of Impacted Properties	97	27	1	3	2	130

Source: Remax.com (June 2, 2019. Note: These searches may result in overlapping results. It should not be assumed that there are 229 unique properties available in the region).

Preliminary cost estimates have been completed for all alternatives retained for evaluation, including Alternative E. While these estimates are considered preliminary, they offer some distinct breakdowns in cost (see summary in **Table 6-1)**. Alternative E would be less costly for grading and drainage than other Build Alternatives, as it would be on an existing roadway prism; however, Alternative E would have measurably higher costs associated with right of way. Additionally, the number of residential and commercial relocations required and the limited number of suitable and comparable properties available rendered Alternative E logistically infeasible. As noted earlier, the level of displacements and/or relocations to residential and commercial properties would only further challenge the economic tax base of Henry County, already impacted by the downsize within the textile and furniture sectors[24]. Additional information regarding the socioeconomic history of the study area can be found in **Chapter 3: Affected Environment and Environmental Consequences** of the Draft EIS and the ***Socioeconomic and Land Use Technical Report*** [VDOT, 2020c]).

In addition to the higher cost associated with Alternative E, there would also be immeasurable logistical challenges related to implementing this alternative compared to Alternatives A, B, or C. **Table 4-8** lists the number of residential properties on the market in different geographic ranges. As illustrated in this table, there are not enough properties within the Drewry Mason Elementary School zone or Ridgeway to implement Alternative E. While the numbers exist (as of June 2, 2019) within the Martinsville area to support the relocations assumed under this alternative, it may not be realistic to assume that all the relocated households could accept moving away from their

[24] According to local area unemployment statistical data obtained from the Bureau of Labor Statistics, the unemployment rate in Henry County has remained consistently higher than that of Virginia and the U.S. Between 2008 and 2018, the average unemployment rate in Henry County was 8.7 percent, whereas the statewide average was 6.0 and the nationwide average was 6.9 (BLS, 2019).

school or other community facilities, as the anticipated relocations would exceed the number of available residential properties within the study area (near Drewry Mason Elementary or Ridgeway). In addition, the available properties may not be functionally equivalent to the residences that would be impacted.

Table 4-8: Available Residential Properties – Alternative E

	Residential Relocations	Near Drewry Mason Elementary	Near Ridgeway	In Martinsville
Number of Properties	97	18	27	184

Source: Remax.com (June 2, 2019. Note: These searches may result in overlapping results. It should not be assumed that there are 229 unique properties available in the region

As the project proponent, VDOT has a desire to implement an alternative that meets the Purpose and Need for the study, while balancing cost and impact. Though there is not a threshold for the number of impacts that are acceptable for a given project, the sheer number, associated costs, and logistical challenges of Alternative E does not reflect such a balance. Therefore, considering the context and severity of the costs and logistical challenges of these property impacts, VDOT determined that Alternative E would not be feasible and recommended that it be eliminated from further consideration. There were no objections to this recommendation from the agencies involved in the study and, as a result, Alternative E was eliminated from further consideration following the June 2019 agency coordination meeting.

4.3 ACCESS MANAGEMENT OPTIONS AND ARTERIAL PRESERVATION

Following the identification and recommendation of Alternative C as the Preferred Alternative, VDOT and FHWA initiated a public comment period between July and August 2019 to solicit input on the Preferred Alternative (Alternative C). Accompanying the comment period, a Public Hearing was also conducted on August 15, 2019 to present the Preferred Alternative and provide an opportunity for public input. Comments submitted to VDOT suggested that the Draft EIS include additional considerations of potential upgrades to the existing Route 220 corridor. The following suggested improvements can collectively be categorized as access management options:

- Free flow option that replaces the three existing signalized intersections on existing Route 220 through the study area (south of the interchange with Route 58) with interchanges, converts the remaining intersections with cross-street movements to restricted cross-street u-turn (RCUT) configurations, and remedies geometric deficiencies;
- Partial control of access, in which certain segments of Route 220 are converted to full access control through the extension and/or connection of local roads to reduce or consolidate access demands on the highway, and remaining segments are upgraded with intersection improvements and correction of geometric deficiencies; and
- Advanced intersection design, focused on the replacement of existing signalized intersections with innovative solutions to improve traffic flow, such as roundabouts or continuous flow intersections.

Public comments received during the July and August 2019 comment period suggested consideration of the above listed improvements or other similar techniques typically evaluated as part of VDOT's Arterial Preservation Program (APP). The APP encourages innovative strategies to implement safety and capacity improvements on arterial highways throughout the Commonwealth of Virginia. While APP implementation strategies may offer localized benefits to preserve the existing conditions of the Route 220 corridor, they are typically considered near-term operational improvements and would likely focus primarily on signal timing improvements within the study area. As previously mentioned, there are a total of five signalized intersections along

existing Route 220 in the study area, with an additional 18 unsignalized median crossovers and over 100 residential and commercial driveways with direct access to the roadway.

Similar to Alignment Option 2 (TSM and TDM Improvements) described in **Section 2.2.1** and Alternative E (full reconstruction and upgrade of Route 220) discussed in **Section 4.2,** these localized improvement options would not address the Purpose and Need for the study. These options and this study have differing goals; however, these localized improvements would not be precluded from future implementation outside the scope of this study.

While the Martinsville Southern Connector Study's goals differ then the APP's, VDOT remains committed to preserving the functionality and service of arterial roadways statewide, including U.S. Route 220. Presently, VDOT has developed a list of focused improvements for 60 miles of Route 220 from the North Carolina line to Route 419 in Roanoke. While these improvements would ensure the safety and preserve the capacity of the arterial highway network, they would not fully address the Purpose and Need for the Martinsville Southern Connector Study. Therefore, they are considered separately as part of the Route 220 Preservation and Improvement Plan. Additional discussion of the considerations regarding these suggested transportation improvements is included in the subsections that follow.

4.3.1 Ability to Address Purpose and Need

4.3.1.1 Accommodating Regional Traffic

Innovative intersections at particular locations along the corridor may improve mobility and provide some measure of improved regional traffic traveling through the study area; however, in the absence of access control, the regional traffic would still be subject to conflict points associated with the five signalized intersections (where signal timing improvements could be made as part of the APP), 18 unsignalized median crossovers and over 100 residential and commercial driveways located along existing Route 220 in the study area. Access control measures along existing Route 220 would likely improve travel times for freight carriers and those traveling through the study area on Route 220 and Route 58.

4.3.1.2 Accommodating Local Traffic

Considering the number of access points and signalized and unsignalized intersections along Route 220 in the study area, implementation of any free flow improvements or partial access control to accommodate regional traffic would offer minimal benefits to local traffic that currently uses Route 220 for access to residences and businesses as well as trips to Drewry Mason Elementary School. Innovative intersections and modifications to the corridor that may help to preserve the arterial through movements of regional traffic would likely have some negative impact on local traffic by eliminating existing access on Route 220.

Connecting or extending existing local roads to reduce or consolidate access demands on existing Route 220 may improve delay at existing intersections and median crossovers; however, these improvements would add additional travel time and distance for local traffic to reach destinations, which would not address this element of need. Furthermore, implementation of innovative intersections at particular locations along the corridor may result in right of way impacts to the multiple residential and commercial properties that currently have access or property frontage along existing Route 220.

4.3.1.3 Addressing Geometric Deficiencies and Inconsistencies

Access improvements that modify intersections and traffic signals, reduce conflict points, increase sight distance, consolidate access points, or upgrade shoulders would not address geometric deficiencies and inconsistencies, as the scope of work of these minor improvements would not correct the substandard sharp curves and abrupt changes in grade that exist along Route 220. In

order to address the inadequate stopping sight distances associated with the sub-standard horizontal and vertical curves along existing Route 220 from the North Carolina state line to Ridgeway, substantial cuts or fills and associated construction costs would be required. Consolidating access points or introducing innovative intersection design to accommodate local and regional traffic from Ridgeway to Route 58, would result in numerous access closures and property impacts. Similar to the discussions included in **Section 4.2**, full reconstruction of the existing roadway would likely be required in order to correct the substandard geometric conditions of existing Route 220, which would likely result in substantial right of way impacts and associated construction costs. As a result, this option would does not offer a practicable option with an appreciable advantage to minimizing right of way requirements or potential environmental impacts, compared to other options considered, while not addressing the Purpose and Need.

4.3.2 Other Considerations

Reconstruction along existing Route 220 would be constrained by a high degree of right of way impacts, requiring complicated and costly maintenance of traffic measures as well as traffic movement disruptions and access interruptions to residences and businesses along Route 220. These traffic disruptions and access interruptions would likely remain for a large duration of the reconstruction along existing Route 220. The disruption of traffic movements along Route 220 would inhibit the ability of residents and commuters to access local businesses. Communities located along either side of Route 220 would continue to be bisected by a busy roadway that carries a high percentage of truck traffic. As part of the reconstruction of Route 220 access to either side of the roadway would become increasingly difficult.

The APP encourages innovative strategies to implement safety and capacity improvements on arterial highways throughout the Commonwealth of Virginia. While APP implementation strategies may offer localized benefits to preserve the existing conditions of the Route 220 corridor, they are typically considered near-term operational improvements and would likely focus primarily on signal timing improvements within the study area. These localized improvement options would not address the Purpose and Need for the study for accommodating both regional and local traffic. This option would not meet the Purpose and Need and was not retained for detailed study. There were no objections to this recommendation from the agencies involved in the study and, as a result, Access Management Options and Arterial Preservation were eliminated from further consideration following the September 2019 agency coordination meeting.

4.4 EASTERN ROUTE OPTIONS

Following the identification and recommendation of Alternative C as the Preferred Alternative, VDOT and FHWA initiated a public comment period between July and August 2019 to solicit input on the Preferred Alternative (Alternative C). Accompanying the comment period, a Public Hearing was also conducted on August 15, 2019 to present the Preferred Alternative and provide an opportunity for public input. Comments submitted to VDOT during the August 2019 comment period on the recommendation of a Preferred Alternative also suggested that an alignment option east of existing Route 220 should be carried forward for evaluation in this Draft EIS. Similar to Alignment Options 5A through 5D and as discussed in **Section 2.2.2** through **Section 2.2.5,** options to the east of existing Route 220 would not eliminate conflicts between regional and local traffic or would not accommodate regional traffic, as traffic data demonstrates the need for a westerly movement from Route 220. Based on the inability of the eastern options (5A through 5D) to address the study's Purpose and Need, these options were not retained as part of the range of alternatives to be evaluated in this Draft EIS. There were no objections to this recommendation from the agencies involved in the study and, as a result, the Eastern Route Options were eliminated from further consideration following the September 2019 agency coordination meeting.

4.5 HYBRID OPTIONS

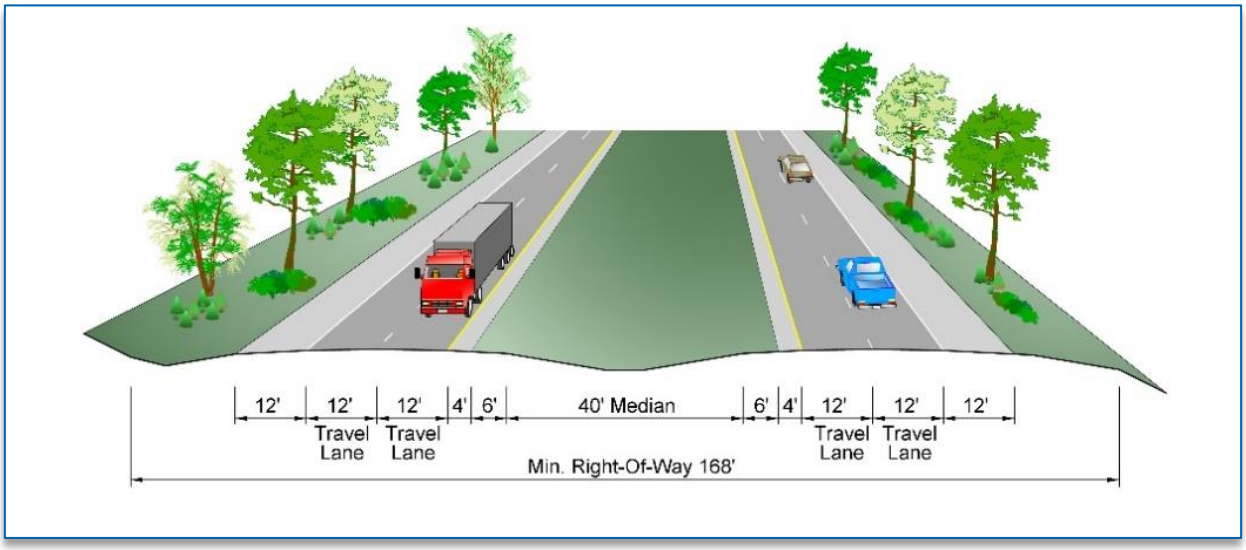
As discussed in **Section 2.**1, a reasonable range of alternatives was developed for the Martinsville Southern Connecter Study and presented in this Draft EIS. Agencies concurred on the range of alternatives during the March 2019 Agency meeting. The identification and evaluation of a reasonable range of alternatives is consistent with FHWA's Technical Advisory *T6640.8A Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA, 1987). Following the identification and recommendation of Alternative C as the Preferred Alternative, VDOT and FHWA initiated a public comment period between July and August 2019 to solicit input on the Preferred Alternative (Alternative C). Accompanying the comment period, a Public Hearing was also conducted on August 15, 2019 to present the Preferred Alternative and provide an opportunity for public input. Comments submitted to VDOT during the August 2019 Public Hearing comment period suggested that VDOT evaluate potential hybrid combinations of the alternatives retained for detailed evaluation in this Draft EIS, which are described in **Sections 2.3.4** through **2.3.6** (Alternatives A, B, and C). Of these alternatives, based on public comment, as well as input from Participating Agencies, and concurrence by USACE and EPA, the CTB has identified Alternative C as the Preferred Alternative. As part of the concurrence on the Preferred Alternative, VDOT, FHWA, USACE, and EPA agreed that modifications or shifts in the Preferred Alternative may be evaluated in the Final EIS and Joint Permit Application (JPA) to minimize impacts (see **Section 7**).

5. TYPICAL SECTIONS AND PLANNING LEVEL LIMIT OF DISTURBANCE

Illustrative planning level engineering assumptions were developed for each alternative using current design standards adopted by VDOT, including AASHTO's *A Policy on Geometric Design of Highways and Streets, 2011* (Green Book) and the VDOT Road Design Manual (AASHTO, 2011 and VDOT, 2019a). Detailed tables showing the design criteria that were used for this study are included in **Appendix B**. The design criteria as well as the cost and impact assumptions presented in this Draft EIS are based on the functional classification of the new roadway as a Rural Principal Arterial (GS-1) with a design speed of 60 mph.

Based on the established design criteria, roadway typical sections were developed and applied to each alternative, depending on the location of the improvements under consideration (i.e. reconstruction with full access control along existing Route 220 or a full access control facility on new location). Where the alternatives would potentially include improvements on new location, the typical section illustrated in **Figure 5-1** was applied. The typical section is a divided highway that has a 40-foot wide median, with 40 feet of pavement on each side. The 40-foot wide median is consistent with both VDOT and AASHTO guidelines for median width. The Green Book notes that "When medians are 40 ft [12 m] or wider, drivers have a sense of separation from opposing traffic; thus, a desirable ease and freedom of operation is obtained, the noise and air pressure of opposing traffic is not noticeable, and the glare of headlights at night is greatly reduced" (AASHTO, 2011). The paved section in each direction consists of a four-foot wide inside shoulder, two 12-foot travel lanes, and a 12-foot wide outside shoulder. Beyond the outside shoulders is a buffer space needed for a design speed of 60 mph[25]. For the purposes of assessing impacts, a 2:1 side slope was utilized beyond the required drainage swales.

Figure 5-1: Typical Section – New Location Alignment

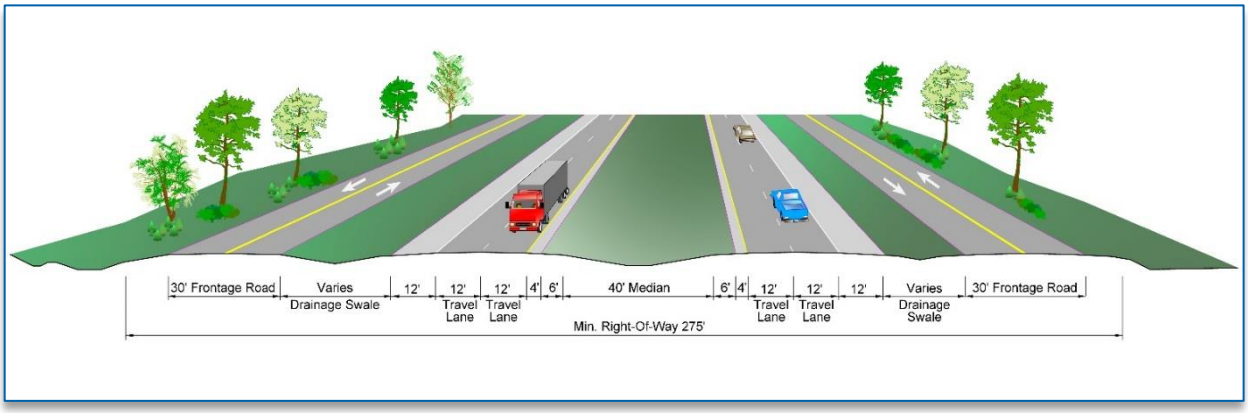


For locations in which frontage roads would be required, the typical sections for the alignment options are shown in **Figure 5-2**. Frontage Roads are associated with reconstruction considered along existing Route 220. The typical sections assume open drainage using swales, therefore, minimization options such as concrete barrier are not included in the illustrative planning levels

[25] A 30-foot clear zone from the edge of travelway to the 2:1 embankment is required per the VDOT Road Design Manual. In this case, with a 12-foot paved shoulder, the additional buffer required would be 18 feet

designs presented in this Draft EIS.

Figure 5-2: Typical Section – Reconstruction of Existing Route 220 with Frontage Roads



Illustrative planning level Limit of Disturbance

Based on the established design criteria and typical sections, an illustrative planning level LOD was developed to estimate the potential impacts of each alternative carried forward for evaluation in the Draft EIS. The LOD has been developed based on the horizontal alignment, vertical profile and typical sections for each of the alternatives carried forward for evaluation. The LOD uses engineered roadway alignments, includes drainage and stormwater needs, and is developed using the recommended roadway grades. The LOD assumes the worst-case scenario for the calculation of impacts and costs[26]. The LOD for evaluated interchanges have been preliminarily determined based on the anticipated traffic volumes and types of connections (i.e. service interchange to lower-order functional class roadway or system interchange to arterial facility or higher-order functionally classified roadway). The LOD within the interchange areas has been established to conceptualize how the alternatives under evaluation would tie into existing roadway facilities and for the purposes of estimating potential impacts to environmental and human resources. Should any improvements from the Martinsville Southern Connector Study advance for detailed engineering and design, refinements to the interchange configurations and LOD would be evaluated to maximize the operational efficiency of the connection and to avoid or minimize impacts to the greatest extent practicable.

The illustrative planning level design and LOD assumes that all bridges over the Norfolk Southern railroad are constructed such that abutments are located outside of the railroad right of way, with an assumed minimum under clearance from top of rail to bottom of overhead structure of 23 feet[27][28]. Where the alternatives cross over a feature (e.g., railway, roadway, waterway), bridges

[26] The illustrative planning level LOD does not consider final sign placement, soundwall design, or drainage features. While these features may extend beyond the LOD, the estimates presented in the Draft EIS still capture a worst-case impact scenario. If it is determined that features extend beyond the LOD as part of advanced engineering and design on any improvements advanced from this study, then additional analysis and documentation may be required.

[27] Planning level engineering assumptions that were developed and used for this study are based on the functional classification of the roadway as a Rural Principal Arterial (GS-1). These are assumptions and not NEPA commitments. If it is determined that there is a need to change or refine any of the assumptions as part of advanced engineering and design on any improvements advanced from this study, then additional analysis and documentation may be required.

[28] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway,

are assumed to be two 44-foot wide structures, one for the northbound and one for the southbound direction. Bridges where adjacent roadways cross over a potential alternative are assumed to be a single structure. All waterway crossings with a 100-year floodplain are assumed to be bridges for cost estimate purposes, whereas other crossings are assumed to be culverts with fills unless otherwise noted in the cost estimate. Roadway profiles were developed such that there is at least ten feet of vertical clearance between the roadway surface and all stream crossings[29]. Additional structural details and specific dimensions would be determined during more detailed design if any improvements should advance from the Martinsville Southern Connector Study.

The LOD varies throughout the corridor due to the presence of considerable cuts and fills. Roadway profiles were developed using the continuous typical sections shown in **Figure 5-1** and **5-2**.

The terrain within the study area is rolling and dominated by igneous and metamorphic rock, consistent with the geology of the Piedmont Physiographic Province in this region. As a result, there is a high likelihood of rock very near the surface. For the development of the LOD and cost estimates for each alternative, 6:1 slopes are assumed to be located at the edge of the required clear zone – or the width of the recoverable area along the roadway edge – for each roadway section. Drainage swales are assumed to have 3:1 slopes with flat bottoms ranging from two to 10 feet in width. Cut slopes and fill slopes to tie in with existing ground beyond the drainage swales are assumed to be 2:1 for all roadways. The 2:1 cut slopes, coupled with the roadside drainage area and wide clear zones, may eliminate the need for additional rockfall protection adjacent to the roadway. For each alternative, roadway cuts greater than 50 feet in height have been identified as potential locations for additional rockfall protection in the cost estimates.

For each of the alternatives evaluated, work is anticipated on segments of crossing and intersecting streets. The latest design criteria were used for the reconstruction of these roadways and are included within the LOD. Typical sections for rebuilt segments of other impacted roadways within the study area are based on the latest pavement widths, roadside grading, and design criteria that are required for their functional classifications in the VDOT Road Design Manual (VDOT, 2019a).

per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT, 2013).

[29] Planning level engineering assumptions that were developed and used for this study are based on the functional classification of the roadway as a Rural Principal Arterial (GS-1). These are assumptions and not NEPA commitments. If it is determined that there is a need to change or refine any of the assumptions as part of advanced engineering and design on any improvements advanced from this study, then additional analysis and documentation may be required.

6. COST ESTIMATES

A preliminary construction cost estimate, including anticipated right of way and utility costs for the alternatives carried forward for evaluation was developed based on the VDOT PCES, Version 7.10. Construction costs for each alternative were calculated using the PCES spreadsheet and study quantities that could be estimated at this time. A cost for preliminary engineering, which includes the final design and preparation of the final plans, specifications, and estimate; permitting; advertisement; and bidding is included in the construction cost.

In addition to construction costs, costs were estimated for the anticipated right of way required to construct each alternative, as well as the costs to relocate existing or provide new utilities. These costs were developed using the VDOT PCES spreadsheets for right of way and utilities. Bridge costs were developed using the latest VDOT PCES bridge spreadsheet, Version 1.2. A summary of the estimated construction, right of way, and utility costs for each alternative is provided in **Table 6-1**.

Table 6-1: Total Estimated Costs

Cost Detail Item	Alternative A	Alternative B	Alternative C (Preferred Alt.)	Alternative D	Alternative E
General	$41,267,945	$37,081,129	$31,975,909	$33,282,443	$27,806,661
Grading	$221,307,269	$168,779,915	$109,525,003	$158,097,833	$144,303,613
Drainage	$60,333,409	$69,938,835	$60,614,427	$44,946,300	$32,002,851
Pavement	$36,026,007	$37,852,652	$34,834,036	$44,927,484	$42,087,681
Incidentals	$43,593,786	$66,101,844	$74,152,248	$85,676,574	$71,210,538
Protective	$14,203,617	$23,861,617	$19,466,617	$37,234,617	$32,313,617
Erosion Control	$22,060,000	$20,762,000	$16,659,000	$32,594,000	$28,992,000
Utilities	$3,152,000	$2,966,000	$2,380,000	$9,779,000	$14,496,000
Traffic and Safety	$4,149,307	$4,067,839	$4,032,977	$5,220,265	$3,623,355
Right of Way	$16,968,884	$29,855,486	$28,980,663	$43,833,016	$60,266,970
Construction Inspection	$52,721,543	$50,965,104	$41,788,652	$53,327,439	$46,832,914
Construction Contingency	$133,828,002	$129,423,549	$106,092,065	$135,527,555	$119,050,895
Escalation	$107,731,543	$104,185,957	$85,404,112	$109,099,681	$95,835,970
Total Cost	**$757,343,311**	**$745,841,928**	**$615,905,708**	**$793,546,207**	**$718,823,065**

The summaries below provide a brief description on the methodology used to calculate each major quantity cost. The spreadsheets detailing the material quantities and costs for each alternative, as well as the methodology and assumptions used to develop the quantities and costs, may be found in **Appendix E** of the report.

General Items – This quantity section included Mobilization, Construction Surveying, and Clearing and Grubbing. All three categories were calculated as a lump sum. Mobilization and Construction Surveying was calculated as a function of the construction cost, whereas Clearing and Grubbing was based on the LOD.

Grading Items – The quantity items in this section included Regular, Rock, and Borrow Excavation. All quantities were measured based off the cubic yard total of each alternative alignment. For estimating purposes, it was assumed that rock is present in the study area and that 10% of any excavation deeper than 15 feet is rock. Alternatives A, B, and C, are primarily on new alignment and would likely require a larger percentage of excavated material to be moved elsewhere for fill. For these alternatives it was assumed that 75 percent of the excavated material can be re-used as fill, setting aside a percentage for the organic material and other unsuitable materials near the surface. For Alternative D, it was assumed that only 30 percent of the excavated material is re-usable since most of it would be along existing roadway pavement section. Only 10 percent was assumed for Alternative E since it primarily follows existing Route 220.

Drainage Items – This section included Stormwater Management facilities: bioretention, stormwater ponds, swales, stream culverts, and closed drainage systems. All Stormwater Management bioretentions and ponds were calculated as a lump sum, taking into consideration the type and size of each facility to estimate a unit price for each. Closed drainage systems were estimated as a function of the total number of stormwater ponds and bioretention. Stream culverts were measured in linear feet for each alternative.

Incidental Items – These items included Structures, Retaining Walls, and Guardrail. The bridge costs were developed using the PCES bridge spreadsheets, which considered the costs for removing existing structures, difficult access, and phased construction. The PCES tool estimated the bridge cost to be approximately $225 per square feet but increased to $300 per square feet to better reflect price trends. Bridges over the Norfolk Southern railroad were assumed to span the entire right of way with 23 feet of clearance between the top of the rail and the bottom of the structure[30]. Retaining walls were only assumed to be in Alternatives D and E to avoid impacts to adjacent roadways and the Norfolk Southern railroad. The lengths and heights of the walls were measured in linear feet directly from the 3-D models developed for each alternative.

Protective Items – Protective items included the Maintenance of Traffic, Environmental / Landscape, Field Offices, Progress Schedule Baseline, and Updates. Maintenance of Traffic was estimated as a percentage of the construction cost. Alternative A was assumed to be three percent of the cost and Alternatives B and C were six percent. Alternatives D and E were assumed to be 10 percent since they are primarily on the existing Route 220 alignment. Environmental / Landscape costs were estimated as a set percentage of construction cost for all alternatives. Field Offices, Progress Schedule Baseline, and Updates were estimated as a lump sum for the item costs.

Erosion Control – Erosion Control was measured as a lump sum in relation to the estimated construction cost. Alternatives A, B, and C would allow large sections of roadway to be built since it is mostly along new alignment. This would allow one installation, reducing erosion control efforts. Erosion Control was assumed to be seven percent of the total cost for construction items for these alternatives. Alternatives D and E would require more erosion control efforts since they're primarily on the existing Route 220 alignment. Ten percent of the construction cost was assumed for these alternatives.

[30] Minimum vertical clearance acceptable for roadway sections crossing the Norfolk Southern Roadway, per VDOT's *Manual of the Structures and Bridge Division*, File No. 06.06-4 (VDOT, 2013).

Utility Items – Utility impacts were assessed using current aerial photography, as-built information provided through Geographic Information System (GIS) data, and communication with the various utility franchise owners within the study area. Assumptions were made to include the costs for relocating overhead poles and lines, as well as underground services including water, sewer, and gas. These assumptions were used to create a set percentage of the total cost for construction items for each alternative. Utility costs for Alternatives A, B, and C were assumed to be one percent of the construction costs. These alternatives are mostly along new alignments, impacting less existing utility services. Alternative D was assumed to be three percent of the total cost because it impacts Segments A and B of the existing corridor. Alternative E was assumed to be five percent of the total cost because it impacts existing utilities in all three segments of the existing corridor.

Traffic Control and Safety Items – These items included traffic signals and pavement markings. Traffic signage, posts, and foundations were calculated as a lump sum, taking into consideration the signage needed for each different interchange. Pavement markings were calculated based off the linear footage of each alternative length, number of lanes, and frontage roads.

Right of Way – Right of way needs were determined by estimated property impacts. Property impacts include changes to access from roadways, partial acquisitions that only touch the frontage or an edge of a property, or the need to acquire an entire parcel. The right of way needs also include conceptual locations for stormwater management. Right of way costs were developed for land and improvements. The improvements included the fair market value of buildings on any property anticipated to be fully impacted by the alignment. The land value was calculated from the tax assessment value of land anticipated to be impacted by the LOD of the alignment. Relocation costs were estimated to be $95,000 per residential site and $75,000 for commercial, industrial, and institutional sites.

Construction Inspection – Construction Inspection was calculated as a lump sum for each alternative. Per current VDOT guidelines, a 12.5 percent rate of the construction cost was used to calculate the inspection costs.

Construction Contingency – Construction Contingency was calculated as 30 percent of the total construction cost for each alternative. The total was assumed to include design development and construction risks.

Escalation – Escalation was calculated using the PCES spreadsheet, with the start date estimated in 2025 and construction lasting four years.

7. PREFERRED ALTERNATIVE

The identified Preferred Alternative for the Martinsville Southern Connector Study is Alternative C. This alternative satisfies the Purpose and Need and best balances the transportation operations, socio-economic impacts, natural resource impacts and cost. In addition, it has been identified as the preliminary Least Environmentally-Damaging Practicable Alternative (LEDPA). Section 404 of the Clean Water Act requires selection and authorization of the LEDPA; and determination from the USACE that there is no other practicable alternative which would have less adverse impact on the aquatic ecosystem.

Table 7-1 shows the comparison of resource impacts and cost between the alternatives carried forward for detailed evaluation.

Table 7-1: Alternative Resource Impacts and Cost Summary

Resource	Alternatives Retained for Detailed Evaluation		
	A	B	C (Preferred Alt.)
Potential Residential Relocations	17	26	25
Potential Commercial Relocations	0	0	0
Other Potential Relocations*	1	5	4
Streams (Linear Feet)	28,998	20,548	21,882
Wetlands (Acres)	7.8	5.9	3.7
Forest (Acres)	296	259	219
Historic Sties (Number of Properties)**	4	5	3
Cost			
Construction and Preliminary Engineering	$737,222,427	$713,020,442	$584,545,045
Right of Way	$16,968,884	$29,855,486	$28,980,663
Utilities	$3,152,000	$2,966,000	$2,380,000
Total Cost	**$757,343,311**	**$745,841,928**	**$615,905,708**

*Includes: Industrial, Institutional, and Cemeteries
**Number of properties on or eligible for listing on the National Register of Historic Places (NRHP)

Alternative C satisfies the purpose of the study and the needs identified in the Purpose and Need Statement: accommodate local traffic, accommodate through traffic, and address geometric deficiencies. The alternative route would provide an efficient connection for regional traffic to travel between the North Carolina state line and Route 58. This would also divert regional traffic from local traffic along existing Route 220, cutting approximately 2 minutes and over a half-mile from the No-Build Alternative travel time and distance. The reconstruction of the southernmost existing Route 220 would also remove the geometric deficiencies, improving traffic operations and address safety concerns by eliminating a number of conflict points.

Alternative C would have the least amount of impacts to forest and 100-year floodplain when compared to the other alternatives carried forward for detailed evaluation. In addition, Alternative C would have the second lowest total wetland impacts, stream impacts and property relocations. Additional engineering could occur as part of the Final EIS and JPA and/or if and when the study advances beyond the Record of Decision/permits to more detailed design. If the study advances, other design modifications may be assumed to further reduce impacts to natural resources and private property. In addition, the estimated construction cost of the Preferred Alternative is approximately $140 million less than all other alternatives carried forward for detailed evaluation.

As part of the identification of the Preferred Alternative, the public was invited to provide review and feedback on the recommendation. VDOT offered a formal comment period and associated Location Public Hearing in August 2019; 659 comments were received.

Following VDOT's recommendation of Alternative C as the Preferred Alternative and informed by public comments received, as well as input from the Participating Agencies, the USACE and the United States Environmental Protection Agency (EPA) provided their concurrence that Alternative C is the Preferred Alternative on September 4, 2019. As part of the concurrence on the Preferred Alternative, VDOT, FHWA, USACE, and EPA agreed that modifications or shifts in the Preferred Alternative may be evaluated in the Final EIS and JPA to minimize impacts to private properties, natural resources, or other considerations (see **Section 4.5)**. A copy of the meeting materials presented at the September 2019 meeting is included in **Appendix F.**

Based on agency concurrence and public input on the Preferred Alternative, the CTB approved the location of Alternative C during their January 2020 meeting.

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APPENDIX A

March 13, 2019 Agency Meeting Materials and Agency Concurrence

Recommendation on the Range of Alternatives

This document is a collection of information developed and discussed as part of the Martinsville Southern Connector Study Environmental Impact Statement (EIS) over the last 11 months. The information in this document is intended to inform concurrence on the following:

- Alignment Option 1 will be retained for analysis in the EIS.
- Alignment Option 2 should not be retained for analysis in the EIS.
- Alignment Option 3 should be retained for analysis in the EIS.
- Alignment Option 4A should be retained for analysis in the EIS.
- Alignment Option 4B should be retained for analysis in the EIS.
- Alignment Option 4C should be retained for analysis in the EIS.
- Alignment Option 4D should be retained for analysis in the EIS.
- Alignment Option 5A should not be retained for analysis in the EIS.
- Alignment Option 5B should not be retained for analysis in the EIS.
- Alignment Option 5C should not be retained for analysis in the EIS.
- Alignment Option 5D should not be retained for analysis in the EIS.

These alignment options have not yet been informed by aerial survey. Once surveying is complete, alignments of the retained alternatives may shift. Agencies will be updated if or when any of these shifts occur.

Evaluating Alignment Options with Respect to Purpose and Need

The table below is a summary of how the recommendation on the range of alternatives is informed relative to each need element of the Purpose and Need statement. These qualitative criteria are applied to inform VDOT's recommendation as to if they should be retained for detailed analysis in the EIS. Additional information will be provided in the EIS to further support this evaluation.

Need Element as Concurred upon	How Alignment Options are Evaluated
Accommodate Regional Traffic – current inconsistencies in access, travel speeds, and corridor composition along U.S. Route 220 inhibits mobility and creates unsafe conditions considering the high volume of truck and personal vehicle traffic traveling through the corridor to origins and destinations north and south of the study area	Alignment options that meet this need would eliminate conflict between regional and local traffic in a manner that accommodates regional origins and destinations and the high percentage of trucks that currently and are anticipated to travel the corridor.
Accommodate Local Traffic – numerous, uncontrolled access configurations along U.S. Route 220, combined with high through traffic movement, create traffic delays and contribute to high crash rates for travelers within the corridor accessing residences, commercial buildings, and schools	Alignment options that meet this need would eliminate unsafe interaction between local and regional traffic, while maintaining adequate local access.
Address Geometric Deficiencies and Inconsistencies – current geometric conditions along U.S. Route 220, such as lane widths, horizontal curves, and stopping sight distances, are below current design standards and vary along the length of the corridor, resulting in safety concerns for all users.	Alignment options that meet this need would address the current geometric deficiencies and inconsistencies on U.S. Route 220. A new alignment would be designated as U.S. Route 220.

Alignment Options Summary

These alignment options were first presented to the agencies in November 2018. In the months since, the options have been further discussed with the agencies and presented to the public at a Citizen Information Meeting on January 23, 2019 (see Attachment B).

Alignment Option 1 – No-Build

Recommendation: This option will be retained for analysis in the EIS.

Evaluating the "no-build" alternative is required when considering a range of alternatives for National Environmental Policy Act (NEPA) analyses. It serves as the baseline condition for evaluating each of the other alternatives. It is acknowledged in retaining this option that it does not meet any of the elements of the Purpose and Need.

Alignment Option 2 – Transportation System Management and Travel Demand Management (TSM/TDM) Improvements

Recommendation: Alignment Option 2 should not be retained for analysis in the EIS.

The TSM/TDM Alignment Option would involve new, relatively low-cost improvements without major construction work. Work items associated with this alignment option could include (and are not limited to) minor geometric improvements (such as additional or extended turn lanes) improved pedestrian crossings, and increased roadway lighting and vegetation removal. These improvements as a standalone option do not meet the need elements that have been identified. Improvements associated with this option would not eliminate the unsafe interactions between local and regional traffic, and would not appropriately address the geometric deficiencies and inconsistencies that exist along U.S. Route 220. Improvements needed to satisfactorily address the geometric deficiencies require extended construction work beyond what is included as part of this option. Implementation of TSM/TDM improvements is not precluded, however, from being implemented as part of a preferred alternative or as standalone projects in the future.

Alignment Option 3 – Full Reconstruction of Existing U.S. Route 220 with Controlled Access
Recommendation: Alignment Option 3 should be retained for analysis in the EIS.
Approximate Length: 6.7 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: U.S. Route 220/U.S. Route 58 Interchange
Alignment Option 3 (orange on the attached map) assumes the full reconstruction of U.S. Route 220 with the implementation of controlled access. Given the scope of the geometric deficiencies of the corridor, coupled with the rolling topography in the region, an "improve existing" option is not appropriate and instead a full reconstruction option is required. Supporting information on these constraints will be included in the EIS.

As the options were introduced to the agencies in 2018, there was discussion about the differences between partial and full access control. A decision was made to speak generally to access control, but accept that it was a part of any option retained for analysis. The EIS will include great discussion on this topic and project a worst case impact scenario in which future decisions on access control could be made without resulting in an increase to impacts. To accommodate the access control measures, this option includes the construction of frontage roads that provide local access and connections to U.S. Route 220 at the northern and southern termini, as well as at interchanges located along corridor. A decision on the number and proposed location of these interchanges could be made after concurrence, when more detailed engineering and traffic analyses are advanced. VDOT will be prepared to discuss preliminary ideas at the March meeting.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor and 47 percent of these trucks then head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south and travel through U.S. Route 220 to North Carolina. . The high truck volumes/percentages led VDOT to introduce all options as access controlled options. In the absence of access control, it is not possible to meet the independent regional and local traffic needs for the study.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, demonstrating a need to eliminate unsafe conflicts between regional and local traffic (see Attachment B). Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. Therefore, there is some question if implementing access control along US. Route 220 can accommodate local traffic or if the frontage roads would become congested and limit rather than enhance local access. Without retaining and advancing this option for more detailed analysis, it is not possible to answer this question.

The current geometric conditions along the corridor are inconsistent. For example, in the southbound side of the Segment A of the corridor, there are seven horizontal curves that are below the minimum radius required (1,204 feet). Lane widths throughout the corridor vary, and stopping sight distances are inadequate. These geometric deficiencies also create sight distance issues where the high percentage of trucks is mixing with schools, businesses, and residences.

The full reconstruction of existing U.S. Route 220 in Alignment Option 3 would attempt to accommodate local and regional traffic by separating the two with frontage roads. The reconstruction of the existing corridor up to current standards would address geometric deficiencies and inconsistencies. It is uncertain to what extent the frontage roads provide adequate separation of local and regional traffic, but detailed analysis will provide additional information. The magnitude of property impacts is not known at a detailed level at this time, but preliminary data suggests the number of relocations may be great enough to render this option infeasible. VDOT recommends retaining Alignment Option 3 for analysis in the EIS. As discussed during the February coordination meeting, VDOT will have preliminary right of way impact data a few months after concurrence and will return to the agencies with a determination as to if it is reasonable to consider this option as a feasible alternative. If it is found to not be feasible based on right of way impacts, VDOT would seek input from FHWA and the other federal agencies as to if this alternative should continue to be advanced for detailed analysis in the EIS.

Alignment Option 4A – New Alignment West of Existing U.S. Route 220

Recommendation: Alignment Option 4A should be retained for analysis in the EIS.
Approximate Length: 7.7 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: New interchange one mile west of U.S. Route 58/Joseph Martin Highway Interchange

Alignment Option 4A (pink on the attached map) is a new western alignment that follows existing U.S. Route 220 for approximately 1.4 miles, before shifting to the west.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, demonstrating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Alignment Option 4A would accommodate regional traffic by providing the desired westerly movement demonstrated by available traffic data presented above. This option would accommodate local traffic by maintaining access to local destinations and diverting regional traffic to the new western alignment. This option would address the geometric deficiencies and inconsistencies that currently exist by fully reconstructing U.S. Route 220 up to the takeoff point for the new western alignment, all of which would be consistent with design standards. This option is understood to be on a ridgeline, and its alignment

already considers avoidance of property impacts and attempts to achieve perpendicular stream crossings.

VDOT recommends retaining Alignment Option 4A for analysis in the EIS based on its ability to accommodate local and regional traffic and address geometric deficiencies and inconsistencies.

Alignment Option 4B – New Alignment West of Existing U.S. Route 220

Recommendation: Alignment Option 4B should be retained for analysis in the EIS.
Approximate Length: 7.3 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: U.S. Route 58/Joseph Martin Highway Interchange

Alignment Option 4B (light blue on the attached map) is a new western alignment that follows existing U.S. Route 220 for approximately 1.4 miles, before shifting to the west.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Alignment Option 4B would accommodate regional traffic by providing the desired westerly movement demonstrated by available traffic data presented above. This option would accommodate local traffic by maintaining access to local destinations and diverting regional traffic to the new western alignment. This option would address the geometric deficiencies and inconsistencies that currently exist by fully reconstructing U.S. Route 220 up to the takeoff point for the new western alignment, all of which would be consistent with design standards.

VDOT recommends retaining Alignment Option 4B for analysis in the EIS based on its ability to accommodate local and regional traffic and address geometric deficiencies and inconsistencies.

Alignment Option 4C – New Alignment West of Existing U.S. Route 220

Recommendation: Alignment Option 4C should be retained for analysis in the EIS.
Approximate Length: 7.4 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: U.S. Route 58/Joseph Martin Highway Interchange

Alignment Option 4C (neon green on the attached map) is a new western alignment that follows existing U.S. Route 220 for approximately 1.4 miles, before shifting to the west. Initially, this option resulted in a new interchange between the U.S. Route 58/Joseph Martin Highway Interchange and the U.S Route 58/U.S. Route 220 interchange. Based on internal reviews, VDOT found this placement to be infeasible. The location would either require a design waiver or design exception based on its proximity to existing interchanges or full reconstruction of the two existing interchanges to provide adequate spacing. The likelihood of obtaining a design waiver or design exception was not clear and therefore VDOT did not recommend pursuing that option. Likewise, the reconstruction of the two existing interchanges would come at an impact and cost that were not warranted. Therefore, in the February coordination meeting, VDOT recommended that this option not be retained. Following comments from the Western Piedmont Planning District Commission at the February 13, 2019 Agency Coordination Meeting, VDOT has shifted this alignment to now tie in to the existing U.S. Route 58/Joseph Martin Highway Interchange. Alignment Option 4C mostly follows the alignment shared with agencies in previous months, but now moves to the same alignment as Alignment Option 4D west to join Alignment Option 4B.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access

points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Alignment Option 4C would accommodate regional traffic by providing the desired westerly movement demonstrated by available traffic data presented above. This option would accommodate local traffic by maintaining access to local destinations and diverting regional traffic to the new western alignment. This option would address the geometric deficiencies and inconsistencies that currently exist by fully reconstructing U.S. Route 220 up to the takeoff point for the new western alignment, all of which would be consistent with design standards.

VDOT recommends retaining Alignment Option 4C for analysis in the EIS based on its ability to accommodate local and regional traffic and address geometric deficiencies and inconsistencies.

Alignment Option 4D – New Alignment West of Existing U.S. Route 220

Recommendation: Alignment Option 4D should be retained for analysis in the EIS.
Approximate Length: 8.4 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: U.S. Route 58/Joseph Martin Highway Interchange

Alignment Option 4D (grey on the attached map) follows existing U.S. Route 220 for approximately 5.6 miles from the North Carolina state line, where it then diverts to the west.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through US Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Alignment Option 4D would accommodate regional traffic by providing the desired westerly movement demonstrated by available traffic data presented above. This option would accommodate local traffic by maintaining access to local destinations and diverting regional traffic to the new western alignment. This option would address the geometric deficiencies and inconsistencies that currently exist by fully reconstructing U.S. Route 220 up to the takeoff point for the new western spur, and constructing new alignment consistent with design standards. At this point, it is uncertain to what extent the frontage roads implemented as part of the reconstruction of U.S. Route 220 would provide adequate separation

of local and regional traffic. . It is uncertain to what extent the frontage roads provide adequate separation of local and regional traffic, but detailed analysis will provide additional information. The magnitude of property impacts is not known at a detailed level at this time, but preliminary data suggests the number of relocations may be great enough to render this option infeasible. VDOT recommends retaining Alignment Option 4D for analysis in the EIS. As discussed during the February coordination meeting, VDOT will have preliminary right of way impact data a few months after concurrence and will return to the agencies with a determination as to if it is reasonable to consider this option as a feasible alternative. If it is found to not be feasible based on right of way impacts, VDOT would seek input from FHWA and the other federal agencies as to if this alternative should continue to be advanced for detailed analysis in the EIS.

Alignment Option 5A – New Alignment East of Existing U.S. Route 220
Recommendation: Alignment Option 5A should not be retained for analysis in the EIS.
Approximate Length: 8.6 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: New interchange 1.2 miles east of U.S. Route 220/U.S. Route 58 Interchange
Alignment Option 5A (yellow on the attached map) follows existing U.S. Route 220 for approximately 5.2 miles from the North Carolina state line, where it then diverts to the east.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Traffic data shows a western alignment is necessary in order to accommodate both local and regional traffic. Alignment Option 5A presents an eastern movement, indicating that this option would not provide adequate separation of local and regional traffic by accommodating the high percentage of truck traffic in the study area. It is assumed that the regional traffic, including the high percentage of trucks, traveling west on U.S. Route 58 from northbound U.S. Route 220 would not travel further east on Alignment Option 5A to ultimately travel west on U.S. Route 58. Because local and regional traffic would not be separated, unsafe interactions between the two would not be eliminated. The only need element

that would be adequately addressed by this option are the geometric deficiencies and inconsistencies, which would be addressed with the full reconstruction of existing U.S. Route 220 up to the point at which a new alignment takes off to the east. All construction would be consistent with design standards.

VDOT recommends not retaining Alignment Option 5A for analysis in the EIS because it does not accommodate local and regional traffic.

Alignment Option 5B – New Alignment East of Existing U.S. Route 220
Recommendation: Alignment Option 5B should not be retained for analysis in the EIS.
Approximate Length: 8.1 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: New interchange 1.2 miles east of U.S. Route 220/U.S. Route 58 Interchange
Alignment Option 5B (dark green on the attached map) follows existing U.S. Route 220 northward for approximately 3.4 miles, where it breaks east.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Traffic data shows a western alignment is necessary in order to accommodate local and regional traffic. Alignment Option 5A presents an eastern movement, indicating that this option would not provide adequate separation of local and regional traffic by accommodating the high percentage of truck traffic in the study area. It is assumed that the trucks traveling west on U.S. Route 58 from northbound U.S. Route 220 would not travel further east on Alignment Option 5B to ultimately travel west on U.S. Route 58. Because local and regional traffic would not be separated, unsafe interactions between the two would not be eliminated. The only need element that would be adequately addressed by this option are

the geometric deficiencies and inconsistencies, which would be addressed with the reconstruction of existing U.S. Route 220 up to the point at which a new alignment takes off to the east. All construction would be consistent with design standards.

VDOT recommends not retaining Alignment Option 5B for analysis in the EIS because it does not accommodate local and regional traffic.

Alignment Option 5C – New Alignment East of Existing U.S. Route 220
Recommendation: Alignment Option 5C should not be retained for analysis in the EIS.
Approximate Length: 8.9 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: New interchange 1.2 miles east of U.S. Route 220/U.S. Route 58 Interchange
Alignment Option 5C (purple on the attached map) is primarily new roadway alignment, following the existing U.S. Route 220 alignment for 0.4 miles from the North Carolina state line.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina.

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Traffic data shows a western alignment is necessary in order to accommodate local and regional traffic. Alignment Option 5A presents an eastern movement, indicating that this option would not provide adequate separation of local and regional traffic by accommodating the high percentage of truck traffic in the study area. It is assumed that the trucks traveling west on U.S. Route 58 from northbound U.S. Route 220 would not travel further east on Alignment Option 5C to ultimately travel west on U.S. Route 58. Because local and regional traffic would not be separated, unsafe interactions between the two

would not be eliminated. The only need element that would be adequately addressed by this option are the geometric deficiencies and inconsistencies, which would be addressed with the reconstruction of existing U.S. Route 220 up to the point at which a new alignment takes off to the east. All construction would be consistent with design standards.

VDOT recommends not retaining Alignment Option 5C for analysis in the EIS because it does not accommodate local and regional traffic.

Alignment Option 5D– New Alignment East of Existing U.S. Route 220

Recommendation: Alignment Option 5D should not be retained for analysis in the EIS.
Approximate Length: 10.2 Miles
Southern Terminus: U.S. Route 220 at North Carolina state line
Northern Terminus: U.S. Route 58/Irisburg Road Interchange

Alignment Option 5D (dark blue on the attached map) is primarily new alignment, following existing U.S. Route 220 for 0.4 miles from the North Carolina state line.

The U.S. Route 220 study corridor is characterized by three distinct segments. Segment A is the southernmost segment, from the North Carolina state line up to just south of Ridgeway. This segment operates similarly to a freeway with high speeds, no signalized intersections, and uncontrolled access. Available data shows that approximately 26 percent of traffic through this segment is truck traffic. This is comparable with Interstate 81, which has truck percentages of 21 to 22 percent in counties near the Tennessee state line. Segment B is near Ridgeway, and is characterized by the first signalized intersection on the northbound side of U.S. Route 220 for over 28 miles. Segment C, the northernmost segment of the corridor, is characterized by uncontrolled access and approximately 70 access points on the northbound and southbound sides.

Traffic data shows that 64 percent of trucks entering U.S. Route 220 from North Carolina travel through the study corridor. 47 percent of these trucks head west on U.S. Route 58. Additionally, 39 percent of trucks traveling eastbound on U.S. Route 58 turn south through U.S. Route 220 to North Carolina..

In addition to the proportion of trucks traveling the corridor, the crash rate per mile of the corridor from 2011 through 2017 was almost four times above the state average, necessitating a need to eliminate unsafe conflicts between regional and local traffic. Segment A, characterized by high speeds, uncontrolled access, and high truck traffic, had a crash rate almost three times the statewide average in this same period. Segment B, where northbound traffic encounters the first traffic signal in over 28 miles, had a crash rate six times the statewide average. Segment C, with about 70 uncontrolled access points to U.S. Route 220, had a crash rate five times the statewide average. In a survey, area residents indicated that the only aspect of existing U.S. Route 220 that is favorable is access to destinations along the corridor. The current geometric conditions along U.S. Route 220 are inconsistent, with varying lane widths, horizontal curves, and inadequate sight distances.

Traffic data shows a western alignment is necessary in order to accommodate local and regional traffic. Alignment Option 5A presents an eastern movement, indicating that this option would not provide adequate separation of local and regional traffic by accommodating the high percentage of truck traffic in the study area. It is assumed that the trucks traveling west on U.S. Route 58 from northbound U.S. Route 220 would not travel further east on Alignment Option 5D to ultimately travel west on U.S. Route 58. Because local and regional traffic would not be separated, unsafe interactions between the two would not be eliminated. The only need element that would be adequately addressed by this option are

the geometric deficiencies and inconsistencies, which would be addressed with the reconstruction of existing U.S. Route 220 up to the point at which a new alignment takes off to the east. All construction would be consistent with design standards.

VDOT recommends not retaining Alignment Option 5D for analysis in the EIS because it does not accommodate local and regional traffic.

Attachment A: Concurrence form
Attachment B: CIM Summary
Attachment C: Crash Rate Table
Attachment D: Updated Map

Concurrence on Alternatives to be retained for Analysis

1) Alignment Option 1 will be retained for analysis in the DEIS.
2) Alignment Option 2 will not be retained for analysis in the DEIS.
3) Alignment Option 3 will be retained for analysis in the DEIS.
4) Alignment Option 4A will be retained for analysis in the DEIS.
5) Alignment Option 4B will be retained for analysis in the DEIS.
6) Alignment Option 4C will be retained for analysis in the DEIS.
7) Alignment Option 4D will be retained for analysis in the DEIS.
8) Alignment Option 5A will not be retained for analysis in the DEIS.
9) Alignment Option 5B will not be retained for analysis in the DEIS.
10) Alignment Option 5C will not be retained for analysis in the DEIS.
11) Alignment Option 5D will not be retained for analysis in the DEIS.

Stipulations:

1) All alternatives retained for analysis assume bridging of Roanoke logperch streams and do not assume bridging for any other streams as part of the analysis for the DEIS.
2) Any alternative retained for analysis may shift upon completion of aerial survey, in which case VDOT will brief the concurring agencies on the proposed changes to the alignment or recommendation to retain the alternative.
3) Once preliminary right of way information is available, VDOT will brief the agencies on the potential impacts for Options 3 and 4d and determine if these options are still feasible and discuss if they should continue to be discussed in the EIS.

VDOT

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Agency/Office	Name	In Person/Phone	I concur with the alternatives to be retained for analysis as discussed in today's meeting
FHWA, Virginia Division	Mack Frost	In Person	Mack Frost
EPA, Region 3	Barbara Okorn	phone	providing any hybrids or other alternatives are fully evaluated Barb Okorn
USACE, Norfolk District	Lee Fuerst	In Person	with the one caveat that if a hybridized option is proposed in the future that a full evaluation of that alt. would be conducted. Lee Fuerst
Virginia Department of Transportation	Scott Smizik	In Person	

Attachment B: CIM Comment Summary

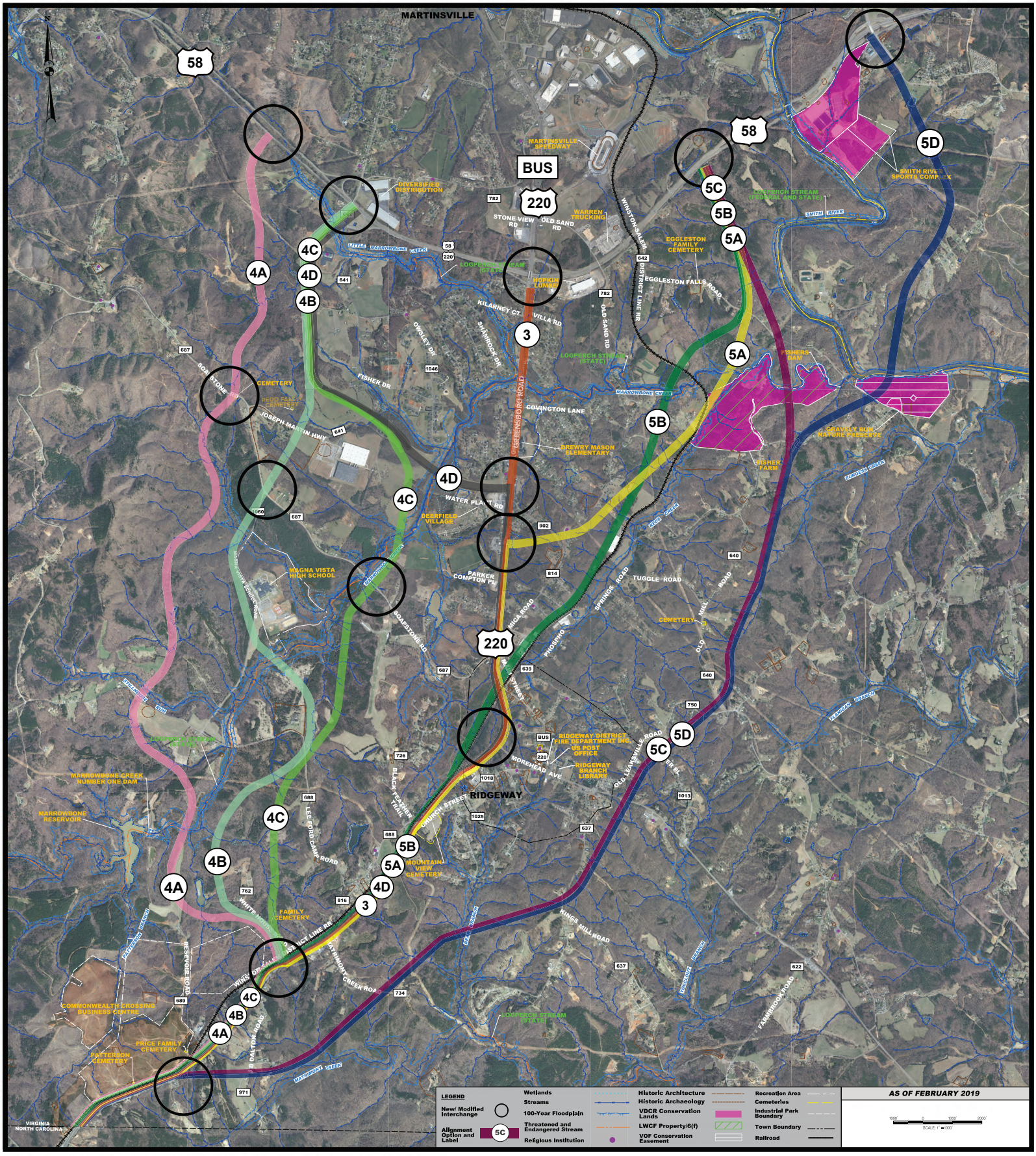
Citizen Information Meeting 1/23/19
Alignment Option Results (Printed and Online combined)

Alignment Option	Like the Most*	Like the Least*
1	1	18
2	3	6
3	14	13
4A	20	10
4B	11	7
4C	16	11
4D	1	6
5A	2	3
5B	3	2
5C	18	17
5D	4	15

Attachment C: Crash Rate Table

ACCOMMODATE LOCAL TRAFFIC – HIGH CRASH RATES

Location	Average Per Year (2011-2017)			Roadway Miles	Crash Rate Per Mile		
	Total	Injury	Fatal		Total	Injury	Fatal
Statewide	124,749	65,225	760	10,105	1.78	0.93	0.01
Salem District	1,869	908	20	7,314.49	0.26	0.12	0.00
Henry County	128	77	3	837.24	0.15	0.09	0.00
Study Corridor	43.0	16.9	0.4	7.02	6.13	2.40	0.06
Segment A	15.4	6.7	0.4	3.20	4.82	2.10	0.13
Segment B	12.6	5.6	0.0	1.16	10.84	4.80	0.00
Segment C	15.0	4.6	0.0	2.66	5.64	1.72	0.00


MARTINSVILLE
58
BUS
220
3
4A
4B
4C
4D
5A
5B
5C
5D
DIVERSIFIED DISTRIBUTION
MARTINSVILLE SPEEDWAY
WARREN TRUCKING
STONE VIEW RD
OLD SAND RD
WINSTON SALEM
DISTRICT LINE RR
EGGLESTON FAMILY CEMETERY
EGGLESTON FALLS ROAD
LEATHERWOOD STREAM (FEDERAL AND STATE)
SMITH RIVER
SMITH RIVER SPORTS COMPLEX
LITTLE MARROWBONE CREEK
LOGPERCH STREAM (STATE)
HOPKINS LUMBER
KILARNEY CT
VILLA RD
SHAMROCK DR
OWSLEY DR
FISHER DR
SOAPSTONE CT
CEMETERY
REDD FAMILY CEMETERY
JOSEPH MARTIN HWY
GREENSBORO ROAD
COVINGTON LANE
BREWRY MASON ELEMENTARY
MARROWBONE CREEK
FISHERS DAM
GRAVELY RUN NATURAL PRESERVE
FISHER FARM
BURGESS CREEK
WATER PLANT RD
DEERFIELD VILLAGE
REDD CREEK
MAGNA VISTA HIGH SCHOOL
SCHOOLHOUSE ROAD
PARKER COMPTON PL
SPRINGS ROAD
TUGGLE ROAD
MILL ROAD
OLD MILL
CEMETERY
MICA ROAD
RHOSPHO
SOAPSTONE RD
M STREET
RIDGEWAY DISTRICT FIRE DEPARTMENT INC.
US POST OFFICE
RIDGEWAY BRANCH LIBRARY
MOREHEAD AVE
OLD LEASKSVILLE ROAD
RIDGEWAY
CHURCH STREET
BLACK FEATHER TRAIL
LEE FORD CAMP ROAD
MARROWBONE CREEK NUMBER ONE DAM
MARROWBONE RESERVOIR
MOUNTAIN VIEW CEMETERY
FAMILY CEMETERY
WHITE OAK
NCL LINE RR
RESERVOIR ROAD
PATTERSON BRANCH
MARTINSVILLE CREEK
KINGS MILL ROAD
FARMBROOK ROAD
COMMONWEALTH CROSSING BUSINESS CENTRE
PRICE FAMILY CEMETERY
PATTERSON CEMETERY
P DALTON ROAD
OLDFIELD STREAM (STATE)
VIRGINIA
NORTH CAROLINA
LEGEND
New/ Modified Interchange
Alignment Option and Label
Wetlands
Streams
100-Year Floodplain
Threatened and Endangered Stream
Religious Institution
Historic Architecture
Historic Archaeology
VDCR Conservation Lands
LWCF Property/6(f)
VOF Conservation Easement
Recreation Area
Cemeteries
Industrial Park Boundary
Town Boundary
Railroad
AS OF FEBRUARY 2019

APPENDIX B

Design Criteria

Martinsville Southern Connector Study

Appendix B: Design Criteria

ROADWAYS IN STUDY AREA (2017 AADT)	FUNCTIONAL CLASSIFICATION	DESIGN SPEED	SECTION AND SLOPE STANDARD	LANE WIDTH	CLEAR ZONE (6:1)	VERTICAL CURVATURE	MINIMUM AND MAXIMUM GRADES	RECOMMENDED INTERCHANGE AND INTERSECTION SPACING
US Route 58	Other Freeway / Expressway	60	GS-1 / CS-4B	12'	30' - 32'	crest, min k=151 sag, min k=136	0.5% / 4.0%	One mile (urban), three miles (rural)
US Route 220 (Existing) **US Route 220 (Proposed)**	Other Principal Arterial	60	GS-1 / CS-4 or CS-4E	12'	30' - 32'	crest, min k=151 sag, min k=136	0.5% / 4.0%	2,640' - Signal to signal; 1,320' between crossovers; 495' to entrances
All new and retrofit interchange ramps	Interchange Ramp	Loop - 30; Diamond - 45; Freeway - Min 50	GS-R	16'	14' - 16'; 20' - 22'	crest, min k=84 sag, min k=96	0.5% / 5.0%* * 5% desired, 7% maximum	
Morehead Avenue (VA Route 87)	Minor Arterial	50	GS-2 / CS-4, CS-4A or 4C	12'	20' - 22'	crest, min k=84 sag, min k=96	0.5% / 5.0%	1,320' - Signal to signal; 1,050' between crossovers; 425' to entrances
Main Street (4,000); Joseph Martin Highway (2,900); Church Street (1,400); Soapstone Road (1,400); Mica Road (1,200)	Major Collector	45	GS-3 / CS-4, CS-4A or 4C	12'	20' - 22'	crest, min k=61 sag, min k=79	0.5% / 5.0%* * 5% desired, 8% maximum	1,050' - Signal to signal; 660' between crossovers; 360' to entrances
Magna Vista School Road (690); Lee Ford Camp Road (460)	Minor Collector	45	GS-3 / CS-4, CS-4A or 4C	12'	20' - 22'	crest, min k=61 sag, min k=79	0.5% / 5.0%* * 5% desired, 8% maximum	660' - Signal to signal; 440' between crossovers; 250' to entrances
All other roadways	Local Road	35	GS-4 / CS-1	11'	14' - 16'	crest, min k=29 sag, min k=49	0.5% / 5.0%* * 5% desired, 10% maximum	305' between commercial entrances
Frontage Roads	Service Road	35	GS-9 / CS-1, CS-4B if adjacent to Route 220	11' - 12'	14' - 16'	crest, min k=29 sag, min k=49	0.5% / 5.0%* * 5% desired, 10% maximum	

Minimum Clearance over Roadway: 16' - 9"

Minimum Clearance over Railway: 23' - 0"

Maximum superelevation = 8 percent, except 4 percent in urban sections with curb and gutter

Standard Roadway Cross-Slope = 2 percent

Bridge widths will match approach lanes.

APPENDIX C

Detailed Mapping of Alternatives Carried Forward for Consideration

Legend

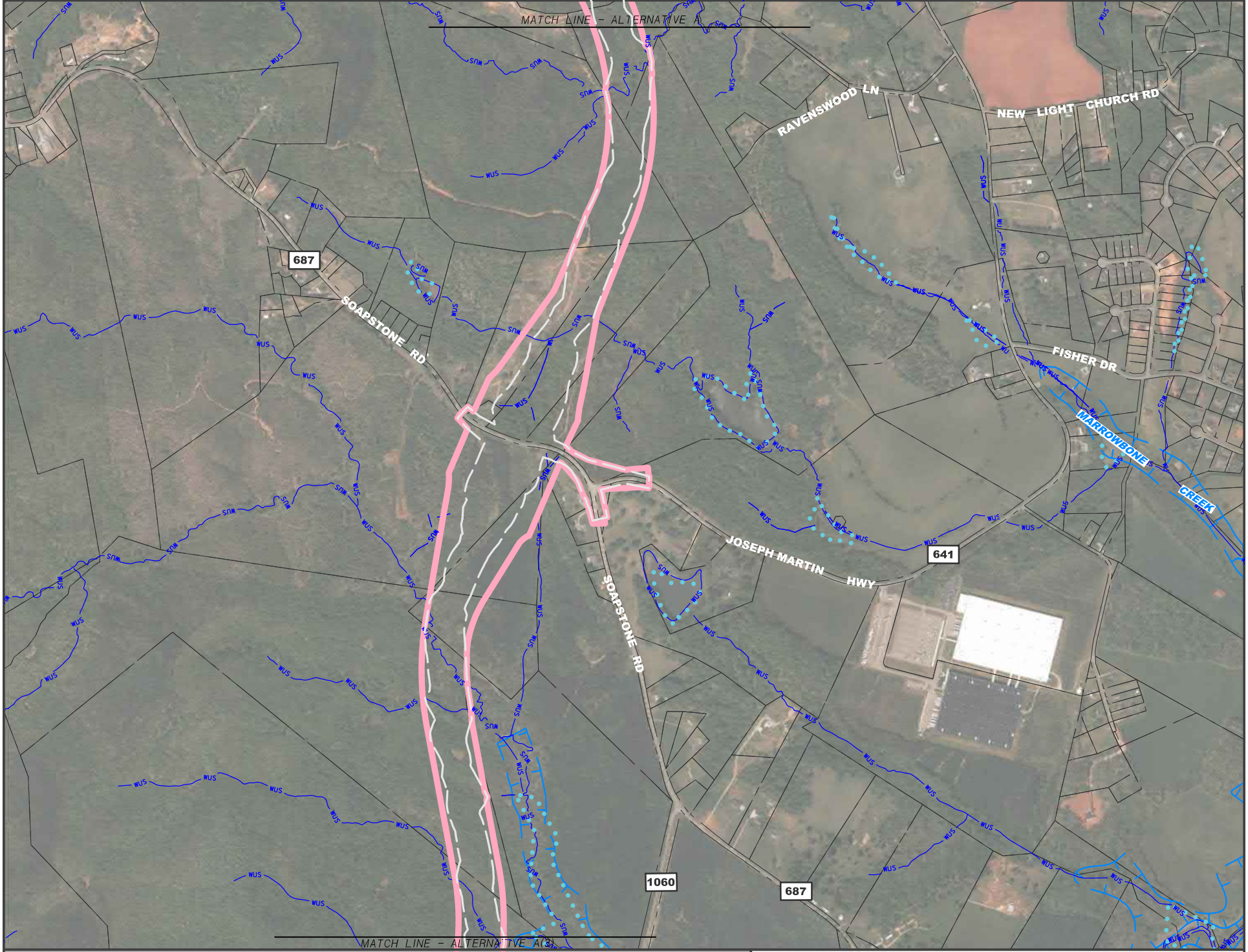
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative A

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

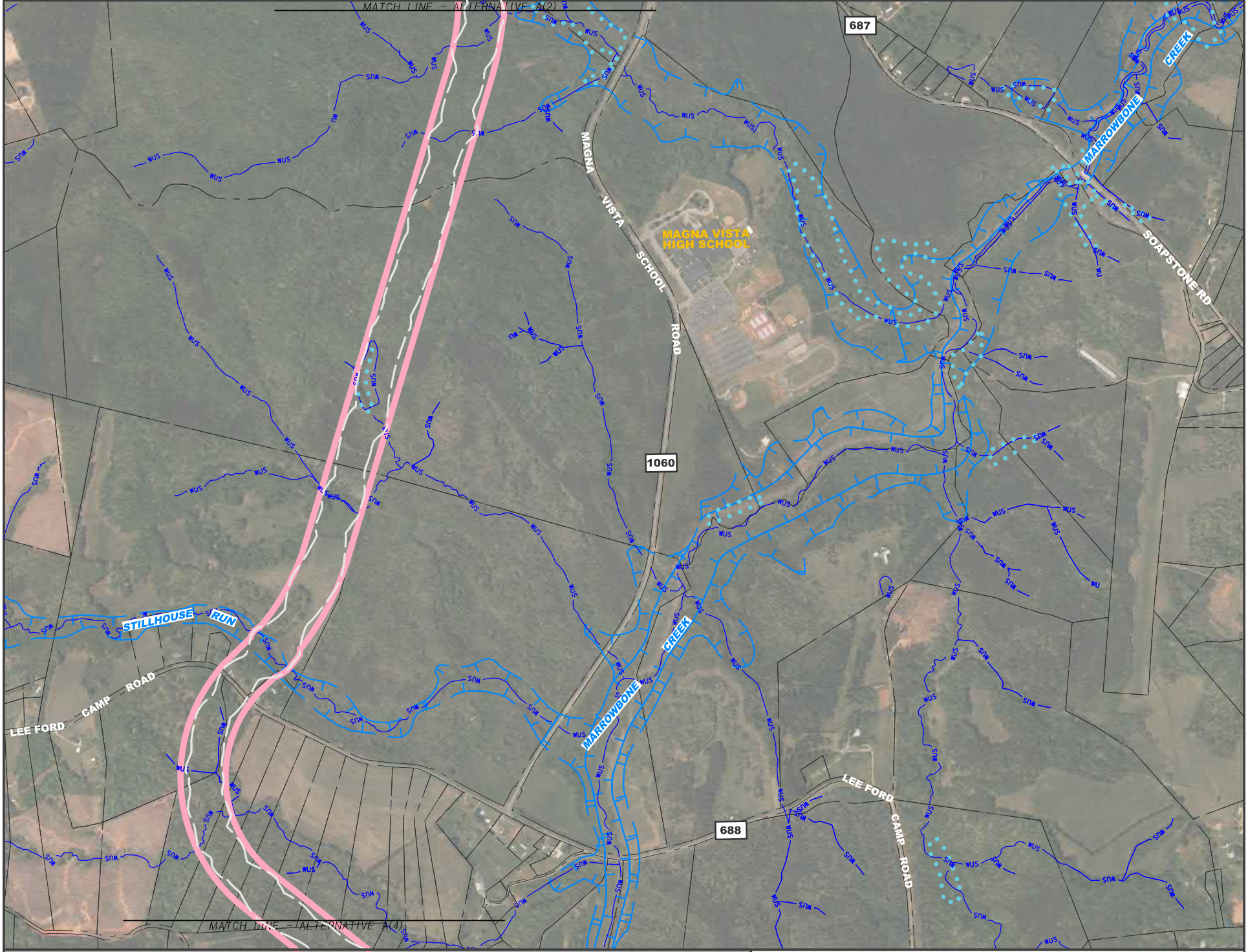
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative A (2)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

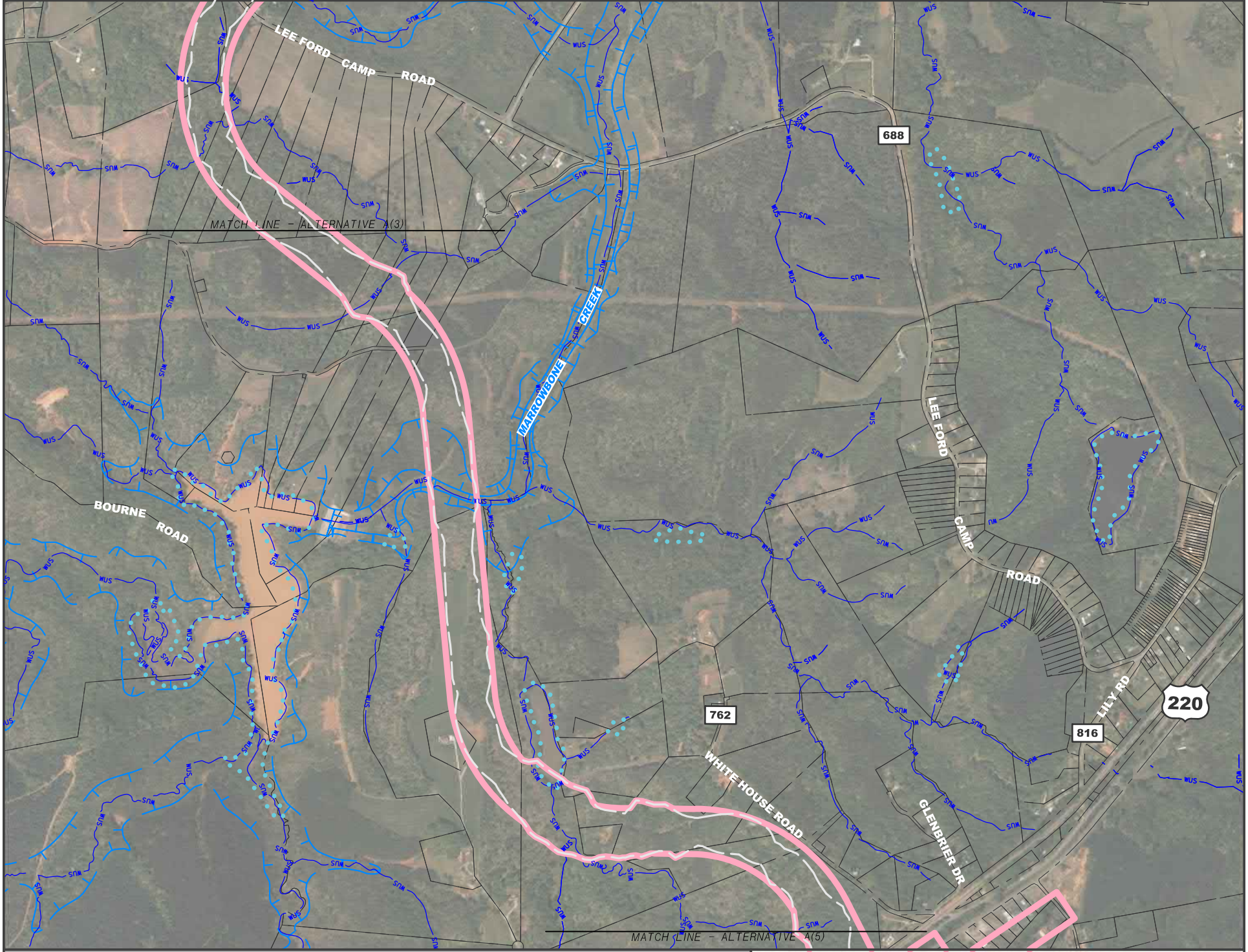
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative A (3)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

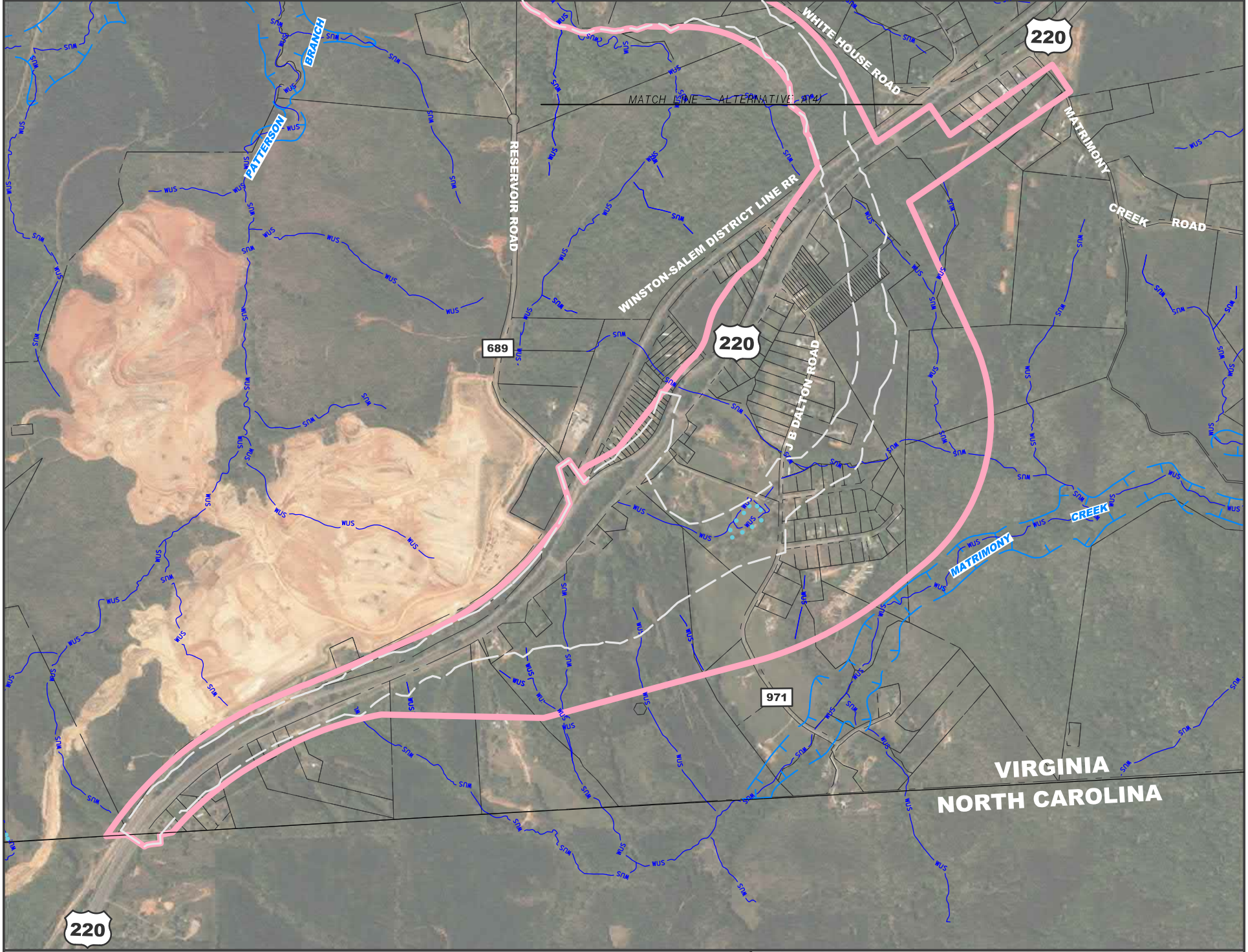
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

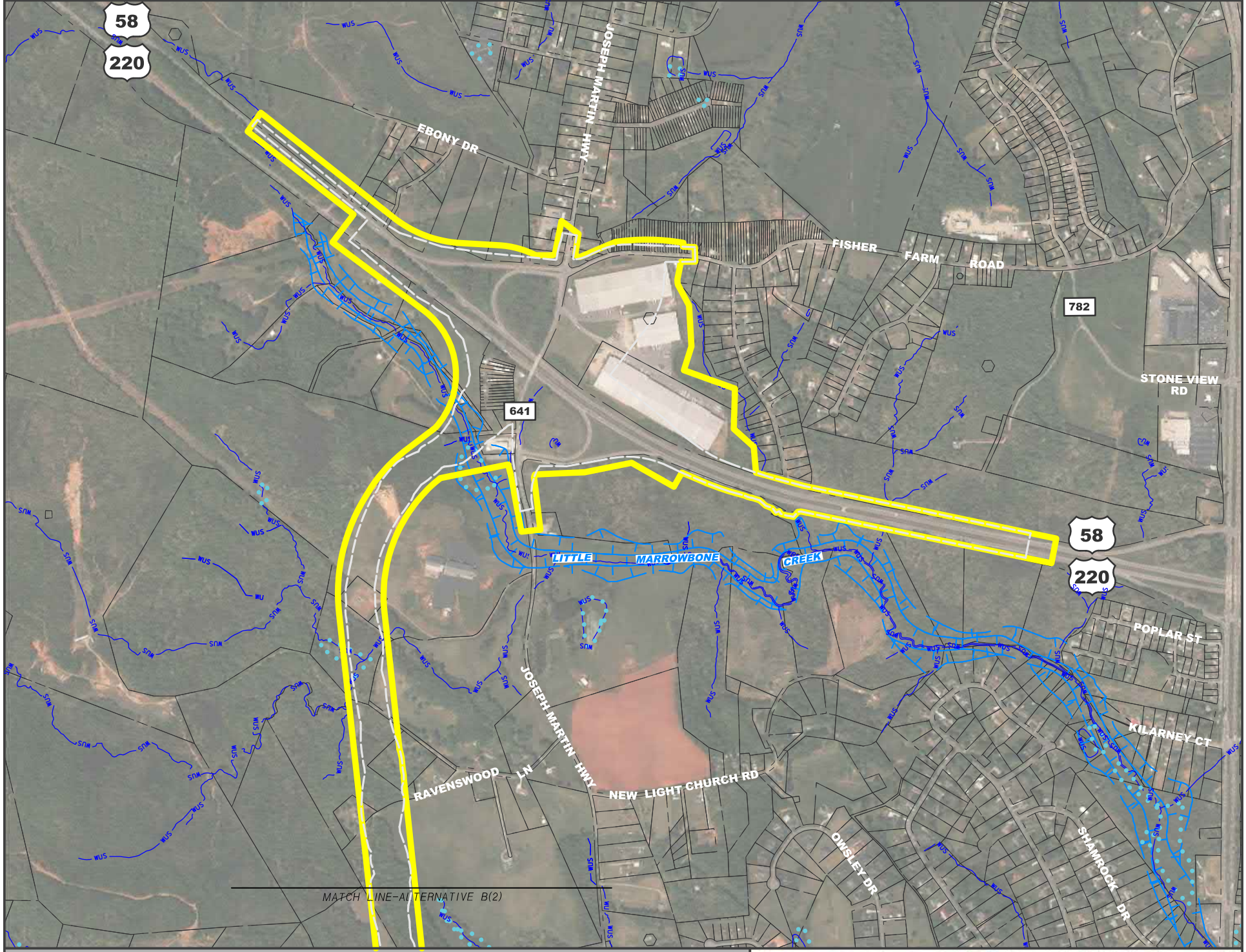
N

Alternative A (4)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


PATTERSON BRANCH
RESERVOIR ROAD
WHITE HOUSE ROAD
220
MATCH LINE – ALTERNATIVE A (4)
MATRIMONY CREEK ROAD
WINSTON-SALEM DISTRICT LINE RR
689
220
J B DALTON ROAD
CREEK
MATRIMONY
971
VIRGINIA
NORTH CAROLINA
220
Legend
Wetlands
Streams
WUS
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative A (5)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

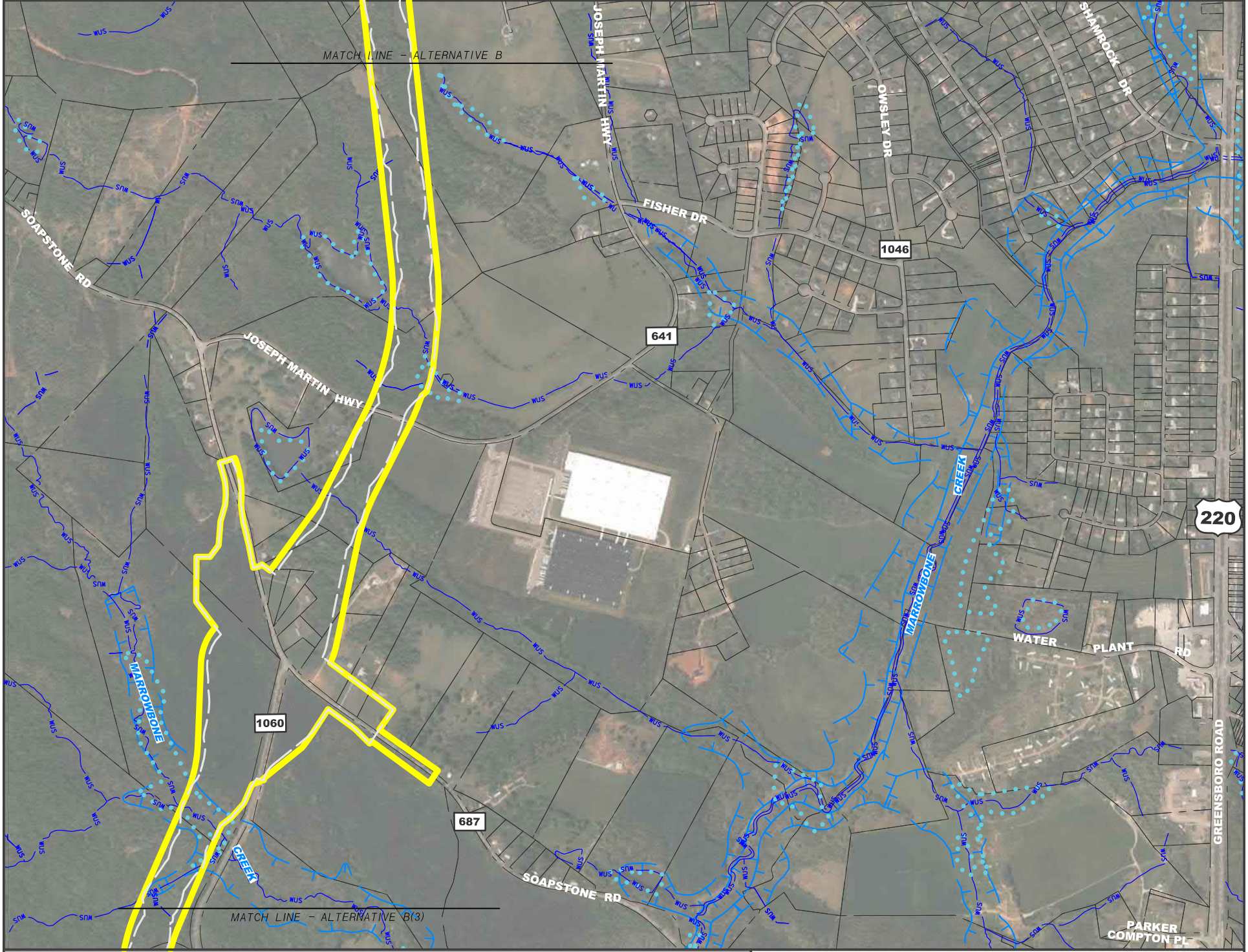
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative B

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

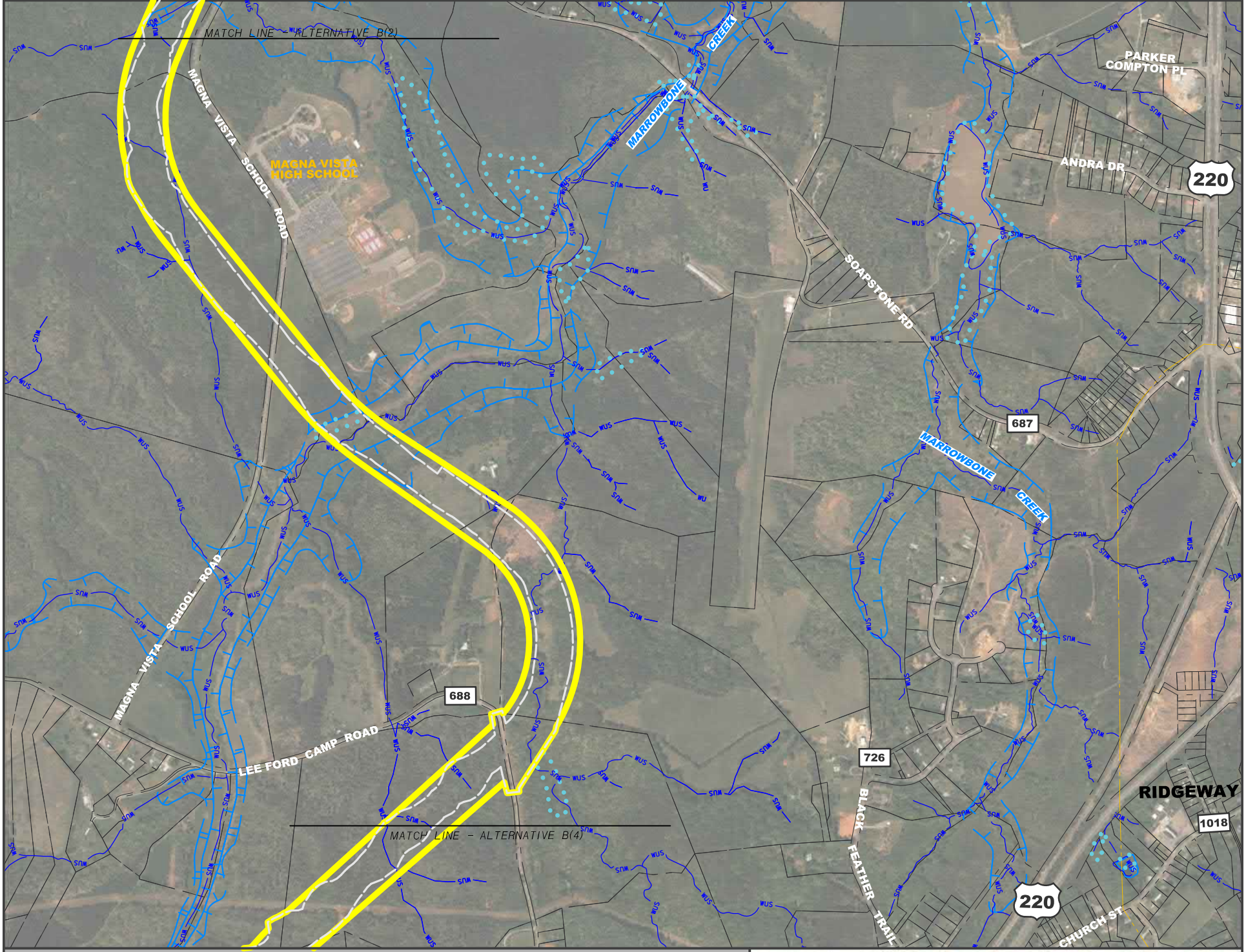
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative B (2)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

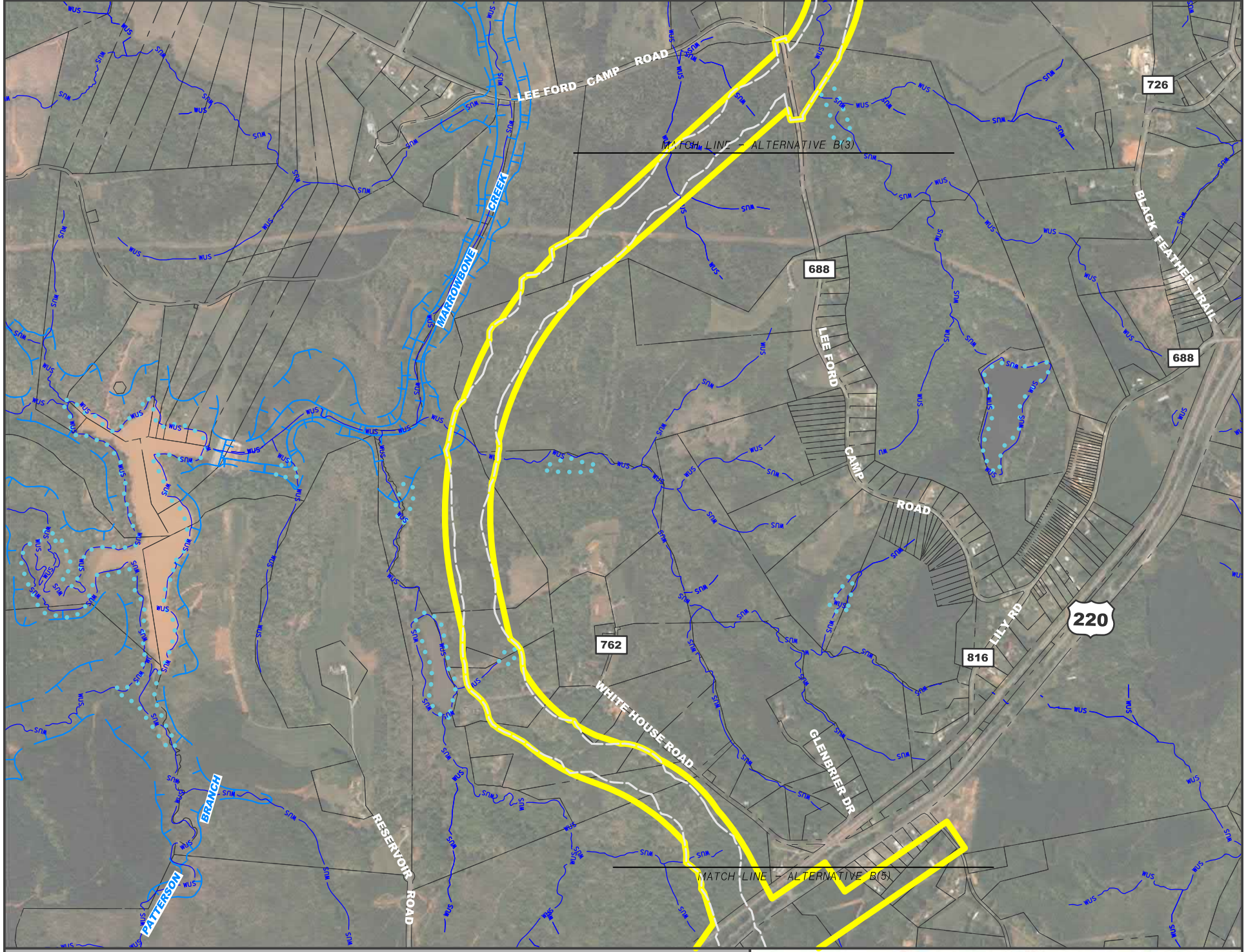
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

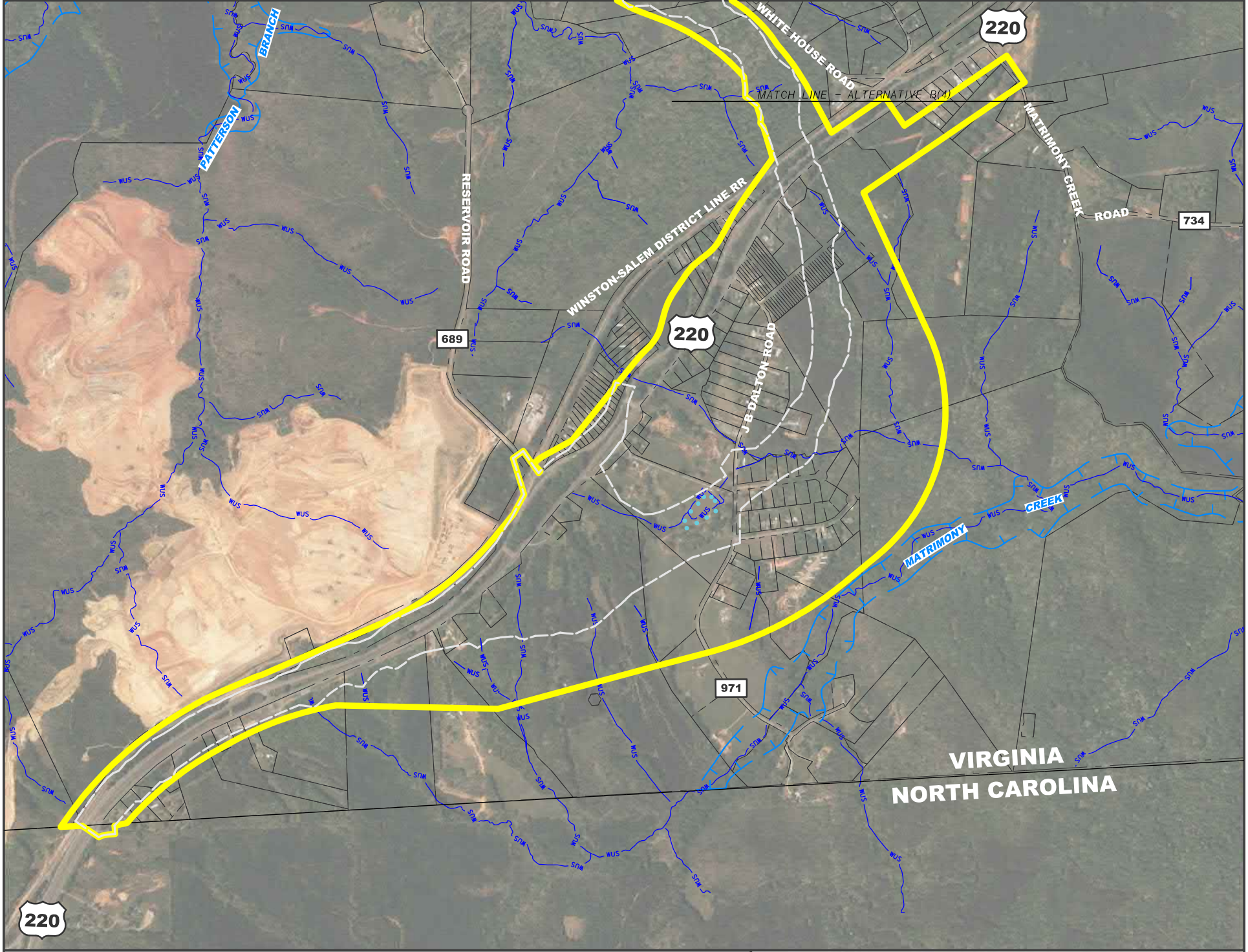
N

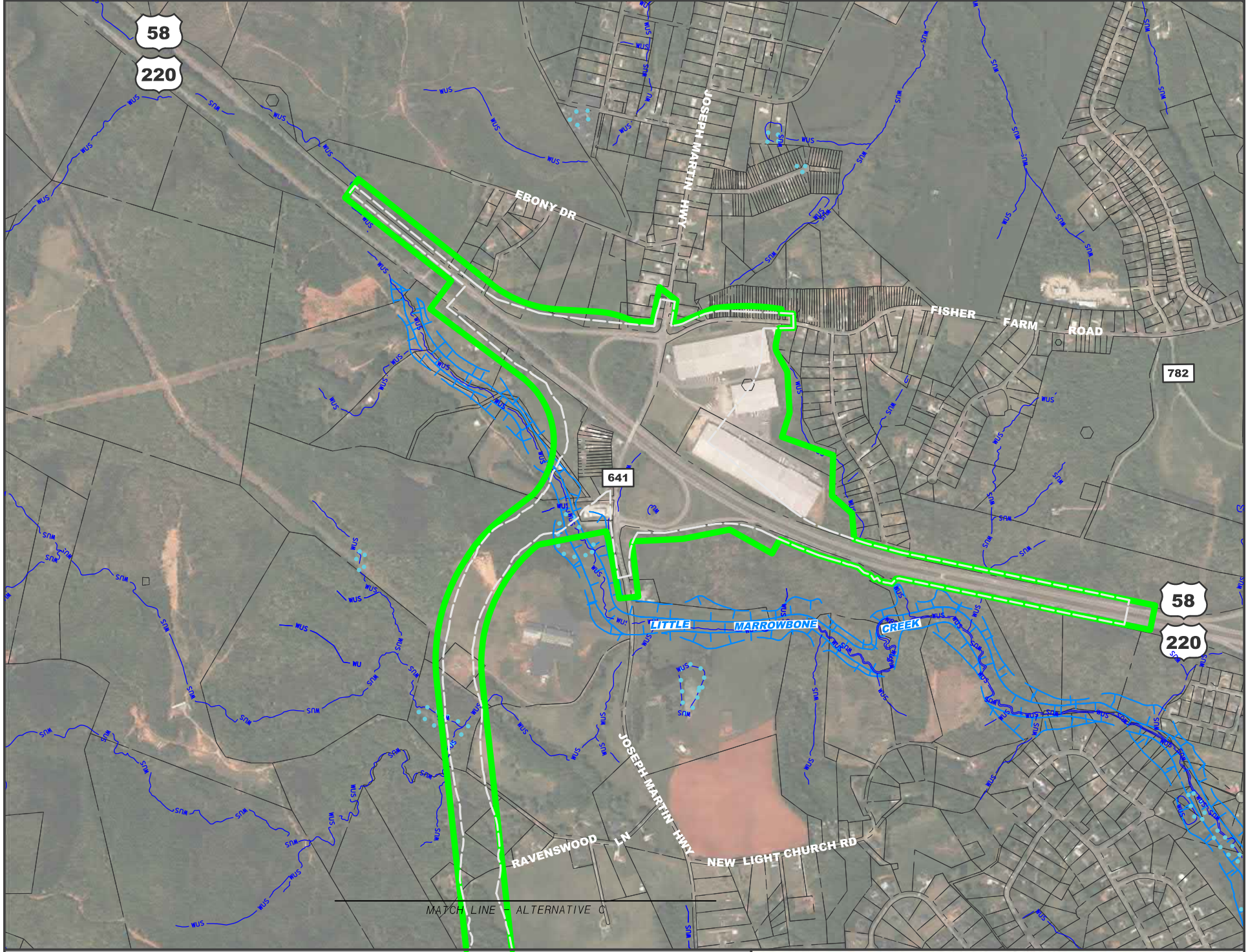
Alternative B (3)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


LEE FORD CAMP ROAD
726
MATCH LINE - ALTERNATIVE B(3)
BLACK FEATHER TRAIL
688
MARROWBONE CREEK
LEE FORD CAMP ROAD
688
762
816
LILY RD
220
WHITE HOUSE ROAD
GLENBRIER DR
RESERVOIR ROAD
PATTERSON BRANCH
MATCH LINE - ALTERNATIVE B(5)
Legend
Wetlands
Streams
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative B (4)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


PATTERSON BRANCH
WHITE HOUSE ROAD
220
MATCH LINE - ALTERNATIVE B(4)
MATRIMONY CREEK ROAD
734
RESERVOIR ROAD
WINSTON-SALEM DISTRICT LINE RR
689
220
J B DALTON ROAD
CREEK
MATRIMONY
971
VIRGINIA
NORTH CAROLINA
220
Legend
Wetlands
Streams
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative B (5)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

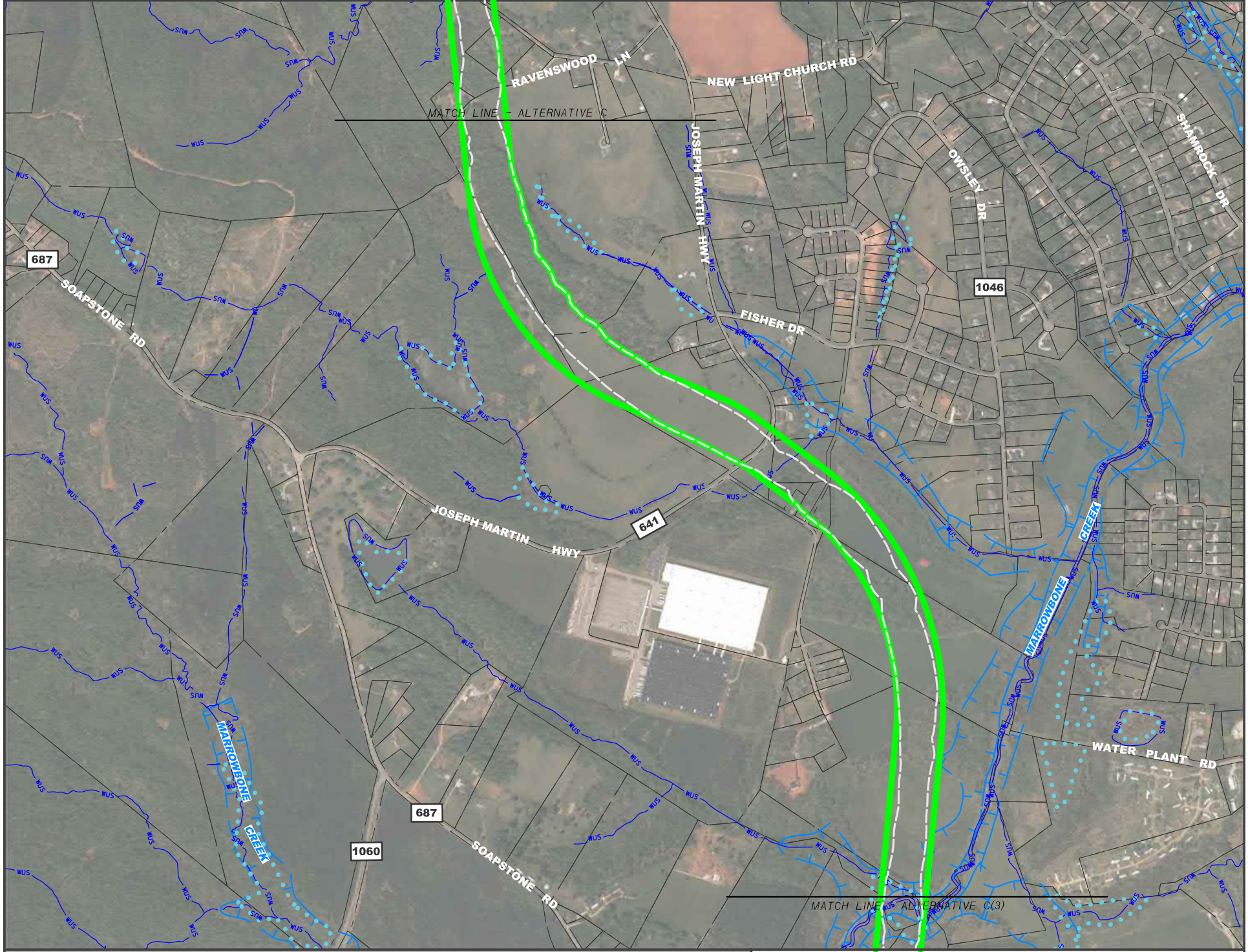
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative C

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

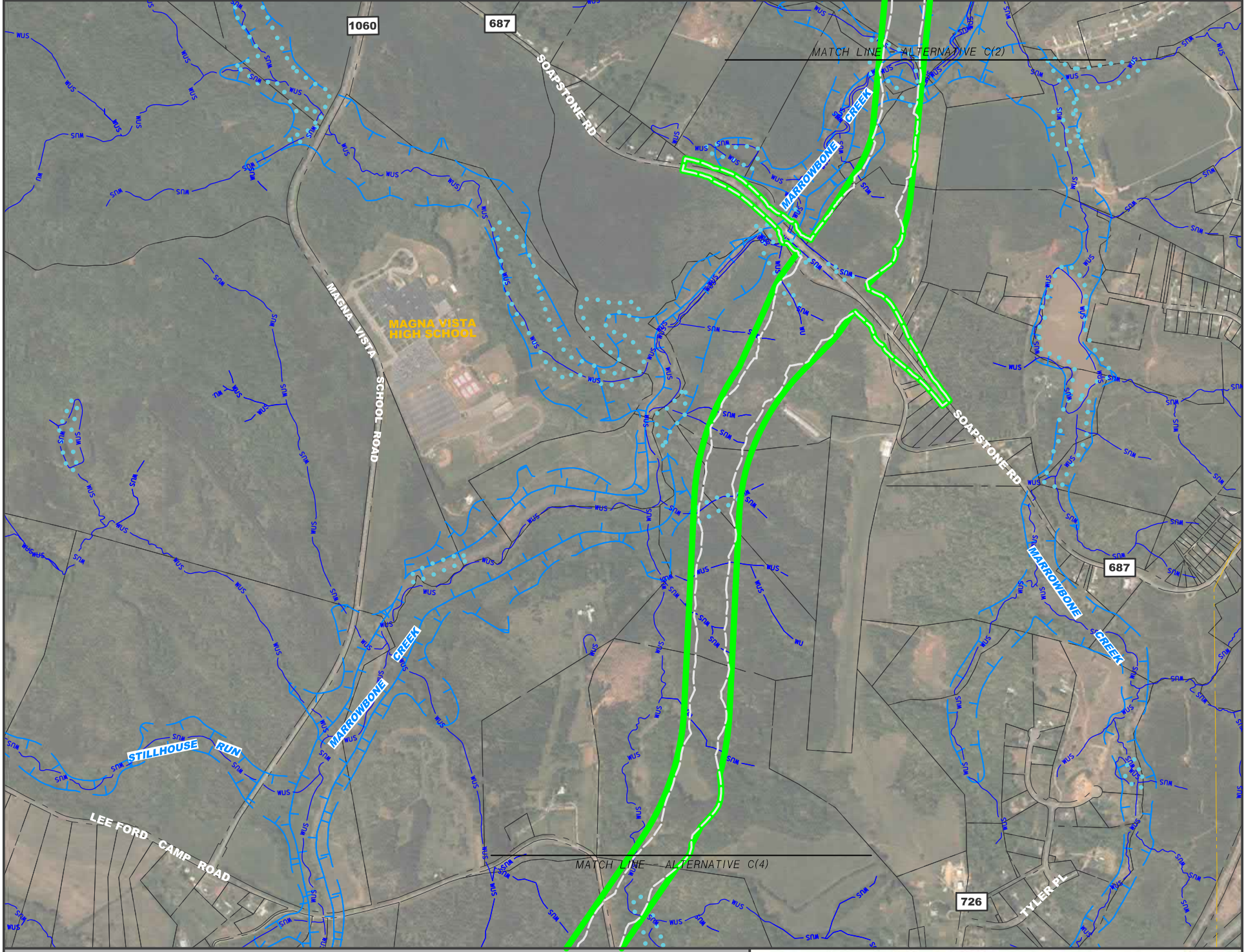
Wetlands	Town Boundary	LOD
Streams	RIght of Way	Inventory Boundary
100-Year Floodplain		

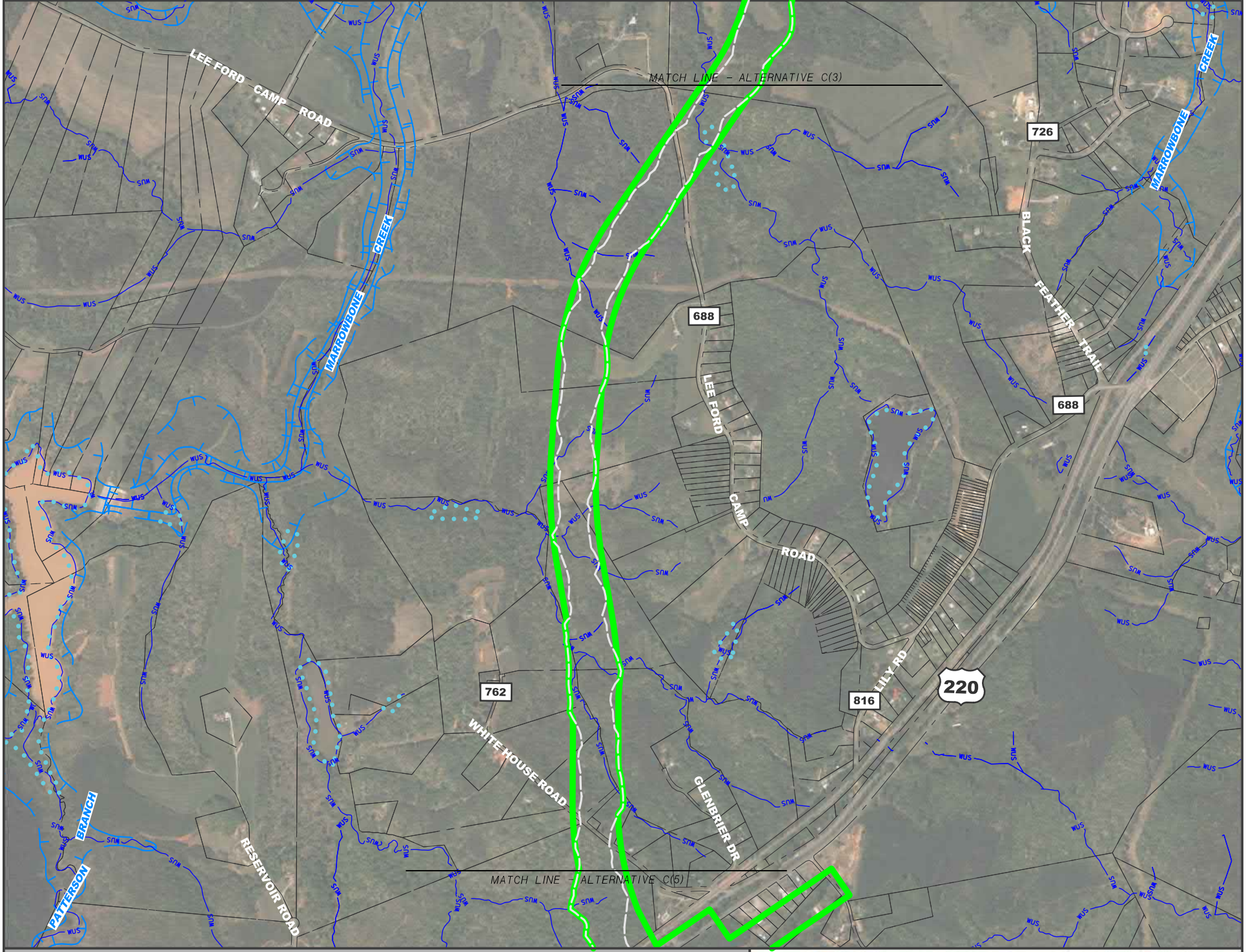
N

Alternative C (2)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


1060
687
SOAPSTONE RD
MATCH LINE - ALTERNATIVE C(2)
MARROWBONE CREEK
MAGNA VISTA HIGH SCHOOL
MAGNA VISTA SCHOOL ROAD
SOAPSTONE RD
687
MARROWBONE CREEK
MARROWBONE CREEK
STILLHOUSE RUN
LEE FORD CAMP ROAD
MATCH LINE - ALTERNATIVE C(4)
726
TYLER PL
Legend
Wetlands
Streams
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative C (3)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

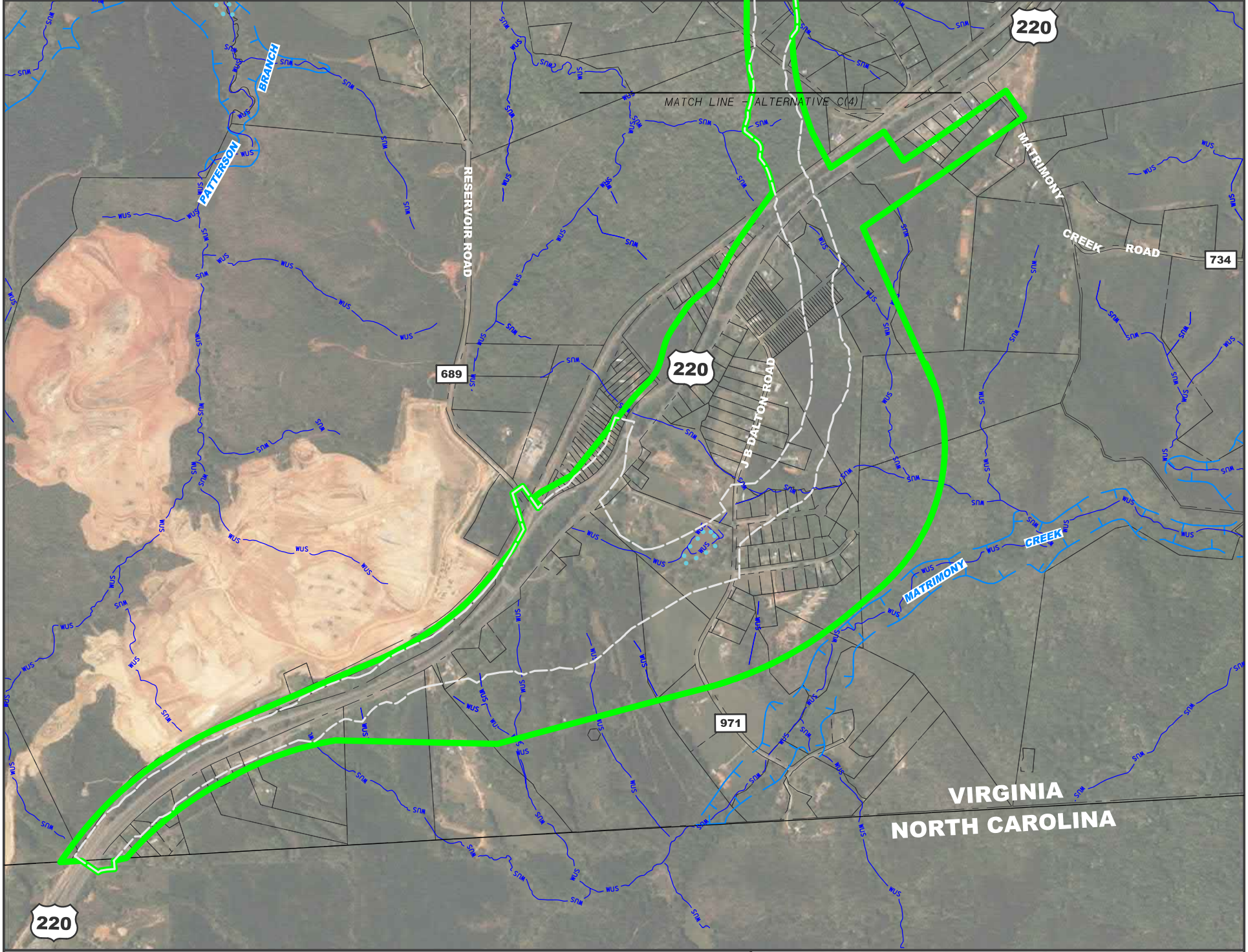
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative C (4)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


MATCH LINE - ALTERNATIVE C(4)
220
PATTERSON BRANCH
RESERVOIR ROAD
689
220
J E DALTON ROAD
MATRIMONY CREEK ROAD
734
CREEK
MATRIMONY
971
VIRGINIA
NORTH CAROLINA
220
Legend
Wetlands
Streams
WUS
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative C (5)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Legend

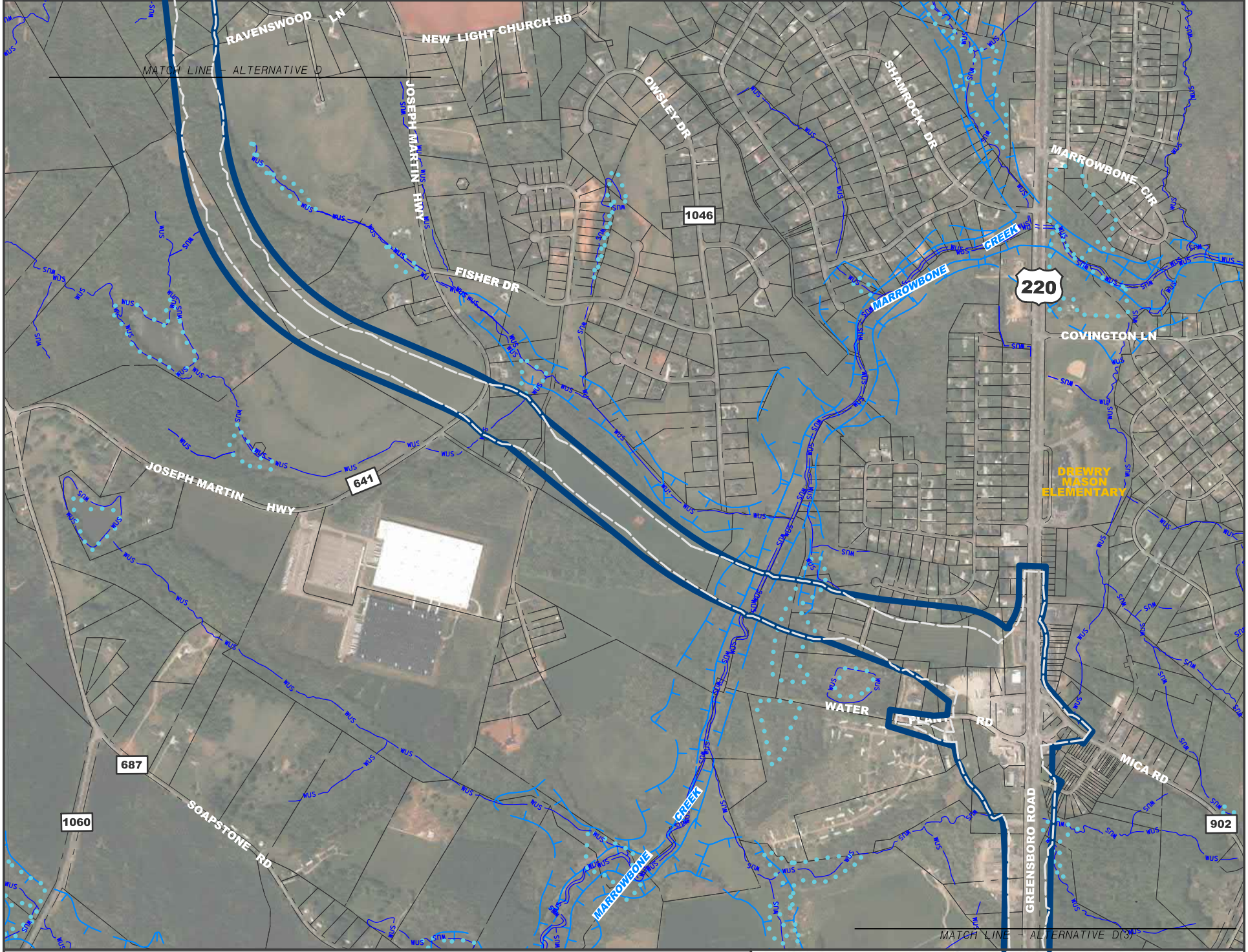
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative D

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

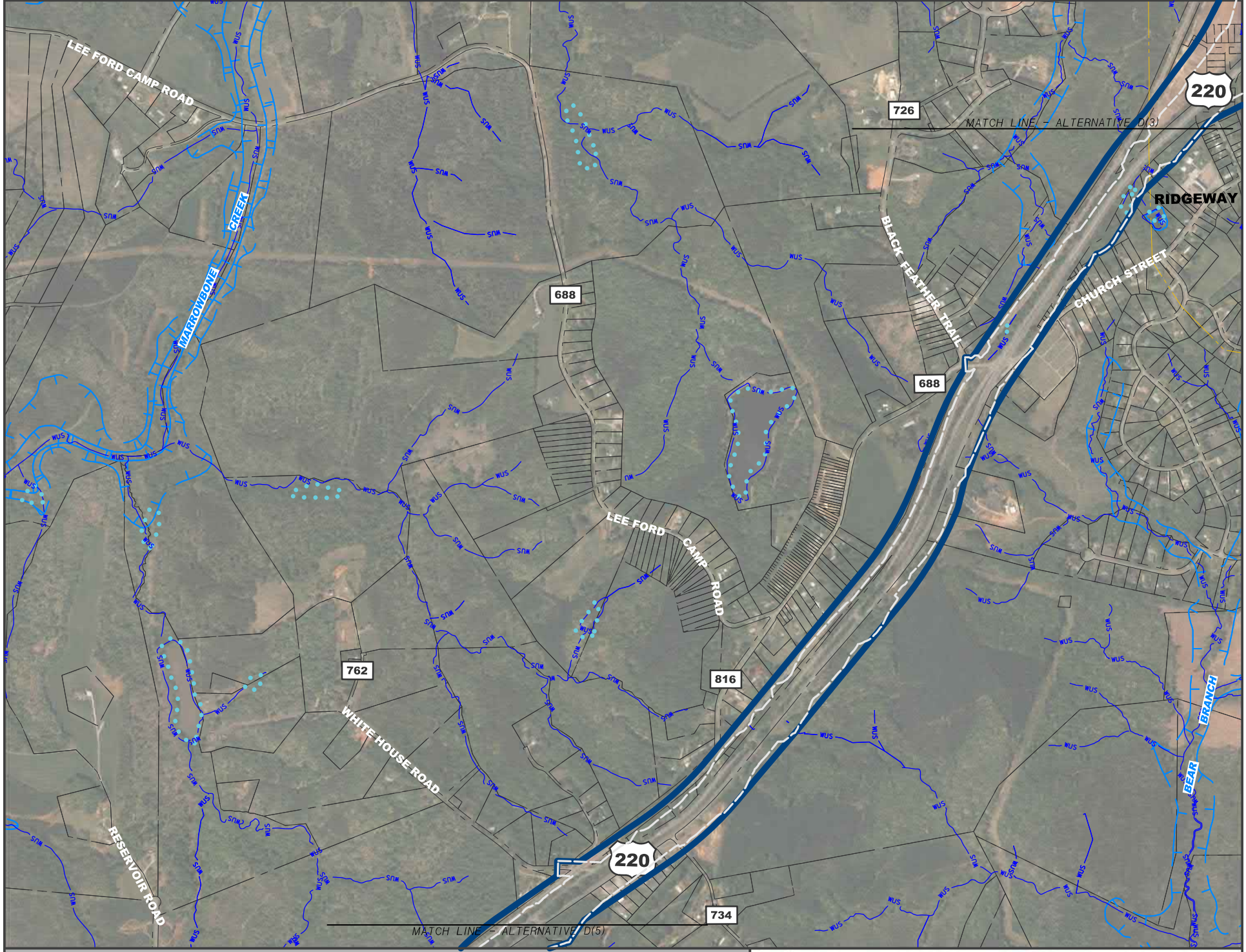
N

Alternative D (2)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


220
MATCH LINE - ALTERNATIVE D(2)
814
PARKER COMPTON PL
GREENSBORO ROAD
MARROWBONE CREEK
MICA ROAD
SPRINGS ROAD
PHOSPHO
SOAPSTONE RD
639
687
MAIN STREET
BYP
220
RIDGEWAY
MOREHEAD AVE
1018
688
726
MATCH LINE - ALTERNATIVE D(4)
Legend
Wetlands
Streams
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative D (3)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

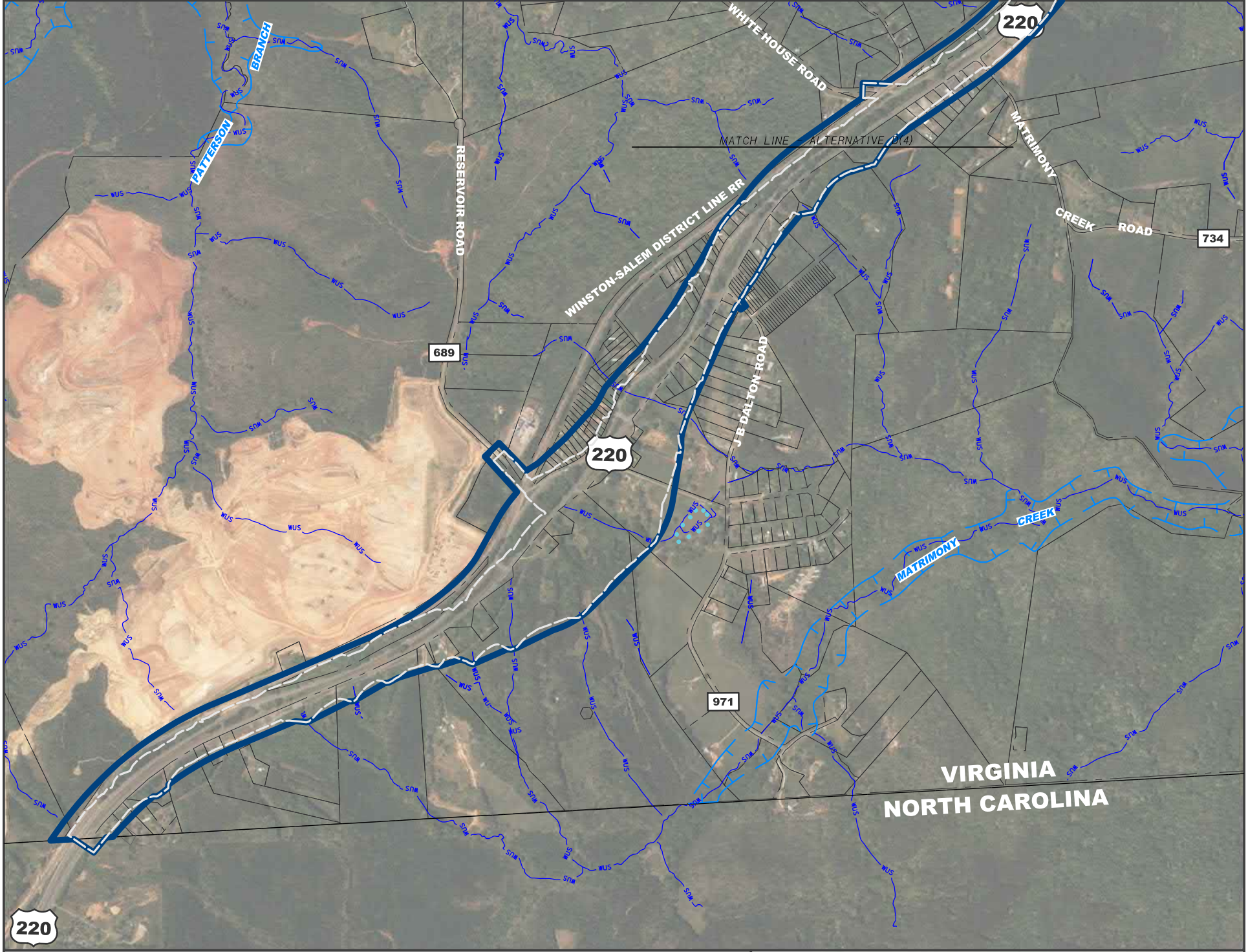
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

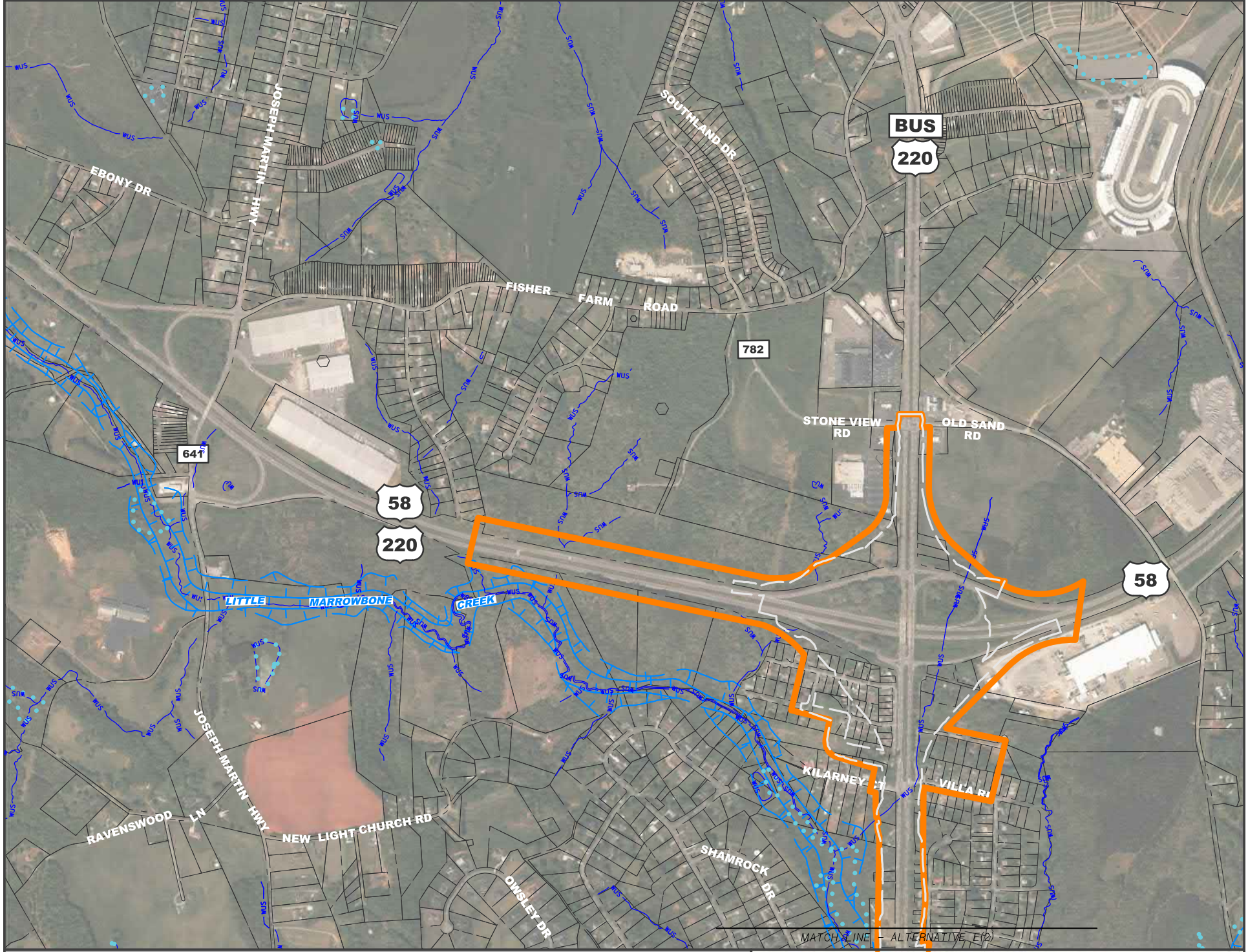
N

Alternative D (4)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


WHITE HOUSE ROAD
220
MATCH LINE - ALTERNATIVE D(4)
MATRIMONY CREEK ROAD
734
PATTERSON BRANCH
RESERVOIR ROAD
WINSTON-SALEM DISTRICT LINE RR
689
J B DALTON ROAD
220
CREEK
MATRIMONY
971
VIRGINIA
NORTH CAROLINA
220
Legend
Wetlands
Streams
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative D (5)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

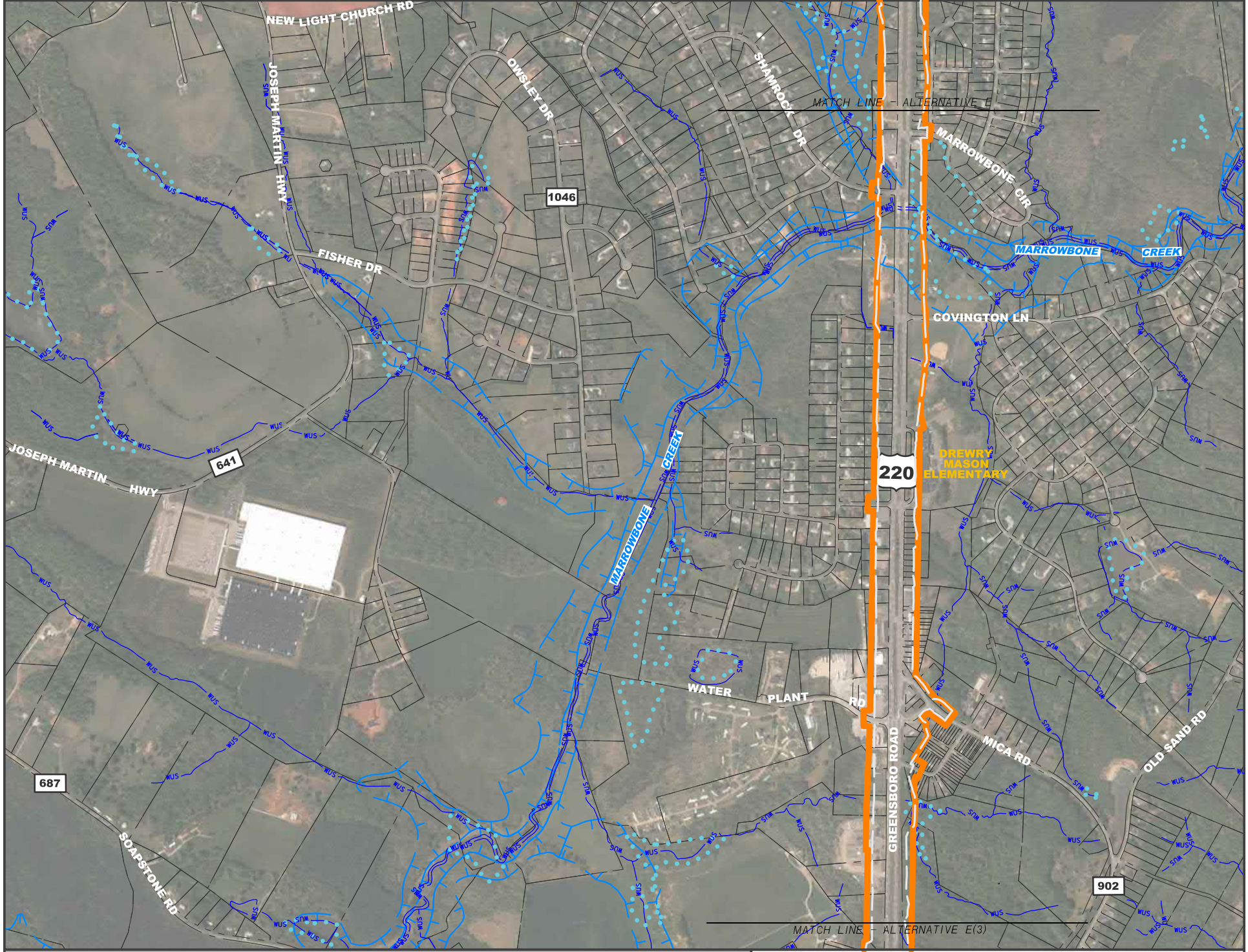
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative E

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

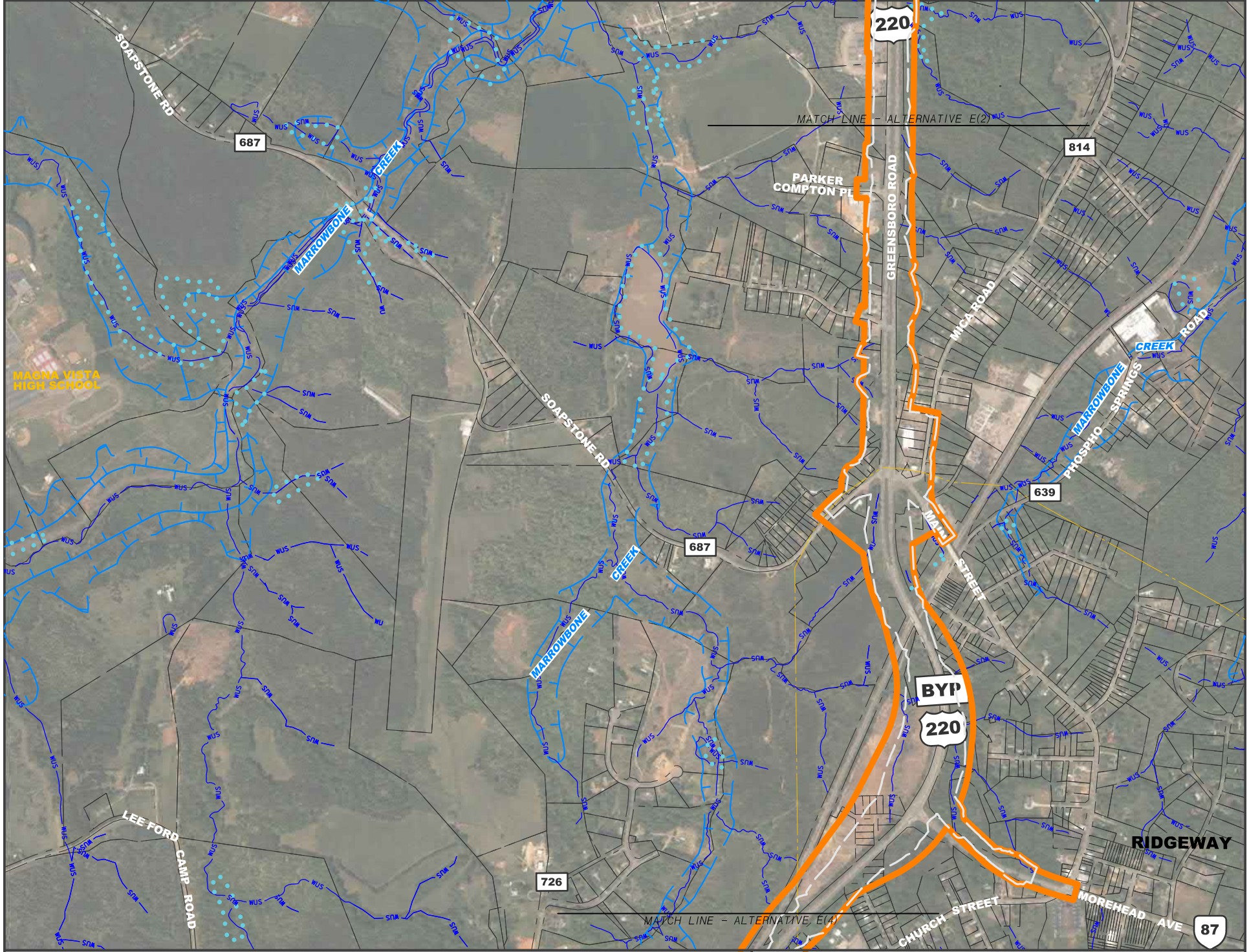
- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

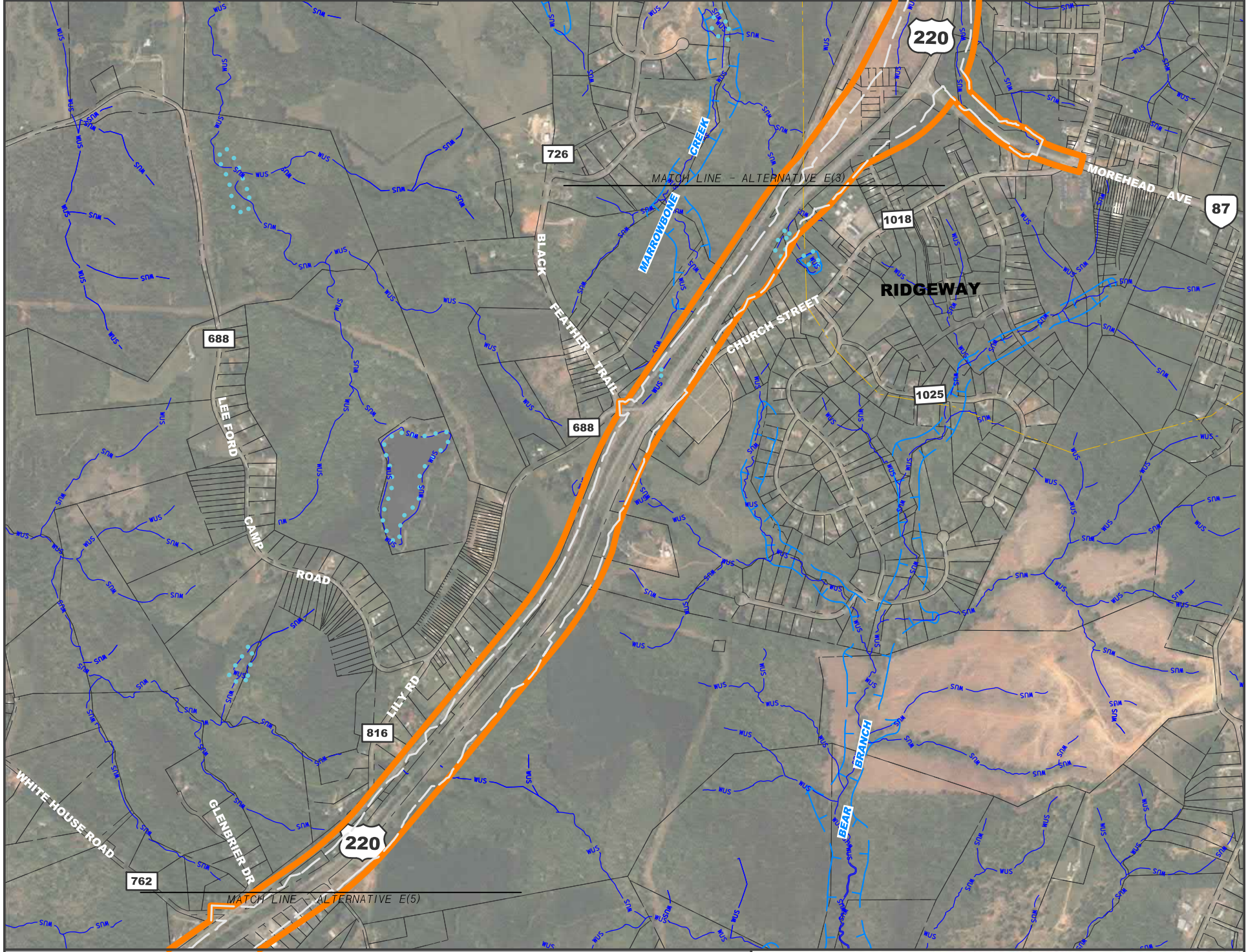
N

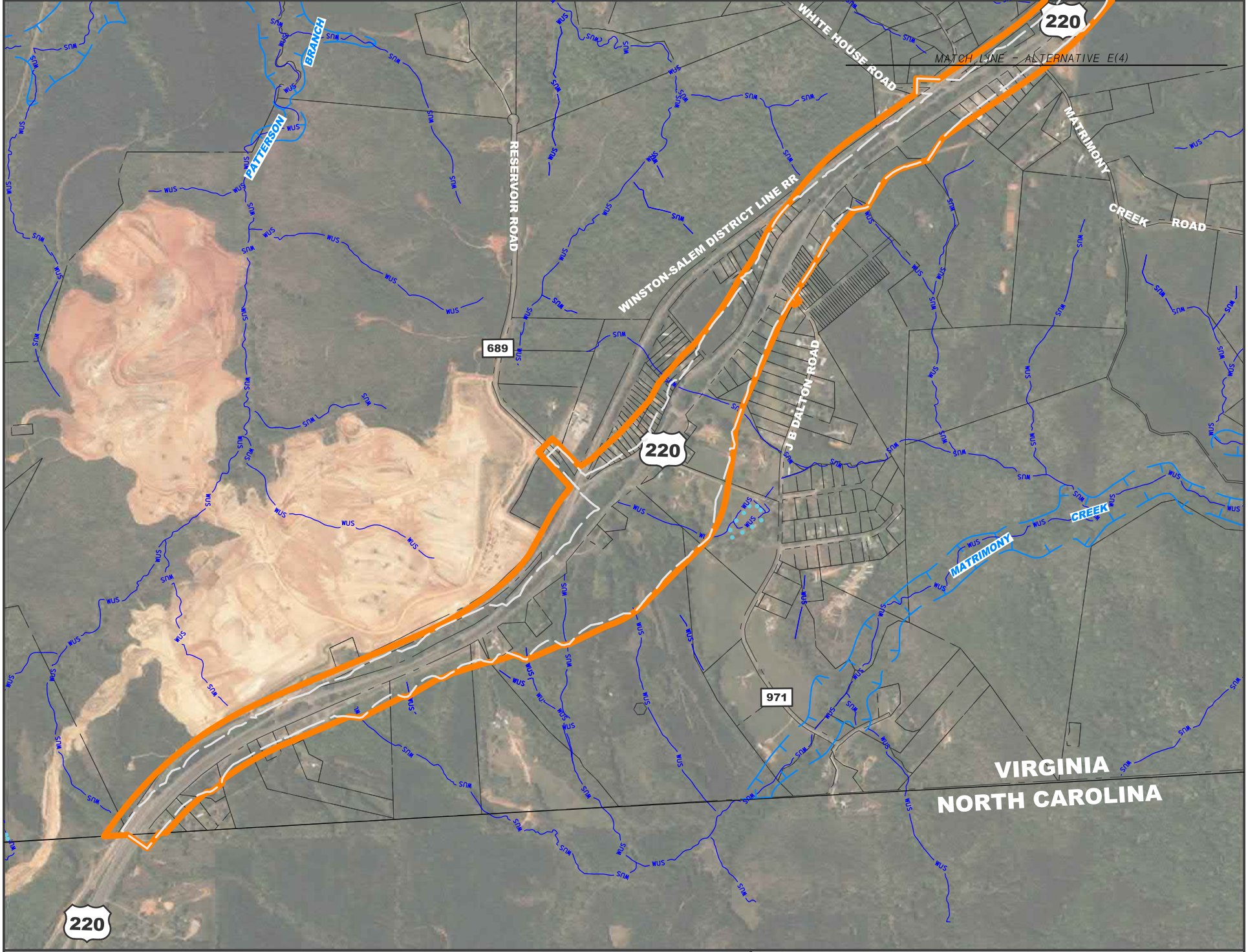
Alternative E (2)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


SOAPSTONE RD
687
CREEK
MARROWBONE
MAGNA VISTA HIGH SCHOOL
SOAPSTONE RD
687
CREEK
MARROWBONE
LEE FORD CAMP ROAD
726
MATCH LINE - ALTERNATIVE E(2)
MATCH LINE - ALTERNATIVE E(4)
220
PARKER COMPTON PL
GREENSBORO ROAD
814
WICA ROAD
CREEK
ROAD
MARROWBONE
SPRINGS
PHOSPHO
639
MAIN
STREET
BYP
220
RIDGEWAY
CHURCH STREET
MOREHEAD AVE
87
Legend
Wetlands
Streams
WUS
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative E (3)
1000'
0
1000'
2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement


220
726
MATCH LINE - ALTERNATIVE E(3)
CREEK
MARROWBONE
BLACK
FEATHER TRAIL
1018
MOREHEAD AVE
87
RIDGEWAY
CHURCH STREET
688
LEE FORD
CAMP
ROAD
688
1025
LILY RD
816
WHITE HOUSE ROAD
GLENBRIER DR
220
762
MATCH LINE - ALTERNATIVE E(5)
BEAR
BRANCH
WUS
Legend
Wetlands
Streams
100-Year Floodplain
Town Boundary
RIght of Way
LOD
Inventory Boundary
N
Alternative E (4)
1000' 0 1000' 2000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement



Legend

- Wetlands
- Streams
- 100-Year Floodplain
- Town Boundary
- RIght of Way
- LOD
- Inventory Boundary

N

Alternative E (5)

1000' 0 1000' 2000'

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

APPENDIX D

June 12, 2019 Agency Meeting Materials

NEPA PROGRAMS AGENCY COORDINATION MEETING SUMMARY

June 12, 2019
10:00 AM – 12:00 PM

ATTENDEES

Name	Agency	Phone	Email	Attendance
Federal Agencies				
Mack Frost	FHWA	(804) 775-3352	Mack.Frost@dot.gov	In Person
Lee Fuerst	USACE	(757) 201-7832	Lee.Fuerst@usace.army.mil	In Person
Allison Whitlock	USFWS	(804) 815-1989	alison_whitlock@fws.gov	Phone
Kim Baggett	USACE	(757) 201-7873	Kimberly.A.Baggett@usace.army.mil	In Person
Mandy Ranslow	ACHP	(202) 517-0218	mranslow@achp.gov	Phone
Robert Berg	USACE	(757) 201-7793	Robert.A.Berg@usace.army.mil	In Person
State Agencies				
Mackenzie Scott	DEQ	(804) 698-4371	mackenzie.scott@deq.virginia.gov	In Person
Angel Aymond	VDOT	(804) 786-5344	Angel.Aymond@vdot.virginia.gov	In Person
Scott Smizik	VDOT	(804) 371-4082	Scott.Smizik@vdot.virginia.gov	In Person
Jenny Salyers	VDOT	(804) 371-6706	Jennifer.Salyers@vdot.virginia.gov	In Person
Local Agencies				
Leah Manning	WPPDC		lmanning@wppdc.org	Phone
Dave Hoback	WPPDC		dhoback@wppdc.org	Phone
Lee Clark	Henry County	(276) 634-4620	leclark@co.henry.va.us	Phone
Other				
Jessica Klinefelter	Wallace Montgomery		jklinefelter@wallacemontgomery.com	Phone
Ray Moravec	Wallace Montgomery		rmoravec@wallacemontgomery.com	Phone
Shaunee Beussink	RK&K			In Person
Caleb Parks	WRA			In Person
Megan Comer	WRA			In Person

MEETING SUMMARY

Martinsville Southern Connector Study

Schedule

Angel Aymond began the meeting by reviewing the current schedule. The deadline for comments on the Natural Resources Technical Report (NRTR) is June 25th.

The schedule for the Cultural Resources report says "TBD". The cultural resources Determination of Eligibility (DOE) forms will be sent to DHR in July, with the technical report to follow.

Right of Way & Relocations Memorandum

Last month, VDOT presented potential right-of-way impacts for Alternatives A through E. VDOT recommended that Alternatives D and E not be studied further, due to the infeasibility of 84 and 130 relocations, respectively. VDOT agreed at that time to investigate a modified D alignment (called Alternative F in the memo) to determine if it could be brought to an acceptable level. For the last month VDOT evaluated that but found it could not be done without increasing other impacts. This memo details the rationale for eliminating Alternatives D, E and F, including the cost and logistics of implementing a high number of relocations. VDOT ROW has assigned some values to the cost of relocation above and beyond acquisition, including finding replacement property. Alternatives D and E will be discussed in technical reports, but not in the DEIS. However, they will be documented in the alternatives chapter of the DEIS.

Comments from Lee Fuerst (USACE) –Lee Fuerst provided some comments from Barbara Okorn (EPA) on the ROW and Relocations Memo since she was unable to attend the meeting. EPA requested any Environmental Justice or Natural Resources concerns with D and E be discussed. If so, that would help the argument to drop D and E. EPA also asked for considerations in North Carolina to be included.

Question from Lee Fuerst (USACE) –Will language from the memo be included verbatim in the documents? If so, she has changes to the memo and will type up and provide to Angel.

Question from Mack Frost (FHWA) **-** Is the memo going to be an attachment to the technical report? Scott said that VDOT is looking at options and is open for input. Mack responded that it makes sense to include the memo as an appendix to the Alternative Analysis Technical Report.

Question from Mack Frost (FHWA) **-** How will Alternatives D and E be discussed in the DEIS? Scott said that the DEIS discusses alternatives dropped and alternatives retained. Alternatives D and E would be in a new category of alternatives initially retained, but then dropped because they were not feasible. He requested any input from the federal agencies on the wording. Lee Fuerst (USACE) suggested using the phrase "not practicable" in the description.

Angel asked for comments on memo by Wednesday, June 19.

Updated wetland and stream impacts and cost

Angel provided refined wetland and waterways impacts to the group on the screen. Back in May, VDOT provide a range of impacts. VDOT has concluded additional delineations and refinements and has final numbers which will be presented to the public at the August meeting.

Comment from Lee Fuerst (USACE) – Are these impact numbers from the NRTR? Yes, they are the numbers from the NRTR that was provided in early June to the agencies. Lee then asked about whether the impacts assume bridging. Scott responded that the impact calculations for Waters of the US (WOUS) assume no bridging. However, VDOT has included some bridging in the cost estimate.

Comment from Mack Frost (FHWA – Does the cost include mitigation? Scott responded that a contingency factor is included for the overall cost estimate to cover anticipated mitigation for each alternative.

Comment from Lee Fuerst (USACE) – Can you forward the table of impacts? Angel responded that it will be in the meeting summary.

Scott said that the costs are still being reviewed by VDOT and there could be minor adjustments to things like relocation costs. The initial cost assumed a 3-year construction plan; VDOT is now discussing a 4-year construction plan, which could change the cost. The differences between the alternatives should remain consistent even though the numbers could fluctuate with additional information.

Angel noted that public materials with be available on July 15, 30 days before the public meeting. VDOT intends to include a recommended alternative with the public materials. VDOT will recommend Alternative C as the Preferred Alternative.

Comment from Lee Fuerst (VDOT) – Referring to the memo, she asked for clarification on Alternatives 1, 2, 3, 4A, etc. Angel responded that those designations were from the previous naming system that included eastern alignment options. Alternative 1 was No Build. Alternative 2 was TDM/TSM (dropped from consideration). Alternative 3 became E. Alternatives 4A, 4B, 4C and 4D, became A, B, C, and D. Alternatives 5A, 5B, 5C and 5D were eastern alignments dropped from consideration.

Angel provided a map on the screen showing the alternatives that will be the focus moving forward – Alternatives A, B and C. This map will be included in the meeting summary.

Question from Lee Fuerst (USACE) – Are these the only alternatives shown to the public? Angel responded VDOT will show all the other alternatives considered and walk the public through the study process to arrive at the recommended preferred alternative.

Question from Lee Fuerst (USACE) – Did Allison Whitlock (USFWS) provide any comments? Allison responded on the phone that there is Northern Long Eared Bat (NLEB) habitat impacts that occur with forest impacts, but for Section 7 consultation under the Endangered Species Act, the NLEB is covered under the 4D rule. There are no other threatened and endangered (T&E) species issues.

Question from Mack Frost (FHWA) –Are there plans to prepare a Biological Assessment? Scott responded that previous coordination with USFWS indicated VDOT should conduct an assessment of streams within the corridor (which were conducted by Virginia Tech and included in the NRTR) in which no T&E habitat was identified. Other than the 4D rule for NLEB, there are no T&Es on this project and a Biological Assessment is not necessary.

There were several comments and discussion relating to the level of detail shown in the mapping on interchanges. The maps shown at the meeting are public-facing maps with "bubbles" to indicate where an interchange would occur. The technical reports provide a detailed Planning-level Limit of Disturbance (LOD) for the proposed interchanges and the impacts are calculated from that (not the bubbles on this public-facing map).

Additionally, VDOT has assumed everything in the Planning level LOD would be impacted; however, more detailed design would be conducted later to identify avoidance and minimization with interchanges and ramps.

Question from Mack Frost (FHWA) - Were there comments on Alternative C? Angel said that the public generally favored all western alignments. Scott reminded everyone that Alternative C northern interchange was realigned to Joseph Martin Highway rather than dropping it based on insufficient interchange spacing. This occurred in the February-March timeframe.

Comment from Dave Hoback (WPPDC) – The PDC generally has a favorable reaction to Alternative C and appreciates that the cost is significantly less; however, the northern interchange impacts a few warehouses which causes commerce concerns. He asked whether a refinement could be done to minimize impacts to businesses.

Comment from Lee Clark (Henry County) – Henry County is concerned about Alternative C from a planning perspective. If the objective of this project is to separate local and regional traffic, the current Alternative C interchange placement has hundreds of residences just north and south. With the interchange there, you are introducing a new set of local traffic into the mix of regional traffic. He asked if there is a possibility of moving the Alternative C interchange to Alternative A to provide some separation and avoid impacts? Scott acknowledged his comment. He suggested that refinements of a Preferred Alternative (PA) would happen in the FEIS and would be motivated by public and agency comments this summer. Scott encouraged Henry County to also provide this comment formally through the document's comment period. VDOT's goal is to get the Commonwealth Transportation Board (CTB) action on approving the Preferred Alternative and VDOT can then refine from that point. VDOT would look at where refinements can be accomplished without increasing impacts to Waters of the US.

Next Steps

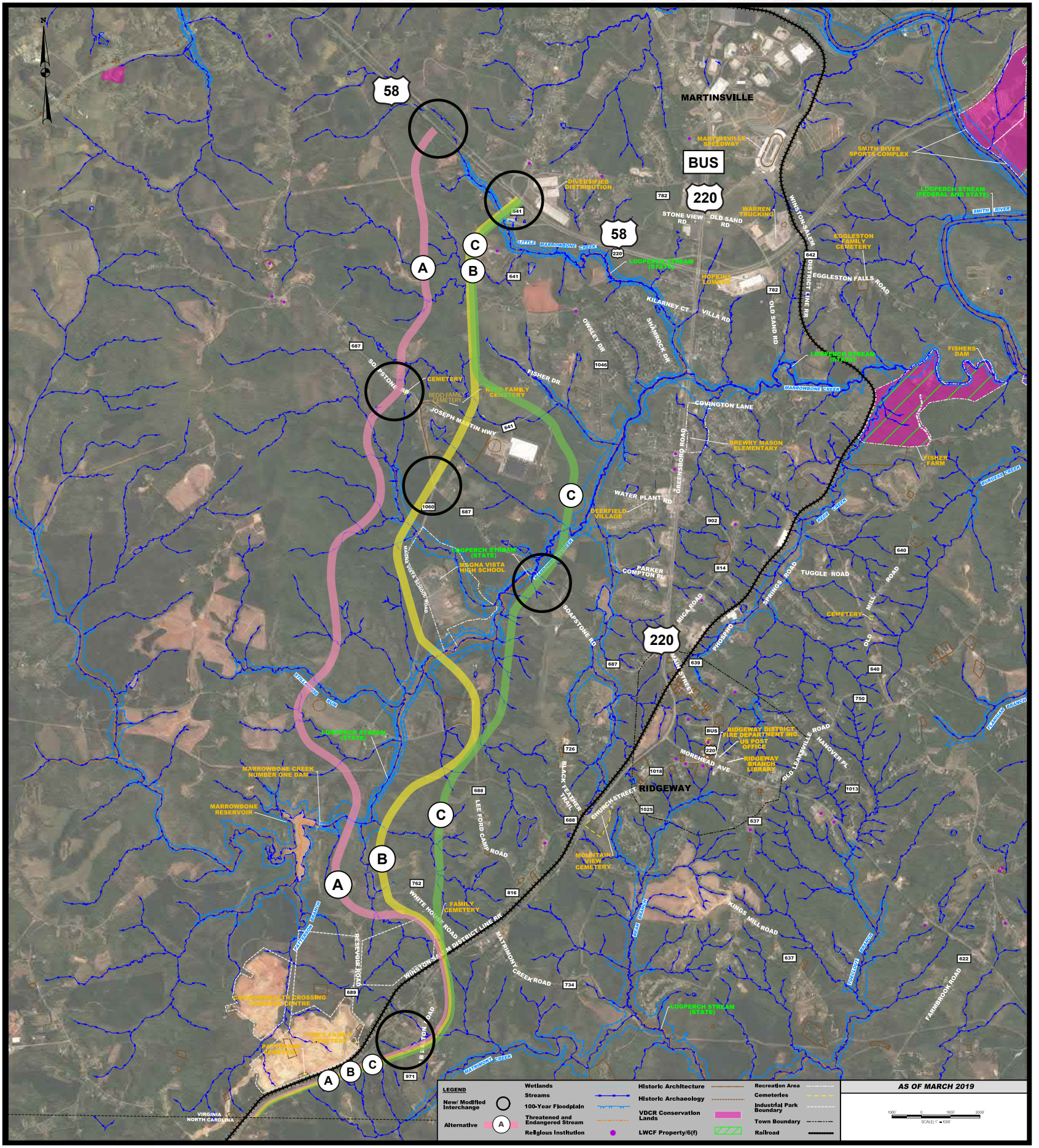
There was many comments and discussion on the schedule moving forward; specifically related to the concurrence on a preferred alternative and public comments. The important dates are as follows:

- Agency Meeting on July 10 – recommended cancelling meeting
- Public materials available online on July 15
- Agency Meeting on August 14 – summary of comments received from July 15 through this date

- Public meeting on August 15 at Drewry Mason Elementary
- Public comment period ends August 25
- Agency Meeting on August 28 (a GoTo Meeting/call) to concur on Preferred Alternative
- CTB meeting on September 17

In order to ensure sufficient time to review public comments before concurring on the Preferred Alternative, VDOT will provide weekly updates of the public comments throughout the 30-day comment period. Because comments are allowed through August 25 and concurrence is desired on August 28, there may be a need to push the concurrence date, depending on whether significant public comments come on the last day. There was discussion that the federal permitting dashboard does not include the Preferred Alternative concurrence date so there is some flexibility, if needed. The schedule will remain as is for now and VDOT will revisit with agencies pending public comments.

Comment from Allison Whitlock (USFWS) – Allison is leaving USFWS at the end of the month. At this time, it is unknown who will be assigned to this study. We may receive that information from USFWS on the re-assignment prior to the need for agency concurrence on the Preferred Alternative.


MARTINSVILLE
RIDGEWAY
58
BUS
220
A
B
C
MARTINSVILLE SPEEDWAY
SMITH RIVER SPORTS COMPLEX
DIVERSIFIED DISTRIBUTION
WARREN TRUCKING
STONE VIEW RD
OLD SAND RD
WINSTON-SALEM DISTRICT LINE RR
EGGLESTON FAMILY CEMETERY
EGGLESTON FALLS ROAD
LITTLE MARROWBONE CREEK
LOOPERCOCK STREAM (STATE)
HOPKINS LOMMER
KILARNEY CT
VILLA RD
OLD SAND RD
ONSLEY DR
SHAMROCK DR
FISHERS DAM
MARROWBONE CREEK
SO PSTONE RD
CEMETERY
REDD FAMILY CEMETERY
FISHER DR
JOSEPH MARTIN HWY
COVINGTON LANE
BREWRY MASON ELEMENTARY
GREENSBORO ROAD
FISHER FARM
BURGESS CREEK
WATER PLANT RD
DEERFIELD VILLAGE
HOPSCOTCH STREAM (STATE)
MAGNA VISTA HIGH SCHOOL
MAGNA VISTA SCHOOL ROAD
PARKER COMPTON PL
TUGGLE ROAD
SPRINGS ROAD
MILL ROAD
MICA ROAD
PHOSPHO
CEMETERY
OLD MILL
SOAPSTONE RD
MILL STREET
SMITH RIVER
HOPSCOTCH STREAM (STATE)
MARROWBONE CREEK NUMBER ONE DAM
MARROWBONE RESERVOIR
RIDGEWAY DISTRICT FIRE DEPARTMENT INC
US POST OFFICE
RIDGEWAY BRANCH LIBRARY
MOREHEAD AVE
OLD LEASVILLE ROAD
HANOVER PL
BLACK FEATHER TRAIL
CHURCH STREET
LEE FORD CAMP ROAD
MOUNTAIN VIEW CEMETERY
KINGS MILL ROAD
WHITE HOUSE ROAD
FAMILY CEMETERY
WINSTON-SALEM DISTRICT LINE RR
MATHIWONY CREEK ROAD
RESERVOIR ROAD
PATTERSON BRANCH
FARMBROOK ROAD
LOOPERCOCK STREAM (STATE)
PRICE FAMILY CEMETERY
PATTERSON CEMETERY
MATHIWONY CREEK
VIRGINIA
NORTH CAROLINA
LEGEND
New/ Modified Interchange
Alternative
Wetlands
Streams
100-Year Floodplain
Threatened and Endangered Stream
Religious Institution
Historic Architecture
Historic Archaeology
VDCR Conservation Lands
LWCF Property/6(f)
Recreation Area
Cemeteries
Industrial Park Boundary
Town Boundary
Railroad
AS OF MARCH 2019

Background

On March 13, 2019, the Virginia Department of Transportation (VDOT), the Federal Highway Administration (FHWA), the U.S. Army Corps of Engineers (USACE), and the U.S. Environmental Protection Agency (EPA) concurred on the range of alternatives for the Martinsville Southern Connector Study/U.S. Route 220 Environmental Impact Statement (EIS). The range of alternatives includes an alternative that would partially reconstruct Route 220 from the North Carolina state line to north of the Town of Ridgeway before moving in a northwesterly direction on new alignment (Alternative D) as well as an alternative that would fully reconstruct Route 220 from the North Carolina state line to the U.S. 58 bypass (Alternative E). During consideration of this range of alternatives, VDOT informed the agencies involved in the study that there were concerns with the potential number of private property impacts that could occur under either of these alternatives. As all alternatives in the study assume a limited access facility, frontage roads would need to be constructed along Route 220 under either of these alternatives to maintain access to private properties along the corridor. VDOT noted that once preliminary right of way impacts were understood, it would return to the agencies with a recommendation as to if these alternatives should be considered feasible and be under consideration as a potential preferred alternative. This approach was documented in the concurrence on the range of alternatives. (See attached for figures and signed concurrence form.)

At the May 8, 2019 agency meeting, VDOT presented estimated right of way impacts for all of the alternatives retained for analysis. Table 1 illustrates the potential impacts as presented during the monthly agency meeting. In reviewing the numbers, VDOT explained that these numbers were derived by counting the properties within the planning level limits of disturbance and noting the property type indicated in the Henry County tax records. No investigations were completed to determine if a residential unit was inhabited by more than one family or if a commercial property housed more than one business. These numbers also only assume relocations per the methodologies agreed upon for the study. Should any alternative advance to more detailed design, additional relocations may be necessary. Therefore, these numbers were considered to be a lower range of what may actually be impacted.

Table 1: Property Impacts as Presented in May 2019

	Residential	Commercial	Industrial	Institutional	Cemetery	Total
Alternative A	17	0	0	0	1	18
Alternative B	26	0	4	0	1	31
Alternative C	25	0	3	0	1	29
Alternative D	56	21	4	1	2	84
Alternative E	97	27	1	3	2	130

Based on these findings, VDOT recommended that neither Alternative D nor Alternative E be studied further. Acknowledging that most agencies involved in the study, including VDOT, would like to see some type of alternative that improves the existing corridor retained in the study, VDOT suggested it would revisit Alternative D to determine if it could be modified to reduce property impacts to an acceptable level, without measurably increasing impacts to other resources. There were no objections from the other agencies involved in the study and following the meeting, USACE and EPA asked that this analysis be documented for consideration prior to the June 12, 2019 agency meeting. This document serves to meet that request.

VDOT realigned the portion of Alternative D on new alignment, resulting in the new alignment taking off from Route 220 further south to reduce property impacts. It also extended further west before tying into us 58, to avoid some of the larger property impacts associated with the proposed reconfiguration of the existing interchange with Joseph Martin Highway. Table 2 illustrates the potential property impacts that could occur under this new alignment, "Alternative F".

Table 2: Property Impacts as Presented in June 2019						
	Residential	Commercial	Industrial	Institutional	Cemetery	Total
Alternative A	17	0	0	0	1	18
Alternative B	26	0	4	0	1	31
Alternative C	25	0	3	0	1	29
Alternative D	56	21	4	1	2	84
Alternative E	97	27	1	3	2	130
Alternative F	**42**	**9**	**1**	**0**	**2**	**54**

While Alternative F offered some reduction in property impacts, the impacts were still considered too great for VDOT to recommend that the alternative be considered or carried through the study. Therefore, prior to the June 2019 agency meeting, VDOT recommended to the agencies involved in the study that only Alternatives A, B, and C continue to be documented as alternatives retained for detailed analysis in the EIS. Recognizing the regulatory environment in which the study is being conducted, VDOT has made this recommendation based on the cost and logistics associated with the high number of relocations that would occur under Alternative D, E, or F. Analysis completed to date for Alternatives D and E will be documented in supporting technical reports but these alternatives will not be discussed in the EIS. The attempt to optimize Alternative D as Alternative F will be discussed in the EIS.

Cost

Preliminary cost estimates have been completed for all alternatives retained for analysis, including Alternative F. While these estimates are considered preliminary and still under VDOT review, they offer some distinct breakdowns in cost, as summarized in Table 2. Alternative C has the lowest estimated cost, over $100,000,000 less than the second lowest cost. The higher costs associated with Alternatives A and B are resource impact-related costs, associated with the high costs for construction, grading, and drainage on the steeper topography.

Alternatives D and E are less costly for grading and drainage than the other build alternatives, as they are on an existing roadway prism. Alternatives D and E, however, have measurably higher costs associated with right of way. These costs are not fully measurable and are accounted for in VDOT's recommendation and USACE's public interest review factors which include relocations.

Alternative F is a combination of the two, with right of way costs remaining high and impact costs increased due to the topography of the proposed alignment. VDOT and its partner agencies share a desire to analyze all reasonable alternatives and document the costs and impacts of those alternatives. Therefore, while Alternatives A and B have a higher cost estimate than Alternative C, it is still reasonable continue to study them. The right of way impacts associated with Alternatives D, E, and F, however, are not reasonable and the high right of way costs associated with these alternatives. While this document summarizes the known costs associated with this high level of relocations, the unknown costs associated with VDOT's potential legal and real estate transactions, coupled with the costs that would be incurred by

the relocated individuals and community make these alternatives infeasible as the overall cost may never be known.

One correction VDOT will apply to these costs is accurately reflecting the costs associated with the right of way process. While the "Right of Way Buildings" column is based on the reported fair market per square foot cost, it does not account for the additional cost VDOT would assume for each relocated residence or business. The reported cost assumes the fair market value for purchasing the building, but does not consider the additional funds that VDOT would expend for each relocation (this correction will be applied prior to costs being published for the August public hearing and/or in the Draft EIS).

Without conducting the more detailed right of way analyses[1] that accompany more advanced phases of design, these additional costs can be estimated based on the average cost for a 3 bedroom 2 bath home in Henry County, which ranges from $60,000 to $160,000. Based on this cost of replacement housing, as well as moving expenses and closing costs on a replacement home, VDOT would assume to pay an additional $95,000 for each residential relocation. Table 3, illustrates how preliminary cost estimates may increase for each alternative based on the number of residential relocations. As noted above, this does not include any increase in costs that may occur if/when the project advances to more detailed design and other relocations were deemed necessary based on impacts to access.

Costs for non-residential relocations are more difficult to estimate at this early stage. Non-residential displaced persons are entitled to reimbursement of moving expenses for their personal property. There is no cap on these expenses, but it is based on the actual cost of the move. This amount can vary greatly depending on the type of business (i.e. office versus industrial), and the amount of personal property. Moving costs can include (not all inclusive) the cost of a move planner, replacement of stationary or signage on vehicles made obsolete by the move, storage for up to 12 months (if it facilitates the move), and up to $2,500 in search expenses to find a replacement location. Non-residential displaced persons also are entitled to a maximum of $25,000 in approved reestablishment expenses to make the replacement location suitable for business. Nonresidential displaced persons also have the option, subject to several conditions, to be entitled to an "in lieu of " or fixed payment of up to $75,000 based upon the average of the last 2 years of income as determined by income tax returns. This payment is "in lieu of" the aforesaid moving and reestablishment payments. As there are many unknowns related to the moving and re-establishment payments, this document assumes the "in lieu of" fee for a worst case scenario. Table 3 illustrates the additional cost that will be applied to the draft cost estimates. It is not possible, at this time, to estimate the cost of cemetery relocation(s) so no increases are yet assumed for those properties. It can, however, be assumed that the relocation of any cemetery would add additional cost to the implementation of any project.

[1] Analyses would include determining the number, ages, and needs of the people residing in each home, which would determine the number of bedrooms, bathrooms, etc. that would be needed in a replacement home. The analyses also would determine the appraisal value for each acquired structure and relocation costs that would be based on the real estate inventory in the region at the time the project advanced to the right of way stage.

Table 4: Additional Right of Way Costs to be Incorporated into Overall Cost Estimates												
	Residential	**Additional Cost**	**Commercial**	**Additional Cost**	**Industrial**	**Additional Cost**	**Institutional**	**Additional Cost**	**Cemetery**	**Additional Cost**	**Total Additional Right of Way Cost**	**Adjusted Cost Estimates Based on Additional Right of Way Cost**
Alternative A	17	$1,615,000	0	0	0	0	0	0	1	TBD	$1,615,000	**$667,492,424**
Alternative B	26	$2,470,000	0	0	4	$300,000	0	0	1	TBD	$2,770,000	**$649,919,517**
Alternative C	25	$2,375,000	0	0	3	$225,000	0	0	1	TBD	$2,600,000	**$517,850,544**
Alternative D	56	$5,320,000	21	$1,575,000	4	$300,000	1	$75,000	2	TBD	$7,270,000	**$682,903,026**
Alternative E	97	$9,215,000	27	$2,025,000	1	$75,000	3	$225,000	2	TBD	$11,540,000	**$631,177,149**
Alternative F	42	$3,990,000	9	$675,000	1	$75,000	0	0	2	TBD	$4,740,000	**$718,227,026**

Logistics

In addition to the higher costs associated with Alternatives D, E, and F, there also would be immeasurable logistical challenges related to implementing any of these alternatives compared to Alternatives A, B, or C. Table 5 lists the number of residential properties on the market in different geographic ranges, based on a June 2, 2019 search of Remax.com.

Table 4: Available Residential Properties

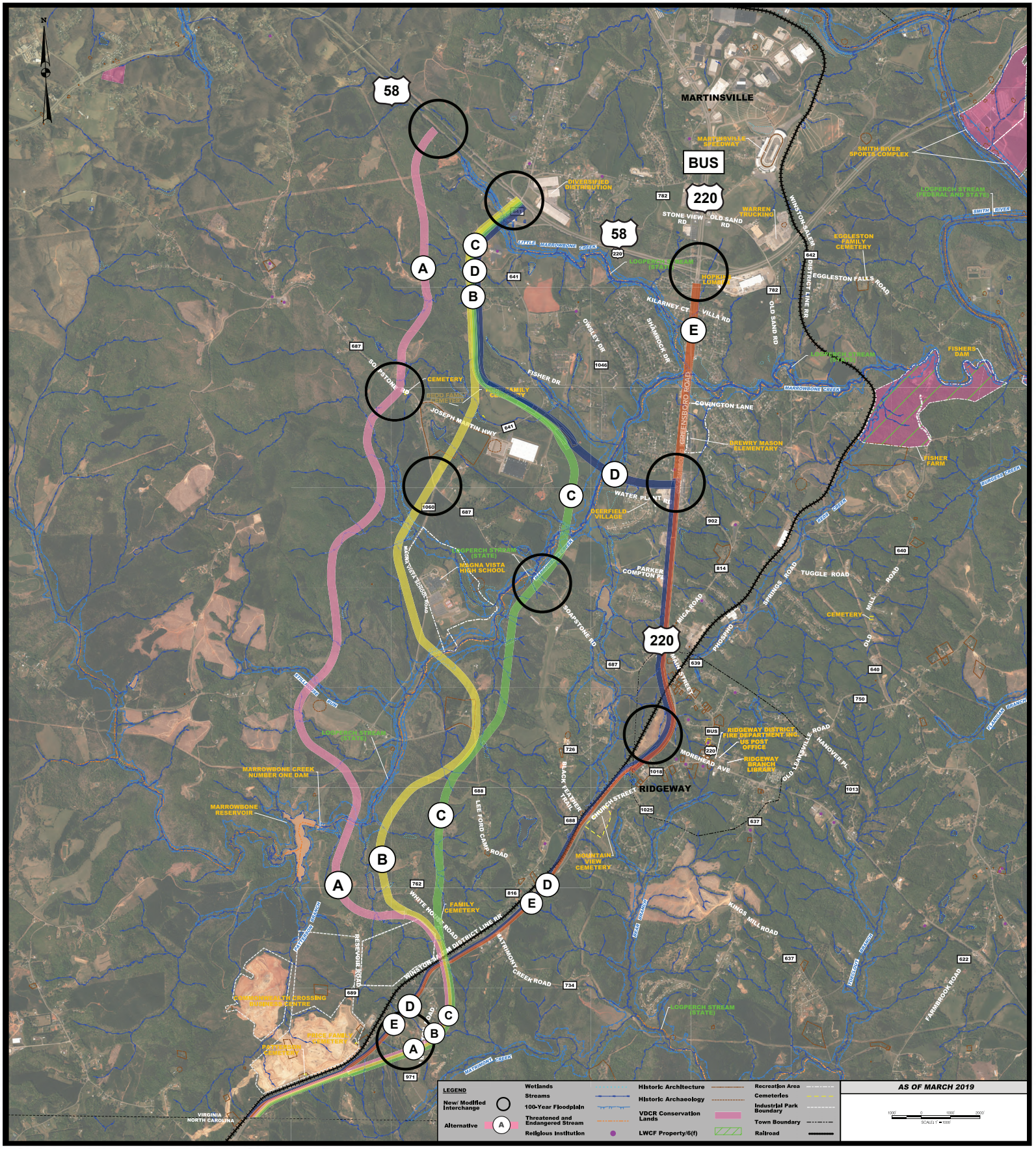
	Residential Impacts per Alternative	Properties near Drewry Mason Elementary School	Properties near Ridgeway	Properties in Martinsville
Alternative A	17	18	27	184
Alternative B	26			
Alternative C	25			
Alternative D	56			
Alternative E	97			
Alternative F	42			

Note: These searches may result in overlapping results. It should not be assumed there are 229 unique properties available in the region.

As illustrated in Table 4, there are not enough properties within the Drewry Mason Elementary School zone or the Town of Ridgeway to implement Alternatives D, E, or F. It would take over half of the properties available in Martinsville to implement Alternative E. While the numbers exist as of June 2, 2019 within Martinsville area to support the relocations assumed under these alternatives, it may not be realistic to assume the project could take half the market or that all of the relocated individuals could accept moving away from their school or other community facilities. In addition, the available properties may not be functionally equivalent to residences that would be impacted. If functionally equivalent and decent, safe, and sanitary housing is not available, the right-of-way process would be halted until adequate housing were put on the market, or until VDOT constructed new housing, which would add additional unknown costs to the project.

Conclusion

As the project proponent, VDOT has a desire to implement an alternative that meets the purpose and need for the study, while balancing cost and impact. Though there is not a threshold for the number of impacts that are acceptable for a given project, the sheer number and associated costs and logistical challenges of Alternatives D, E, and F do not reflect such a balance. While it would be possible to continue to carry these alternatives through the study and document them in the Draft EIS, they are so extreme that doing so could have unintended adverse consequences. First, the extreme nature of these alternatives would most likely capture the focus of the public during the planned public hearing in August 2019. This would prevent the public from adequately considering those alternatives that do adequately balance impact and cost. Furthermore, including these alternatives in the Draft EIS would result in mapping and other information being made public that would imply impacts to these properties. While that may not be the intent, public perception and or misunderstanding could lead to years of misinformation, as VDOT has experienced on other projects. Based on the costs and logistical challenges of these property impacts, VDOT cannot recommend further studying Alternatives D, E, or F. The work that has been completed to date on these alternatives will be documented in the associated technical reports but not presented in the Draft EIS for consideration as a preferred alternative.


MARTINSVILLE
BUS
220
58
RIDGEWAY
MARROWBONE CREEK NUMBER ONE DAM
MARROWBONE RESERVOIR
A
B
C
D
E
LEGEND
New/ Modified Interchange
Alternative
Wetlands
Streams
100-Year Floodplain
Threatened and Endangered Stream
Religious Institution
Historic Architecture
Historic Archaeology
VDCR Conservation Lands
LWCF Property/6(f)
Recreation Area
Cemeteries
Industrial Park Boundary
Town Boundary
Railroad
AS OF MARCH 2019
VIRGINIA
NORTH CAROLINA

APPENDIX E

VDOT Project Cost Estimating System

VDOT Project Cost Estimating System

The following information focuses on the methodology used to develop the cost estimates for each alternative. The existing conditions near the five build alternatives vary, requiring different assumptions for many of the cost items associated with them. Alternative A is primarily on new alignment, with a new interchange proposed at the Route 58/220 bypass. Alternatives B and C are also primarily on new alignment. However, they connect to the Route 58/220 bypass at an existing interchange with Joseph Martin Highway that will require considerable reconstruction. Alternative D follows along or adjacent to the existing Route 220 alignment over much of its length, which will require new frontage roads to be built adjacent to the mainline to provide local access. Alternative D also requires modification at the existing interchange at Route 58/220 bypass and Joseph Martin Highway. Alternative E involves the full reconstruction of the existing Route 220 roadway as a limited access facility, with frontage roads over most of its length and a modified interchange at Route 58 to create more of a freeway-to-freeway connection.

In general, the cost estimates measure quantities of major items anticipated to be included in the construction, appropriate for the level of design at this stage. When possible, standard pay items are used for these major quantities. When the major quantities measured are a combination of multiple standard items, a lump sum calculation is used to estimate the cost of a unit, and this inclusive unit cost is used in the major quantity estimate. Unit prices are based on published VDOT District averages, primarily from the Salem District.

The following is a list of assumptions made for the individual major items for each of the Alternatives with respect to the existing conditions:

1. General Items

This category includes Mobilization, Construction Surveying, and Clearing and Grubbing, which are calculated consistently across the three alternatives. Clearing and Grubbing is calculated as a function of the limits of disturbance. Alternatives D and E follow along existing Route 220 and would likely not require as much clearing of trees and vegetation, however they would require a greater number of existing buildings to be demolished as part of the work. Mobilization and Construction Surveying are calculated as a function of the construction cost.

2. Grading Items

There are three primary estimate items in this section: Regular Excavation, Rock Excavation, and Borrow Excavation. All six alternatives will need material to be brought to the site as a result of the high fill requirements, even with efforts to balance the earthwork within the limits of the permissible roadway grades. It is assumed that rock is present, and for the estimating purposes it is assumed that 10 percent of any excavation deeper than 15 feet is rock. This assumes further study and geotechnical investigations will be completed in the next phase of design, as well as optimization of roadway profiles.

Alternatives A, B and C are primarily on new alignment, and as a result a larger percentage of excavated material is likely to be moved elsewhere on the site and be used as fill. For Alternatives A, B and C, it is assumed that 75% of the excavated material can be re-used as fill, setting aside a percentage for the organic material near the surface and other unsuitable materials. For Alternative D, it is assumed that only 30% of the excavated material is re-usable, as much of it will be existing roadway pavement section in addition to unsuitable material and organics. Alternative E is primarily following existing road alignment, so it is assumed that only 10% of the excavated material will be re-used as fill.

3. Drainage Items

Stormwater Management facilities were calculated using lump sum calculations, building a price for each type and size of facility. This cost includes major incidental items needed to construct stormwater management swales, ponds, and bioretention facilities. The estimated costs for each facility are in the major quantities estimate as a per each unit price. Closed drainage systems to convey water to the facilities were estimated separately, as a function of the total number of stormwater ponds and bioretention. A lump sum calculation is used for this unit price as well. Culverts for small stream crossings are also measured in this category.

4. Incidental Items

Incidental items include Structures, Retaining Walls, and Guardrail. The Bridge costs are developed individually using PCES Bridge estimator spreadsheets, and include assumed costs for removing existing structures, difficult access, phased construction, and other additions. The PCES tool estimated the bridge cost in the range of $225/sf, and after consultation with VDOT Location and Design, all bridge costs were adjusted up to $300/sf, to reflect recent bid price trends. Bridges over the Norfolk Southern railroad are assumed to span the entire right of way with 23 feet of clearance between the top of rail and the bottom of the structure. Bridges over Marrowbone Creek are currently assumed to span its main channel and FEMA floodplain. Retaining Walls are more prevalent in Alternatives D and E, to avoid impacts to the Norfolk Southern railway and adjacent roadways. Retaining Wall lengths and heights were calculated directly from the 3-D models that were developed for each alternative.

5. Protective Items

Protective items include the Maintenance of Traffic, Environmental / Landscape, and other standard items. The major difference between Alternatives in this category is related to the Maintenance of Traffic. At this stage of design development, Maintenance of Traffic is estimated as a percentage of the construction hard cost. Alternative A, however, is primarily on new alignment, so it is assumed that the Maintenance of Traffic will be much less than the cost for Alternatives D or E, which are primarily on existing roadway and will require several traffic shifts, additional signage, flaggers, and more barrier protection. To account for this difference, the Maintenance of Traffic is assumed as 3% of the construction cost for Alternative A, 6% for Alternatives B and C, and 10% for Alternatives D and E. Alternatives B and C are slightly higher than Alternative A due to the additional traffic control needed to reconstruct the Route 58/220 bypass interchange with Joseph Martin Highway. Environmental / Landscape cost is estimated as a consistent percentage of construction cost for all Alternatives.

6. Erosion Control

Similar to the Maintenance of Traffic, alternatives built on new alignment may have a lower cost related to Erosion Control. The work along existing Route 220 in Alternatives D and E will require phased E&S to construct the northbound and southbound roadway separately, which will require additional material and manpower to remove and reconstruct the controls. Alternatives A, B and C will allow for large sections of the entire roadway to be built all at once, only requiring one installation. Erosion Control for Alternatives D and E is assumed to be 10% of the neat construction cost, and for Alternatives A, B, and C it is assumed as 7% of the neat cost.

7. Utility Items

Utilities are assumed to be a percentage of the neat construction cost. Alternatives A, B and C are all on new alignment and will have minimal impacts to existing services. There are utility easements for natural gas pipelines and electrical transmission lines to cross, and the costs associated with these crossings will be further explored at a later stage. Alternatives D and E primarily use the existing Route 220 roadway, and as a result will have considerably more impacts to existing services. Utility costs for Alternatives A, B and C are assumed to be 1% of the neat construction cost. Alternative D is assumed to be 3% of the total cost, as it impacts the utilities in Segments A and B of the Route 220 roadway. Alternative E is assumed as 5% of the total cost, because there are added impacts to the overhead utilities that flank both sides of Route 220 in Segment C, the northern section between Route 58 and Soapstone Road.

8. Traffic Control and Safety Items

Traffic control items cover traffic signs and pavement markings. The new interchanges on each alignment will likely require overhead or cantilever signs, as well as large ground-mounted signs on the crossing streets. Alternative D has four new interchanges, and as a result will have a higher cost than the other four alternatives. Alternatives D and E also have a higher total mileage of frontage roads, which increases the linear footage of pavement markings considerably over Alternatives A, B and C.

9. Soft Cost Items

Additional items are added to the construction cost below the line. These items include Right of Way, Construction Inspection, Construction Contingency, and Escalation. Escalation is calculated using the PCES spreadsheet, with a construction start date of 2025, and a four-year construction duration. Contingency has been set at 30% of the total construction cost and is assumed to cover design development and construction risks. Construction Inspection is set at 12.5% of the construction cost, per current guidelines. Right of Way costs have been estimated for both land and improvements. The improvements include the fair market value of buildings on any property projected to be fully impacted by the project. The land value has been calculated from the tax assessment value of the land projected to be impacted by the limits of disturbance of the project. Relocation costs have been estimated as $95,000 per residential site, and $75,000 for commercial, industrial, and institutional sites.

MAJOR QUANTITIES ESTIMATE

DATE:	6/6/19
ROAD:	**Route 220**
ALTERNATIVE:	**Alt A**
PREPARED BY:	**WALLACE MONTGOMERY**

LINE NO.	ITEM NUMBER	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL
GENERAL ITEMS						
0010	00100	MOBILIZATION	LS	$20,272,000.00	1	$20,272,000
0020	00101	CONSTRUCTION SURVEYING	LS	$4,049,000.00	1	$4,049,000
0030	00110	CLEARING AND GRUBBING	LS	$16,946,945.00	1	$16,946,945
GRADING ITEMS						
0040	00120	REGULAR EXCAVATION	CY	$17.50	3,549,269	$62,112,209
0050	00124	ROCK EXCAVATION	CY	$125.00	142,121	$17,765,114
0060	00130	BORROW EXCAVATION	CY	$29.72	4,758,747	$141,429,946
DRAINAGE ITEMS						
0070	NS	SWM - BIORETENTION HALF SMALL	LS	$253,469.91	5	$1,267,350
0080	NS	SWM - BIORETENTION SMALL	LS	$526,723.76	1	$526,724
0090	NS	SWM - BIORETENTION HALF MEDIUM	LS	$1,386,563.91		$0
0100	NS	SWM - BIORETENTION MEDIUM	LS	$2,755,921.04		$0
0110	NS	SWM - BIORETENTION HALF LARGE	LS	$2,227,273.27	1	$2,227,273
0120	NS	SWM - BIORETENTION LARGE	LS	$4,436,889.77		$0
0130	NS	SWM - E SMALL	LS	$152,646.93		$0
0140	NS	SWM - E MEDIUM	LS	$335,393.53		$0
0150	NS	SWM - E LARGE	LS	$606,357.58		$0
0160	NS	SWM - POND HALF SMALL	LS	$203,420.65	2	$406,841
0170	NS	SWM - POND SMALL	LS	$426,690.94	2	$853,382
0180	NS	SWM - POND HALF MEDIUM	LS	$663,912.76	6	$3,983,477
0190	NS	SWM - POND MEDIUM	LS	$1,311,059.44	1	$1,311,059
0200	NS	SWM - POND HALF LARGE	LS	$1,134,210.75	5	$5,671,054
0210	NS	SWM - POND LARGE	LS	$2,251,655.42	2	$4,503,311
0220	NS	SWM - POND 1/3 XL	LS	$1,121,109.23		$0
0230	NS	SWM - POND 1/2 XL	LS	$1,664,147.29	2	$3,328,295
0240	NS	SWM - POND XL	LS	$3,270,405.17	1	$3,270,405
0250	NS	SWM - DRY SWALE	LF	$180.00	167,772	$30,198,960
0260	01360	STREAM CULVERTS - 36" CONC. PIPE	LF	$101.94	11,319	$1,153,859
0270	NS	CLOSED DRAINAGE SYSTEM	LF	$116.53	14,000	$1,631,420
PAVEMENT ITEMS						
0280	10636	ASPHALT CONC.TY. SM-9.5D	TON	$132.00	54,681	$7,217,877
0290	10611	ASPHALT CONCRETE TY. IM-19.0D	TON	$126.00	54,681	$6,889,792
0300	10642	ASPHALT CONCRETE TY. BM-25.0A	TON	$120.00	170,008	$20,400,943
0310	10100	AGGR. MATL. NO. 21B	TON	$37.00	41,011	$1,517,395

ALTERNATIVE:		Alt A				
INCIDENTAL ITEMS						
0320	NS	GUARDRAIL	LF	$26.83	19,200	$515,136
0330	NS	BRIDGES	SF	$300.00	138,340	$41,502,000
0340	NS	RETAINING WALLS	SF	$150.00	10,511	$1,576,650
PROTECTIVE ITEMS						
0350	NS	MAINTENANCE OF TRAFFIC	LS	$10,963,000.00	1	$10,963,000
0360	NS	ENVIRONMENTAL / LANDSCAPE	LS	$3,121,000.00	1	$3,121,000
0370	25505	FIELD OFFICE	MO	$1,828.00	48	$87,744
0380	25565	PROGRESS SCHEDULE BASELINE	LS	$7,873.00	1	$7,873
0390	25567	PROGRESS SCHEDULE UPDATES	EA	$500.00	48	$24,000
EROSION CONTROL ITEMS						
0400	NS	EROSION CONTROL	LS	$22,060,000.00	1	$22,060,000
UTILITY ITEMS						
0410	NS	UTILITY RELOCATIONS	LS	$3,152,000.00	1	$3,152,000
TRAFFIC CONTROL & SAFETY ITEMS						
0420	50974	TRAFFIC SIGNS, POSTS, AND FOUNDATIONS	LS	$3,425,653.85	1	$3,425,654
0430	54043	TY.B CL.II PAVE. LINE MARK.	LF	$2.85	253,914	$723,653

SUB-TOTAL GENERAL ITEMS =	$41,267,945
SUB-TOTAL GRADING ITEMS =	$221,307,269
SUB-TOTAL DRAINAGE ITEMS =	$60,333,409
SUB-TOTAL PAVEMENT ITEMS =	$36,026,007
SUB-TOTAL INCIDENTAL ITEMS =	$43,593,786
SUB-TOTAL PROTECTIVE ITEMS =	$14,203,617
SUB-TOTAL EROSION CONTROL =	$22,060,000
SUB-TOTAL UTILITY ITEMS =	$3,152,000
SUB-TOTAL TRAFFIC & SAFETY ITEMS =	$4,149,307
TOTAL (ALL CATEGORIES) =	**$446,093,340**
Right of Way Land =	**$14,069,585**
Right of Way Buildings =	**$1,189,299**
Right of Way Relocation Cost =	**$1,710,000**
Construction Inspection =	**$52,721,543**
30% CONTINGENCY =	**$133,828,002**
24.15% ESCALATION =	**$107,731,542**
TOTAL CONSTRUCTION COST =	**$757,343,311**

MAJOR QUANTITIES ESTIMATE

DATE: 6/6/19
ROAD: Route 220
ALTERNATIVE: Alt B
PREPARED BY: WALLACE MONTGOMERY

LINE NO.	ITEM NUMBER	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL
GENERAL ITEMS						
0010	00100	MOBILIZATION	LS	$19,747,000.00	1	$19,747,000
0020	00101	CONSTRUCTION SURVEYING	LS	$3,944,000.00	1	$3,944,000
0030	00110	CLEARING AND GRUBBING	LS	$13,390,129.00	1	$13,390,129
GRADING ITEMS						
0040	00120	REGULAR EXCAVATION	CY	$17.50	2,230,859	$39,040,032
0050	00124	ROCK EXCAVATION	CY	$125.00	56,340	$7,042,505
0060	00130	BORROW EXCAVATION	CY	$29.72	4,128,445	$122,697,378
DRAINAGE ITEMS						
0070	NS	SWM - BIORETENTION HALF SMALL	LS	$253,469.91		$0
0080	NS	SWM - BIORETENTION SMALL	LS	$526,723.76	3	$1,580,171
0090	NS	SWM - BIORETENTION HALF MEDIUM	LS	$1,386,563.91	2	$2,773,128
0100	NS	SWM - BIORETENTION MEDIUM	LS	$2,755,921.04	1	$2,755,921
0110	NS	SWM - BIORETENTION HALF LARGE	LS	$2,227,273.27	3	$6,681,820
0120	NS	SWM - BIORETENTION LARGE	LS	$4,436,889.77	1	$4,436,890
0130	NS	SWM - E SMALL	LS	$152,646.93		$0
0140	NS	SWM - E MEDIUM	LS	$335,393.53		$0
0150	NS	SWM - E LARGE	LS	$606,357.58		$0
0160	NS	SWM - POND HALF SMALL	LS	$203,420.65	4	$813,683
0170	NS	SWM - POND SMALL	LS	$426,690.94	2	$853,382
0180	NS	SWM - POND HALF MEDIUM	LS	$663,912.76	5	$3,319,564
0190	NS	SWM - POND MEDIUM	LS	$1,311,059.44	4	$5,244,238
0200	NS	SWM - POND HALF LARGE	LS	$1,134,210.75	3	$3,402,632
0210	NS	SWM - POND LARGE	LS	$2,251,655.42		$0
0220	NS	SWM - POND 1/3 XL	LS	$1,121,109.23	3	$3,363,328
0230	NS	SWM - POND 1/2 XL	LS	$1,664,147.29	2	$3,328,295
0240	NS	SWM - POND XL	LS	$3,270,405.17		$0
0250	NS	SWM - DRY SWALE	LF	$180.00	159,410	$28,693,800
0260	01360	STREAM CULVERTS - 36" CONC. PIPE	LF	$101.94	7,546	$769,239
0270	NS	CLOSED DRAINAGE SYSTEM	LF	$116.53	16,500	$1,922,745
PAVEMENT ITEMS						
0280	10636	ASPHALT CONC.TY. SM-9.5D	TON	$132.00	57,453	$7,583,849
0290	10611	ASPHALT CONCRETE TY. IM-19.0D	TON	$126.00	57,453	$7,239,129
0300	10642	ASPHALT CONCRETE TY. BM-25.0A	TON	$120.00	178,628	$21,435,342
0310	10100	AGGR. MATL. NO. 21B	TON	$37.00	43,090	$1,594,332

ALTERNATIVE:		Alt B				
INCIDENTAL ITEMS						
0320	NS	GUARDRAIL	LF	$26.83	31,800	$853,194
0330	NS	BRIDGES	SF	$300.00	215,300	$64,590,000
0340	NS	RETAINING WALLS	SF	$150.00	4,391	$658,650
PROTECTIVE ITEMS						
0350	NS	MAINTENANCE OF TRAFFIC	LS	$20,805,000.00	1	$20,805,000
0360	NS	ENVIRONMENTAL / LANDSCAPE	LS	$2,937,000.00	1	$2,937,000
0370	25505	FIELD OFFICE	MO	$1,828.00	48	$87,744
0380	25565	PROGRESS SCHEDULE BASELINE	LS	$7,873.00	1	$7,873
0390	25567	PROGRESS SCHEDULE UPDATES	EA	$500.00	48	$24,000
EROSION CONTROL ITEMS						
0400	NS	EROSION CONTROL	LS	$20,762,000.00	1	$20,762,000
UTILITY ITEMS						
0410	NS	UTILITY RELOCATIONS	LS	$2,966,000.00	1	$2,966,000
TRAFFIC CONTROL & SAFETY ITEMS						
0420	50974	TRAFFIC SIGNS, POSTS, AND FOUNDATIONS	LS	$3,411,115.38	1	$3,411,115
0430	54043	TY.B CL.II PAVE. LINE MARK.	LF	$2.85	230,430	$656,724

SUB-TOTAL GENERAL ITEMS =	$37,081,129
SUB-TOTAL GRADING ITEMS =	$168,779,915
SUB-TOTAL DRAINAGE ITEMS =	$69,938,835
SUB-TOTAL PAVEMENT ITEMS =	$37,852,652
SUB-TOTAL INCIDENTAL ITEMS =	$66,101,844
SUB-TOTAL PROTECTIVE ITEMS =	$23,861,617
SUB-TOTAL EROSION CONTROL =	$20,762,000
SUB-TOTAL UTILITY ITEMS =	$2,966,000
SUB-TOTAL TRAFFIC & SAFETY ITEMS =	$4,067,839
TOTAL (ALL CATEGORIES) =	**$431,411,831**
Right of Way Land =	**$16,169,797**
Right of Way Buildings =	**$10,800,689**
Right of Way Relocation Cost =	**$2,885,000**
Construction Inspection =	**$50,965,104**
30% CONTINGENCY =	**$129,423,549**
24.15% ESCALATION =	**$104,185,957**
TOTAL CONSTRUCTION COST =	**$745,841,928**

MAJOR QUANTITIES ESTIMATE

DATE:	6/6/19
ROAD:	**Route 220**
ALTERNATIVE:	**Alt C**
PREPARED BY:	**WALLACE MONTGOMERY**

LINE NO.	ITEM NUMBER	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL
GENERAL ITEMS						
0010	00100	MOBILIZATION	LS	$16,114,000.00	1	$16,114,000
0020	00101	CONSTRUCTION SURVEYING	LS	$3,217,000.00	1	$3,217,000
0030	00110	CLEARING AND GRUBBING	LS	$12,644,909.00	1	$12,644,909
GRADING ITEMS						
0040	00120	REGULAR EXCAVATION	CY	$17.50	4,156,273	$72,734,772
0050	00124	ROCK EXCAVATION	CY	$125.00	142,676	$17,834,540
0060	00130	BORROW EXCAVATION	CY	$29.72	637,809	$18,955,691
DRAINAGE ITEMS						
0070	NS	SWM - BIORETENTION HALF SMALL	LS	$253,469.91		$0
0080	NS	SWM - BIORETENTION SMALL	LS	$526,723.76	3	$1,580,171
0090	NS	SWM - BIORETENTION HALF MEDIUM	LS	$1,386,563.91		$0
0100	NS	SWM - BIORETENTION MEDIUM	LS	$2,755,921.04	1	$2,755,921
0110	NS	SWM - BIORETENTION HALF LARGE	LS	$2,227,273.27	1	$2,227,273
0120	NS	SWM - BIORETENTION LARGE	LS	$4,436,889.77	1	$4,436,890
0130	NS	SWM - E SMALL	LS	$152,646.93		$0
0140	NS	SWM - E MEDIUM	LS	$335,393.53		$0
0150	NS	SWM - E LARGE	LS	$606,357.58		$0
0160	NS	SWM - POND HALF SMALL	LS	$203,420.65	2	$406,841
0170	NS	SWM - POND SMALL	LS	$426,690.94	2	$853,382
0180	NS	SWM - POND HALF MEDIUM	LS	$663,912.76	4	$2,655,651
0190	NS	SWM - POND MEDIUM	LS	$1,311,059.44	1	$1,311,059
0200	NS	SWM - POND HALF LARGE	LS	$1,134,210.75	6	$6,805,265
0210	NS	SWM - POND LARGE	LS	$2,251,655.42		$0
0220	NS	SWM - POND 1/3 XL	LS	$1,121,109.23		$0
0230	NS	SWM - POND 1/2 XL	LS	$1,664,147.29	4	$6,656,589
0240	NS	SWM - POND XL	LS	$3,270,405.17		$0
0250	NS	SWM - DRY SWALE	LF	$180.00	157,305	$28,314,900
0260	01360	STREAM CULVERTS - 36" CONC. PIPE	LF	$101.94	11,319	$1,153,859
0270	NS	CLOSED DRAINAGE SYSTEM	LF	$116.53	12,500	$1,456,625
PAVEMENT ITEMS						
0280	10636	ASPHALT CONC.TY. SM-9.5D	TON	$132.00	52,872	$6,979,064
0290	10611	ASPHALT CONCRETE TY. IM-19.0D	TON	$126.00	52,872	$6,661,834
0300	10642	ASPHALT CONCRETE TY. BM-25.0A	TON	$120.00	164,383	$19,725,949
0310	10100	AGGR. MATL. NO. 21B	TON	$37.00	39,654	$1,467,190

ALTERNATIVE:		Alt C				
INCIDENTAL ITEMS						
0320	NS	GUARDRAIL	LF	$26.83	30,600	$820,998
0330	NS	BRIDGES	SF	$300.00	242,242	$72,672,600
0340	NS	RETAINING WALLS	SF	$150.00	4,391	$658,650
PROTECTIVE ITEMS						
0350	NS	MAINTENANCE OF TRAFFIC	LS	$16,990,000.00	1	$16,990,000
0360	NS	ENVIRONMENTAL / LANDSCAPE	LS	$2,357,000.00	1	$2,357,000
0370	25505	FIELD OFFICE	MO	$1,828.00	48	$87,744
0380	25565	PROGRESS SCHEDULE BASELINE	LS	$7,873.00	1	$7,873
0390	25567	PROGRESS SCHEDULE UPDATES	EA	$500.00	48	$24,000
EROSION CONTROL ITEMS						
0400	NS	EROSION CONTROL	LS	$16,659,000.00	1	$16,659,000
UTILITY ITEMS						
0410	NS	UTILITY RELOCATIONS	LS	$2,380,000.00	1	$2,380,000
TRAFFIC CONTROL & SAFETY ITEMS						
0420	50974	TRAFFIC SIGNS, POSTS, AND FOUNDATIONS	LS	$3,402,876.92	1	$3,402,877
0430	54043	TY.B CL.II PAVE. LINE MARK.	LF	$2.85	221,088	$630,100

SUB-TOTAL GENERAL ITEMS =	$31,975,909
SUB-TOTAL GRADING ITEMS =	$109,525,003
SUB-TOTAL DRAINAGE ITEMS =	$60,614,427
SUB-TOTAL PAVEMENT ITEMS =	$34,834,036
SUB-TOTAL INCIDENTAL ITEMS =	$74,152,248
SUB-TOTAL PROTECTIVE ITEMS =	$19,466,617
SUB-TOTAL EROSION CONTROL =	$16,659,000
SUB-TOTAL UTILITY ITEMS =	$2,380,000
SUB-TOTAL TRAFFIC & SAFETY ITEMS =	$4,032,977
TOTAL (ALL CATEGORIES) =	**$353,640,216**
Right of Way Land =	**$15,926,982**
Right of Way Buildings =	**$10,378,681**
Right of Way Relocation Cost =	**$2,675,000**
Construction Inspection =	**$41,788,652**
30% CONTINGENCY =	**$106,092,065**
24.15% ESCALATION =	**$85,404,112**
TOTAL CONSTRUCTION COST =	**$615,905,708**

MAJOR QUANTITIES ESTIMATE

DATE:	6/6/19
ROAD:	**Route 220**
ALTERNATIVE:	**Alt D**
PREPARED BY:	**WALLACE MONTGOMERY**

LINE NO.	ITEM NUMBER	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL
GENERAL ITEMS						
0010	00100	MOBILIZATION	LS	$20,954,000.00	1	$20,954,000
0020	00101	CONSTRUCTION SURVEYING	LS	$4,185,000.00	1	$4,185,000
0030	00110	CLEARING AND GRUBBING	LS	$8,143,443.00	1	$8,143,443
GRADING ITEMS						
0040	00120	REGULAR EXCAVATION	CY	$17.50	2,633,935	$46,093,864
0050	00124	ROCK EXCAVATION	CY	$125.00	56,416	$7,051,988
0060	00130	BORROW EXCAVATION	CY	$29.72	3,531,359	$104,951,981
DRAINAGE ITEMS						
0070	NS	SWM - BIORETENTION HALF SMALL	LS	$253,469.91		$0
0080	NS	SWM - BIORETENTION SMALL	LS	$526,723.76	3	$1,580,171
0090	NS	SWM - BIORETENTION HALF MEDIUM	LS	$1,386,563.91	1	$1,386,564
0100	NS	SWM - BIORETENTION MEDIUM	LS	$2,755,921.04	1	$2,755,921
0110	NS	SWM - BIORETENTION HALF LARGE	LS	$2,227,273.27		$0
0120	NS	SWM - BIORETENTION LARGE	LS	$4,436,889.77	1	$4,436,890
0130	NS	SWM - E SMALL	LS	$152,646.93	10	$1,526,469
0140	NS	SWM - E MEDIUM	LS	$335,393.53	7	$2,347,755
0150	NS	SWM - E LARGE	LS	$606,357.58	7	$4,244,503
0160	NS	SWM - POND HALF SMALL	LS	$203,420.65	2	$406,841
0170	NS	SWM - POND SMALL	LS	$426,690.94		$0
0180	NS	SWM - POND HALF MEDIUM	LS	$663,912.76	5	$3,319,564
0190	NS	SWM - POND MEDIUM	LS	$1,311,059.44	1	$1,311,059
0200	NS	SWM - POND HALF LARGE	LS	$1,134,210.75		$0
0210	NS	SWM - POND LARGE	LS	$2,251,655.42		$0
0220	NS	SWM - POND 1/3 XL	LS	$1,121,109.23		$0
0230	NS	SWM - POND 1/2 XL	LS	$1,664,147.29		$0
0240	NS	SWM - POND XL	LS	$3,270,405.17	1	$3,270,405
0250	NS	SWM - DRY SWALE	LF	$180.00	86,019	$15,483,420
0260	01360	STREAM CULVERTS - 36" CONC. PIPE	LF	$101.94	5,929	$604,402
0270	NS	CLOSED DRAINAGE SYSTEM	LF	$116.53	19,500	$2,272,335
PAVEMENT ITEMS						
0280	10636	ASPHALT CONC.TY. SM-9.5D	TON	$132.00	68,192	$9,001,305
0290	10611	ASPHALT CONCRETE TY. IM-19.0D	TON	$126.00	68,192	$8,592,156
0300	10642	ASPHALT CONCRETE TY. BM-25.0A	TON	$120.00	212,014	$25,441,704
0310	10100	AGGR. MATL. NO. 21B	TON	$37.00	51,144	$1,892,320

ALTERNATIVE:		Alt D				
INCIDENTAL ITEMS						
0320	NS	GUARDRAIL	LF	$26.83	22,800	$611,724
0330	NS	BRIDGES	SF	$300.00	234,446	$70,333,800
0340	NS	RETAINING WALLS	SF	$150.00	98,207	$14,731,050
PROTECTIVE ITEMS						
0350	NS	MAINTENANCE OF TRAFFIC	LS	$33,887,000.00	1	$33,887,000
0360	NS	ENVIRONMENTAL / LANDSCAPE	LS	$3,228,000.00	1	$3,228,000
0370	25505	FIELD OFFICE	MO	$1,828.00	48	$87,744
0380	25565	PROGRESS SCHEDULE BASELINE	LS	$7,873.00	1	$7,873
0390	25567	PROGRESS SCHEDULE UPDATES	EA	$500.00	48	$24,000
EROSION CONTROL ITEMS						
0400	NS	EROSION CONTROL	LS	$32,594,000.00	1	$32,594,000
UTILITY ITEMS						
0410	NS	UTILITY RELOCATIONS	LS	$9,779,000.00	1	$9,779,000
TRAFFIC CONTROL & SAFETY ITEMS						
0420	50974	TRAFFIC SIGNS, POSTS, AND FOUNDATIONS	LS	$4,025,051.69	1	$4,025,052
0430	54043	TY.B CL.II PAVE. LINE MARK.	LF	$2.85	419,373	$1,195,213

SUB-TOTAL GENERAL ITEMS =	$33,282,443
SUB-TOTAL GRADING ITEMS =	$158,097,833
SUB-TOTAL DRAINAGE ITEMS =	$44,946,300
SUB-TOTAL PAVEMENT ITEMS =	$44,927,484
SUB-TOTAL INCIDENTAL ITEMS =	$85,676,574
SUB-TOTAL PROTECTIVE ITEMS =	$37,234,617
SUB-TOTAL EROSION CONTROL =	$32,594,000
SUB-TOTAL UTILITY ITEMS =	$9,779,000
SUB-TOTAL TRAFFIC & SAFETY ITEMS =	$5,220,265
TOTAL (ALL CATEGORIES) =	**$451,758,515**
Right of Way Land =	**$24,140,349**
Right of Way Buildings =	**$15,537,667**
Right of Way Relocation Cost =	**$4,155,000**
Construction Inspection =	**$53,327,439**
30% CONTINGENCY =	**$135,527,555**
24.15% ESCALATION =	**$109,099,681**
TOTAL CONSTRUCTION COST =	**$793,546,207**

MAJOR QUANTITIES ESTIMATE

DATE:	6/6/19
ROAD:	**Route 220**
ALTERNATIVE:	**Alt E**
PREPARED BY:	**WALLACE MONTGOMERY**

LINE NO.	ITEM NUMBER	DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL
GENERAL ITEMS						
0010	00100	MOBILIZATION	LS	$18,482,000.00	1	$18,482,000
0020	00101	CONSTRUCTION SURVEYING	LS	$3,691,000.00	1	$3,691,000
0030	00110	CLEARING AND GRUBBING	LS	$5,633,661.00	1	$5,633,661
GRADING ITEMS						
0040	00120	REGULAR EXCAVATION	CY	$17.50	2,185,429	$38,244,999
0050	00124	ROCK EXCAVATION	CY	$125.00	45,240	$5,654,938
0060	00130	BORROW EXCAVATION	CY	$29.72	3,378,320	$100,403,676
DRAINAGE ITEMS						
0070	NS	SWM - BIORETENTION HALF SMALL	LS	$253,469.91		$0
0080	NS	SWM - BIORETENTION SMALL	LS	$526,723.76		$0
0090	NS	SWM - BIORETENTION HALF MEDIUM	LS	$1,386,563.91		$0
0100	NS	SWM - BIORETENTION MEDIUM	LS	$2,755,921.04		$0
0110	NS	SWM - BIORETENTION HALF LARGE	LS	$2,227,273.27		$0
0120	NS	SWM - BIORETENTION LARGE	LS	$4,436,889.77		$0
0130	NS	SWM - E SMALL	LS	$152,646.93	14	$2,137,057
0140	NS	SWM - E MEDIUM	LS	$335,393.53	13	$4,360,116
0150	NS	SWM - E LARGE	LS	$606,357.58	17	$10,308,079
0160	NS	SWM - POND HALF SMALL	LS	$203,420.65		$0
0170	NS	SWM - POND SMALL	LS	$426,690.94		$0
0180	NS	SWM - POND HALF MEDIUM	LS	$663,912.76		$0
0190	NS	SWM - POND MEDIUM	LS	$1,311,059.44		$0
0200	NS	SWM - POND HALF LARGE	LS	$1,134,210.75		$0
0210	NS	SWM - POND LARGE	LS	$2,251,655.42		$0
0220	NS	SWM - POND 1/3 XL	LS	$1,121,109.23		$0
0230	NS	SWM - POND 1/2 XL	LS	$1,664,147.29		$0
0240	NS	SWM - POND XL	LS	$3,270,405.17		$0
0250	NS	SWM - DRY SWALE	LF	$180.00	65,915	$11,864,700
0260	01360	STREAM CULVERTS - 36" CONC. PIPE	LF	$101.94	7,546	$769,239
0270	NS	CLOSED DRAINAGE SYSTEM	LF	$116.53	22,000	$2,563,660
PAVEMENT ITEMS						
0280	10636	ASPHALT CONC.TY. SM-9.5D	TON	$132.00	63,881	$8,432,345
0290	10611	ASPHALT CONCRETE TY. IM-19.0D	TON	$126.00	63,881	$8,049,058
0300	10642	ASPHALT CONCRETE TY. BM-25.0A	TON	$120.00	198,613	$23,833,570
0310	10100	AGGR. MATL. NO. 21B	TON	$37.00	47,911	$1,772,709

ALTERNATIVE:		Alt E				
INCIDENTAL ITEMS						
0320	NS	GUARDRAIL	LF	$26.83	18,600	$499,038
0330	NS	BRIDGES	SF	$300.00	183,990	$55,197,000
0340	NS	RETAINING WALLS	SF	$150.00	103,430	$15,514,500
PROTECTIVE ITEMS						
0350	NS	MAINTENANCE OF TRAFFIC	LS	$29,323,000.00	1	$29,323,000
0360	NS	ENVIRONMENTAL / LANDSCAPE	LS	$2,871,000.00	1	$2,871,000
0370	25505	FIELD OFFICE	MO	$1,828.00	48	$87,744
0380	25565	PROGRESS SCHEDULE BASELINE	LS	$7,873.00	1	$7,873
0390	25567	PROGRESS SCHEDULE UPDATES	EA	$500.00	48	$24,000
EROSION CONTROL ITEMS						
0400	NS	EROSION CONTROL	LS	$28,992,000.00	1	$28,992,000
UTILITY ITEMS						
0410	NS	UTILITY RELOCATIONS	LS	$14,496,000.00	1	$14,496,000
TRAFFIC CONTROL & SAFETY ITEMS						
0420	50974	TRAFFIC SIGNS, POSTS, AND FOUNDATIONS	LS	$2,491,643.54	1	$2,491,644
0430	54043	TY.B CL.II PAVE. LINE MARK.	LF	$2.85	397,092	$1,131,711

SUB-TOTAL GENERAL ITEMS =	$27,806,661
SUB-TOTAL GRADING ITEMS =	$144,303,613
SUB-TOTAL DRAINAGE ITEMS =	$32,002,851
SUB-TOTAL PAVEMENT ITEMS =	$42,087,681
SUB-TOTAL INCIDENTAL ITEMS =	$71,210,538
SUB-TOTAL PROTECTIVE ITEMS =	$32,313,617
SUB-TOTAL EROSION CONTROL =	$28,992,000
SUB-TOTAL UTILITY ITEMS =	$14,496,000
SUB-TOTAL TRAFFIC & SAFETY ITEMS =	$3,623,355
TOTAL (ALL CATEGORIES) =	**$396,836,316**
Right of Way Land =	**$26,925,187**
Right of Way Buildings =	**$21,331,783**
Right of Way Relocation Cost =	**$12,010,000**
Construction Inspection =	**$46,832,914**
30% CONTINGENCY =	**$119,050,895**
24.15% ESCALATION =	**$95,835,970**
TOTAL CONSTRUCTION COST =	**$718,823,065**

APPENDIX F

September 4, 2019 Agency Meeting Materials and Agency Concurrence

AGENCY COORDINATION MEETING

CONCURRENCE MEETING SUMMARY

Wednesday, September 4, 2019

ATTENDEES

Name	Agency	Phone	Email	Attendance
Federal Agencies				
Barb Okorn	EPA	(215) 814-3330	okorn.barbara@epa.gov	Phone
Lee Fuerst	USACE	(757) 201-7832	lee.fuerst@usace.army.mil	Phone
Robert Berg	USACE	(757) 201-7793	robert.a.berg@usace.army.mil	Phone
John Simkins	FHWA	(804) 775-3347	john.simkins@dot.gov	Phone
Mandy Ranslow	ACHP	(202) 517-0218	mranslow@achp.gov	Phone
State Agencies				
Hannah Schul	DEQ	(804) 698-4074	hannah.schul@deq.virginia.gov	Phone
Mackenzie Scott	DEQ	(804) 698-4371	mackenzie.scott@deq.virginia.gov	Phone
Local Agencies				
Tim Hall	Henry County	(276) 634-4601	thall@co.henry.va.us	Phone
Joseph Bonanno	WPPDC	(276) 638-3987	jbonanno@wppdc.org	Phone
Virginia Department of Transportation				
Angel Aymond	VDOT	(804) 786-5344	angel.aymond@vdot.virginia.gov	Phone
Scott Smizik	VDOT	(804) 371-4082	scott.smizik@vdot.virginia.gov	Phone
Angel Deem	VDOT	(804) 371-6756	angel.deem@vdot.virginia.gov	Phone
Jim Cromwell	VDOT	(804) 225-3608	james.cromwell@vdot.virginia.gov	Phone
Other				
Caleb Parks	WRA	(804) 327-5252	cparks@wrallp.com	Phone
Nicholas Nies	WRA	(804) 327-5224	nnies@wrallp.com	Phone
Megan Comer	WRA	(804) 327-5218	mcomer@wrallp.com	Phone

Meeting Purpose and Overview

On August 6, 2019, the Virginia Department of Transportation (VDOT) submitted their recommendation of Alternative C as the preferred alternative and proposed conceptual mitigation to the Cooperating and Participating Agencies for the Martinsville Southern Connector Study. On August 15, 2019, VDOT presented the preferred alternative recommendation at a public meeting for review and comment. Following up on the public comments received and discussions with individual agencies since the previous coordination meeting, VDOT provided an updated information package with a formal request for concurrence on the preferred alternative and conceptual mitigation. The purpose of this agency meeting was to solicit concurrence from the Concurring (Cooperating) Agencies involved in the study: the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA).

Discussion Summary

Angel Aymond (VDOT) initiated the meeting with a roll call of the attendees participating remotely on the telephone conference. She then noted that an updated concurrence package had been distributed for review; the concurrence package previously distributed on August 6, 2019 was updated on August 28, 2019 as part of VDOT's formal request for concurrence from USACE and EPA on the recommended preferred alternative and conceptual mitigation. Based on requests from the Concurring Agencies, the materials were further revised and redistributed on September 4, 2019.

Angel noted that specific comments, received during the public comment period on the recommended preferred alternative, identified additional options for consideration. These comments included feedback from the Blue Ridge Environmental Defense League (BREDL) and the Southern Environmental Law Center (SELC). Angel discussed how these options had been addressed in the concurrence package but more detailed documentation and responses would be provided in the response to comments document accompanying the Final Environmental Impact Statement (EIS).

Barb Okorn (EPA) noted the BREDL comments regarding Interstate 73 (I-73) were not addressed in the concurrence package and suggested that alignment options considered through the National Environmental Policy Act (NEPA) review of I-73 should be evaluated in the Draft EIS for the Martinsville Southern Connector Study. Although not specifically referred to as I-73 options, these options were generally discussed in the Eastern Route Options section of the revised concurrence package distributed September 4, 2019. Scott Smizik (VDOT) explained that I-73 was a separate project, currently unfunded and not listed in long range plans, that was not reasonably foreseeable for future implementation. He clarified that the status of the I-73 improvements were not discussed in the Draft Indirect Effects and Cumulative Impacts Technical Report for the Martinsville Southern Connector Study Draft EIS, however, the Final EIS would include documentation of the I-73 improvements as part of response to comments, as necessary. I-73 was intended to address transportation needs beyond the scope of the current study; therefore, the alignment options evaluated in the I-73 study would not be expected to address the purpose and need identified for the Martinsville Southern Connector Study. Traffic data supporting the study demonstrates the need for a westerly movement from U.S. Route 220; therefore, the eastern options considered in the I-73 study would not meet the study's purpose and need.

Scott noted that additional information and explanation would be provided in the response to comments document that will be developed as part of the Final EIS. Lee Fuerst (USACE) asked why responses to public comments on the recommended preferred alternative would not be included in the Draft EIS. Scott noted that the EIS is subject to One Federal Decision and suggested that the public comment period in July/August 2019 on the recommended preferred alternative was intended to inform the Commonwealth Transportation Board's location decision, where as additional opportunity for public review on the complete evaluation of alternatives considered in the Draft EIS would be available beginning December 2019. Consistent with FHWA's regulations for implementing NEPA, responses to substantive comments would be included in the Final EIS, following the Draft EIS being made available for public review.

After clarifying questions from the EPA and USACE, Angel Aymond requested the agencies' concurrence on the recommended preferred alternative.

Barb Okorn indicated that the EPA concurred with VDOT's recommendation of the preferred alternative. She also noted that she would be following up with VDOT with comments to

supplement and clarify her concurrence.

Lee Fuerst indicated that the USACE concurred with VDOT's recommendation of the preferred alternative and would also be providing some clarifying comments and stipulations associated with her concurrence. Lee emphasized that the USACE's concurrence was not an indication of USACE's preference or endorsement of one alternative over another. USACE's concurrence serves as the preliminary identification of the least environmentally damaging practicable alternative.

Angel closed the meeting by stating that the next meeting would be on Wednesday, September 11th, 2019 and would focus on permitting.

Concurrence on the Preferred Alternative

This document is intended to inform the concurring agencies on VDOT's recommendation of the preferred alternative and conceptual mitigation. This document is a collection of information developed and discussed as part of the Martinsville Southern Connector Study/Route 220 Environmental Impact Statement (EIS) over monthly meetings from April 2018 through June 2019.

VDOT has recommended Alternative C as the preferred alternative to the Cooperating and Participating agencies for the study. This alternative is what VDOT believes is the Least Environmentally Damaging Practicable Alternative (LEDPA). Alternative C best balances cost and impacts while meeting the Purpose and Need of the study.

Alternative C satisfies the purpose of the study and the need elements that were identified: accommodate local traffic, accommodate regional traffic, and address geometric deficiencies and inconsistencies. The alignment of Alternative C would provide a westerly movement necessary to meet regional travel patterns, would provide for the separation of local and regional traffic, and would resolve geometric deficiencies and inconsistencies by constructing a new US Route 220.

Alternative C is estimated to have the least amount of impacts to wetlands, as well as the second lowest total stream impacts and property relocations of the three alternatives carried forward for evaluation. Additional engineering could occur as part of the Final EIS (and permit application) or if/when funding becomes available for the study to advance to a detailed design phase. This additional engineering could include refinements to the illustrative planning level design included in the Draft EIS to reduce impacts to natural and cultural resources and private property.

Table 1: Alternatives Impact and Cost Summary[1]

RESOURCE	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
Potential Residential Relocations	17	26	25
Potential Commercial Relocations	0	0	0
Estimated Stream Impacts (linear feet)	28,350	20,548	21,881
Estimated Wetland Impacts (acres)	7.8	5.9	3.7
Preliminary Planning Level Cost Estimate	$757 million	$746 million	$616 million

[1] Impacts assume no bridging in order to document a worst-case scenario. It is assumed that the stream and wetland impacts estimated for Alternative C could be reduced.

August 14, 2019
Updated September 4, 2019

Background

One Federal Decision
The EIS is subject to One Federal Decision (OFD), a policy created by Executive Order 13807, which requires Federal agencies to process environmental reviews and authorization decisions for major infrastructure projects in reduced timelines. The study was designated under OFD in August 2018, after the Notice of Intent was published in February 2018. While FHWA did not apply the reduced timelines prescribed by OFD to this study, the schedule as noted in the Coordination Plan must be followed and permits must be obtained within 90 days following the issuance of the Record of Decision (consistent with OFD). To ensure the necessary information is presented to the agencies and the public, the preferred alternative will be identified in the Draft EIS. Therefore, VDOT is requesting concurrence from the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) in advance of the Draft EIS. USACE and Virginia Department of Environmental Quality (DEQ) have agreed that permits will be issued per the documentation in the Final EIS.

NEPA/Section 404 Merged Process Concurrence Points
The EIS is subject to the NEPA/Section 404 Merged Process Agreement, which includes five concurrence points – Methodologies, Purpose and Need, Range of Alternatives, Preferred Alternative, and Conceptual Mitigation. To date, concurrence from USACE and USEPA (the Concurring Agencies for the study) on 3 of 5 points has been achieved. This document addresses the Preferred Alternative and Conceptual Mitigation. Mitigation concepts will be agreed upon and documented in the Final EIS/permit application.

Environmental Analysis Methodologies
VDOT held a Citizen Information Meeting on May 8, 2018 to introduce the study to the public and solicit comments on transportation issues to inform the study's development. Agencies received a draft of the methodologies on June 8, 2018 for consideration. The methodologies were discussed at the June 13, 2018 agency coordination meeting and revised per agency comments and discussion.
USACE concurred on the Environmental Analysis Methodologies on June 26, 2018.
USEPA concurred on the Environmental Analysis Methodologies on July 10, 2018.

Purpose and Need[2]
VDOT conducted an online survey in fall of 2018 to gather information on transportation issues in the study area, receiving 775 responses. Additionally, VDOT gathered traffic data and other information to inform the development of the Purpose and Need Statement:

[2] Based on this Purpose and Need, no impacts or improvements are assumed in North Carolina. All alternatives assume a tie-in to the existing roadway prior to crossing the state line. If the project advances to detailed design and it is determined that improvements must extend into North Carolina to offer a safe tie-in with the existing roadway, engineering specifics and potential impacts would be coordinated with the agencies with jurisdiction.

The purpose of the Martinsville Southern Connector Study is to enhance mobility for both local and regional traffic traveling along U.S. Route 220 between the North Carolina state line to the U.S. Route 58 Bypass near Martinsville, Virginia.

The following needs were identified for the study:
Accommodate Regional Traffic – current inconsistencies in access, travel speeds, and corridor composition along U.S. Route 220 inhibits mobility and creates unsafe conditions considering the high volume of truck and personal vehicle traffic traveling through the corridor to origins and destinations north and south of the study area;

Accommodate Local Traffic – numerous, uncontrolled access configurations along U.S. Route 220, combined with high through traffic movement, create traffic delays and contribute to high crash rates for travelers within the corridor accessing residences, commercial buildings, and schools;

Address Geometric Deficiencies and Inconsistencies – current geometric conditions along U.S. Route 220, such as lane widths, horizontal curves, and stopping sight distances, are below current design standards and vary along the length of the corridor, resulting in safety concerns for all users.

USACE and USEPA concurred on the Purpose and Need at the agency coordination meeting on November 14, 2018 after participating agencies were given the opportunity to comment.

Range of Alternatives
Upon receiving concurrence on the Purpose and Need, VDOT began to evaluate alignment options. Early agreement was reached among the agencies that all options would generally assume a limited access facility, with decisions being made during the future design phase about the actual type and level of access control. Based on Purpose and Need, VDOT and the agencies discussed that improvements to Route 220 would require full reconstruction.

Alignment options considered included:

- Alignment Option 1: the no-build;
- Alignment Option 2: Transportation System Management/Travel Demand Management improvements;
- Alignment Option 3: Reconstruction of Existing U.S. Route 220;
- Alignment Options 4A-4D: New alignment options (4A-C) and one bypass (4D) to the west of U.S. Route 220; and
- Alignment Options 5A-5D: New alignment options (5B-D) and one bypass (5A) to the east of U.S. Route 220.

VDOT presented these alignment options to the public in January 2019, with the majority of comments received indicating support for the western alignment options. Preliminary and final public comment summaries were provided to the agencies in order to inform concurrence. VDOT also presented the

table below, which explains how each alignment option would be judged against the agreed upon need elements.

Need Element as Concurred upon	How Alignment Options are Evaluated
Accommodate Regional Traffic – current inconsistencies in access, travel speeds, and corridor composition along U.S. Route 220 inhibits mobility and creates unsafe conditions considering the high volume of truck and personal vehicle traffic traveling through the corridor to origins and destinations north and south of the study area	Alignment options that meet this need would eliminate conflict between regional and local traffic in a manner that accommodates regional origins and destinations and the high percentage of trucks that currently and are anticipated to travel the corridor.
Accommodate Local Traffic – numerous, uncontrolled access configurations along U.S. Route 220, combined with high through traffic movement, create traffic delays and contribute to high crash rates for travelers within the corridor accessing residences, commercial buildings, and schools	Alignment options that meet this need would eliminate unsafe interaction between local and regional traffic, while maintaining adequate local access.
Address Geometric Deficiencies and Inconsistencies – current geometric conditions along U.S. Route 220, such as lane widths, horizontal curves, and stopping sight distances, are below current design standards and vary along the length of the corridor, resulting in safety concerns for all users.	Alignment options that meet this need would address the current geometric deficiencies and inconsistencies on U.S. Route 220. A new alignment would be designated as U.S. Route 220.

Based on these criteria, VDOT recommended to retain the following based on Purpose and Need:

- No-Build Alternative (formerly Alignment Option 1)
- Alternative A (formerly Alignment Option 4A)
- Alternative B (formerly Alignment Option 4B)
- Alternative C (formerly Alignment Option 4C)[3]
- Alternative D (formerly Alignment Option 4D)
- Alternative E (formerly Alignment Option 3)

USACE and USEPA concurred on the Range of Alternatives at the agency coordination meeting on March 13, 2019 after participating agencies were given the opportunity to comment.

[3] Alignment Option 4C was originally recommended to not be retained for analysis based on engineering considerations, but was retained after a modification to the northern terminus was made.

Refinements to the Range of Alternatives

Modifications to Alternative C

At the February 12, 2019 agency coordination meeting, VDOT recommended that Alternative C (known at that time as Alignment Option 4C) not be retained for detailed evaluation based on its anticipated location between the existing U.S. Route 220/U.S. Route 58 interchange and the U.S. Route 58/Joseph Martin Highway interchange. Design criteria on the road classification of U.S. Route 58 necessitates a minimum spacing of one mile between interchanges.

Comments received from West Piedmont Planning District Commission and USACE resulted in the reconfiguration of Alignment Option 4C to connect to the existing interchange of U.S. Route 58/Joseph Martin Highway. This reconfiguration was retained for detailed analysis as Alternative C.

Southern Interchange of Alternatives A, B, and C

Following concurrence on the range of alternatives, VDOT obtained aerial survey data that allowed for more advanced engineering of the alignments, which resulted in the southern portion of Alternatives A, B, and C being adjusted to follow east of existing U.S. Route 220 and then crossing over it to head west on new alignments. This southern portion assumes a fully access-controlled facility in order to document the worst case scenario. VDOT is not recommending that a specific type of access control be applied to the preferred alternative as a NEPA commitment. It is possible that the Commonwealth Transportation Board (CTB) could make such a decision as part of its location decision; however, it is more likely that such a decision would be made if/when the project advances to more detailed phases of design.

Determination of Alternatives D and E to be Infeasible

Once preliminary right-of-way information became available, VDOT recommended at the May 8, 2019 agency coordination meeting that Alternatives D and E were not feasible given the large number of potential residential and commercial relocations associated with each one. VDOT recommended that these alternatives no longer be considered as potential preferred alternatives.

Table 2: Property Impacts as Presented in May 2019

	Residential	Commercial	Industrial	Institutional	Cemetery	Total
Alternative A	17	0	0	0	1	18
Alternative B	26	0	4	0	1	31
Alternative C	25	0	3	0	1	29
Alternative D	56	21	4	1	2	84
Alternative E	97	27	1	3	2	130

USACE and USEPA requested additional information in order to support VDOT's recommendation which VDOT presented at the June 12, 2019 agency coordination meeting. The additional information was documented in a memorandum detailing VDOT's rationale for eliminating Alternatives D and E from further consideration, as well as VDOT's attempt to reduce a modified D alignment (called Alternative F in the memorandum) to determine if estimated property impacts could be brought to an acceptable level without increasing impacts to other resources. USACE and USEPA requested that additional information

on Natural Resources and Environmental Justice concerns with Alternatives D and E be documented in the rationale for no longer considering them as potential preferred alternatives. There were no objections to eliminating Alternatives D and E raised by the participating or cooperating agencies.

VDOT will incorporate information from the memorandum into the technical documentation for the Draft EIS and will include the memorandum itself as supporting documentation. The pre-Draft EIS will be circulated to all cooperating and participating agencies prior to publication to ensure any issues are accurately addressed.

Additional Options Identified During Public Involvement
In July/August 2019, VDOT presented a recommended preferred alternative (Alternative C) to the public. In response, the following additional options were identified by the public.

Eastern Route Options
Comments submitted to VDOT and the USACE from the Blue Ridge Environmental Defense League (BREDL) suggested an alternative alignment east of existing U.S. Route 220 should be carried forward for evaluation in the Draft EIS. As noted during the March 2019 concurrence on the Range of Alternatives, options to the east of existing U.S. Route 220 would not eliminate conflicts between regional and local traffic, as traffic data demonstrates the need for a westerly movement from U.S. Route 220. Based on the inability of the eastern options to address the study's purpose and need, these options were not retained as part of the Range of Alternatives to be evaluated in the Draft EIS. The reasons these eastern options do not meet the Purpose and Need has already been discussed with the agencies and documented in the alternatives technical report that has been provided to the agencies. The Draft EIS will also document these considerations. Further discussion and responses to comments on these issues will be documented in the Final EIS.

Access Control Options
Comments submitted to VDOT by BREDL as well as the Southern Environmental Law Center (SELC) suggested that the Draft EIS also consider access management and control options along existing U.S. Route 220. Specifically, the SELC recommended the following additional options:

- Free flow option that replaces the three existing signalized intersections on existing U.S. Route 220 through the study area with interchanges, converts the remaining intersections with cross-street movements to restricted cross-street, u-turn (RCUT) configurations, and remedies geometric deficiencies;
- Partial control of access, in which certain segments of U.S. Route 220 are converted to full access control through the extension and/or connection of local roads to reduce or consolidate access demands on the highway, and remaining segments are upgraded with intersection improvements and correction of geometric deficiencies; and
- Advanced intersection design, focused on the replacement of existing signalized intersections with innovative solutions to improve traffic flow, such as roundabouts or continuous flow intersections.

These options would not address the purpose and need for the study, as they would not offer a measurable reduction of the imbalance of truck volume and regional traffic with local traffic movements. While these options may address some of the intersections along the corridor, they would not address they multitude of private driveways that exist along the corridor and contribute to the traffic and transportation issues documented in the Purpose and Need. These types of improvements would also not address the geometric deficiencies and inconsistencies along existing U.S. Route 220 as standalone options without substantial right of way impacts.

Additional documentation regarding potential access management options will be included in the Draft EIS and supporting alternatives technical report. Further discussion and responses to comments on these issues will be documented in the Final EIS.

Hybrid Options

A number of comments received during the July/August 2019 comment period suggested that VDOT evaluate potential hybrid combinations of the alternatives carried forward for detailed evaluation in the Draft EIS. As part of the refinement to the recommended preferred alternative (Alternative C), VDOT will consider opportunities to link sections of Alternatives A, B, and C from one terminus to the other to reduce potential impacts to resources, while balancing cost and the alternatives effectiveness at meeting the components of the purpose and need.

Additional documentation regarding potential hybrid combinations of alternatives to further avoid and minimize impacts will be included in the Draft EIS and supporting alternatives technical report. Further discussion and responses to comments on these issues will be documented in the Final EIS. The Final EIS also will include responses to substantive comments received from the public on issues related to secondary traffic impacts on local roads under the proposed alternatives any hybridized version of an alternative that may be presented in the Final EIS.

Estimated Impacts to Resources

Table 3: Resources Listed in, Eligible for, or Recommended Eligible for Listing on the NRHP

VDHR Number	Resource	Property Address	Eligibility Recommendation	Alternative APEs
044-0002	Belleview	3637 Joseph Martin Highway	NRHP Listed	A, B
044-0009	Marrowbone	1826 Lee Ford Camp	NRHP Eligible	B
044-5182	Patterson Cemetery	Unassigned	NRHP Eligible	A, B, C
044-5183	Price Cemetery	Reservoir Road	NRHP Eligible	A, B, C
044-5188	Watkins Cemetery	Browns Dairy Road	NRHP Eligible	A, B, C

Table 4: Summary of Direct Floodplain Impacts[4]

Alternative	Total 100-year Floodplain Impact (acres)	Total 500-year Floodplain Impact (acres)
No Build	0	0
Alternative A	7.0	8.7
Alternative B	13.7	14.4
Alternative C	7.5	10.8

Table 5: Summary of Direct Forest Impacts[4]

Alternative	Forest Clearing in LOD (acres)
No Build	0
Alternative A	296
Alternative B	259
Alternative C	219

Table 6: Threatened and Endangered Species Impacts within the LOD[4]

Common Name	Alternative A (acres)	Alternative B (acres)	Alternative C (acres)
Northern Long-Eared Bat[5]	318	261	224
Eastern Black Rail[6]	2.2	1.3	1.0

Table 7: Cropland, Prime Farmland and Farmland of Statewide Importance Impacts (acres)[4]

Soil	A	B	C
Total Cropland	**30.8**	**38.9**	**53.4**
Corn	0	0	0
Winter Wheat/Soybean	0	0.2	0.2
Pasture	24.1	33.6	41.3

[4] As documented in the Draft Natural Resources Technical Report that has been reviewed by the Cooperating and Participating Agencies.
[5] Represents acreage of suitable summer roosting habitat, based on forested and scrub shrub habitat.
[6] Represents acreage of potential habitat based on wetlands designated as PEM.

Hay/Non-Alfalfa	6.5	5.1	11.2
Soybeans	0	0	0
Winter Wheat	0.2	0	0.7
Prime Farmland and Farmland of Statewide Importance Soils	**264**	**346**	**298**

Table 8: Highly Erodible Soils Impacts[4]

Alternative	Highly Erodible Soils (Acres)
A	298
B	358
C	343

Table 9: Impacts to Mineral Operations[4]

Alternative	Number of Mines Affected
A	2
B	3
C	1

Estimated Property Impacts[7]

Table 10: Estimated Residential Impacts[8]

Residential Impact	Alternative A	Alternative B	Alternative C
Number of Residential Properties Impacted	50	119	121
Total Residential Acres Impacted	64	82	85
Residential Relocations	17	26	25

[7] The Alternative Planning-Level Limit of Disturbance (LOD) was used to evaluate potential impacts to properties. When the LOD crosses a structure or is within 10 feet of a structure, that structure is considered a relocation. If the LOD crosses into a property but does not cross and is not within 10 feet of a structure that is considered a partial acquisition and the structure remains (no relocation).

[8] As documented in the Draft Socioeconomic Technical Report that has been reviewed by the Cooperating and Participating Agencies.

Table 11: Estimated Industrial Impacts[8]

Impact	Alternative A	Alternative B	Alternative C
# of Industrial Properties Impacted	3	6	6
Total Industrial Acres Impacted	2	48	48
Industrial Relocations	0	4	3

Estimated Impacts to Commercial Properties[8]

There are no estimated impacts to and no relocations of commercial properties associated with Alternatives A, B, or C.

Estimated Impacts to Environmental Justice Populations

Two census block groups were identified in the Draft Socioeconomic Technical Report as having meaningfully greater minority population than the minority population in Henry County (31.78 percent). As documented in the Draft Socioeconomic Technical Report that has been reviewed by the Cooperating and Participating Agencies, none of the alternatives would result in disproportionate and adverse impacts to EJ populations.

Table 12: Potential Impacts to Land Use (by acreage of parcel)[8]

Land Use Impact	Alternative A	Alternative B	Alternative C
Undeveloped/ Water	279	239	176
Residential	64	82	85
Agricultural	144	100	115
ROW	84	101	102
Industrial	2	48	48
Institutional/ Public Use	1	14	15
Commercial	0	0	0
Total	**574**	**584**	**541**

Conceptual Mitigation

The table below details the location and amount of credits available for purchase as of August 2019.

Table 10: Available Credits per the Regulatory In-lieu fee & Bank Information Tracking System

Location	Stream Credits Available	Wetland Credits Available
Banister Bend	2,400	33
Graham and David	25,000	
Roanoke River	11,000	
Virginia Aquatic Resources Trust Fund	1,500	.21

VDOT's recommended conceptual mitigation is to purchase credits for all impacts. It is understood that credits must be purchased before any work begins, but VDOT is not required to have purchased credits to obtain permits.

As of August 2019, there are 39, 900 stream credits and 33.21 wetland credits available in the primary service area. As presented in **Table 1: Alternatives Impact and Cost Summary**, Alternative C would impact an estimated 21, 881 linear feet of streams and 3.7 acres of wetlands.

If/when the project advances to detailed design, impacts may be reduced, thereby lowering the amount of credits needed. This potential reduction lends to a greater certainty that credits can be purchased to resolve impacts.

This mitigation plan will be refined as necessary in the Final EIS in order to meet permit application needs under OFD.

Concurrence on the Preferred Alternative

Alternative C should be recommended to the Commonwealth Transportation Board as the Preferred Alternative for the Martinsville Southern Connector Study/Route 220 EIS.

Stipulations:

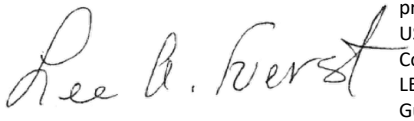
1. The preferred alternative may shift in the development of the Final Environmental Impact Statement to minimize impacts to private properties and/or natural resources, in which case VDOT will brief the concurring agencies on the proposed changes.
2. This concurrence serves as the USACE preliminary LEDPA determination. USACE identification of the LEDPA is a formal determination made as part of a USACE permit decision. USACE concurrence that VDOT's preferred alternative for the Martinsville Southern Connector Study appears to be the preliminary LEDPA is a non-binding preliminary determination. This preliminary LEDPA concurrence indicates that the USACE anticipates VDOT's preferred alternative would satisfy the 404(b)(1) Guidelines, but this concurrence is not a final determination and does not mean the USACE has authorized or will authorize VDOT's preferred alternative. This preliminary determination may need to be revisited if conditions or circumstances change the foundations upon which the determination was made. If after concurrence, the lead agency determines that changes to the Purpose and Need, Alternatives, or the Preferred Alternative are necessary, then the lead agency and cooperating agencies with authorization decision responsibilities will review such changes to determine if concurrence should be revisited. Examples of potential changes include new information that leads to a change in project design, project purpose, alternative screening criteria, and/or discovery of a new alternative.

Agency/Office	Name	I concur with the recommendation of Alternative C as the preferred alternative	Comments
EPA, Region 3	Barbara Okorn	Barbara Okorn	Based on the information provided to date we concur with Alternative C being carried forward as the preferred alternative in the DEIS. We look forward to working with you on avoidance and minimization efforts as the project continues. We also look forward to reviewing the additional supporting documentation in the DEIS for the proposed alternatives that were suggested during the public comment period.
USACE, Norfolk District	Lee Fuerst		

Mack Frost
Federal Highway Administration

Scott Smizik
Virginia Department of Transportation

August 14, 2019
Updated September 4, 2019

Agency/Office	Name	I concur with the recommendation of Alternative C as the preferred alternative	Comments
EPA, Region 3	Barbara Okorn		
USACE, Norfolk District	Lee Fuerst		USACE does not provide concurrence on a preferred alternative; however, this concurrence serves as the USACE preliminary LEDPA determination. USACE identification of the LEDPA is a formal determination made as part of a USACE permit decision. USACE concurrence that VDOT's preferred alternative for the Martinsville Southern Connector Study appears to be the preliminary LEDPA is a non-binding preliminary determination. This preliminary LEDPA concurrence indicates that the USACE anticipates VDOT's preferred alternative would satisfy the 404(b)(1) Guidelines, but this concurrence is not a final determination and does not mean the USACE has authorized or will authorize VDOT's preferred alternative. This preliminary determination may need to be revisited if conditions or circumstances change the foundations upon which the determination was made. If after concurrence, the lead agency determines that changes to the Purpose and Need, Alternatives, or the Preferred Alternative are necessary, then the lead agency and cooperating agencies with authorization decision responsibilities will review such changes to determine if concurrence should be revisited. Examples of potential changes include new information that leads to a change in project design, project purpose, alternative screening criteria, and/or discovery of a new alternative. It is important to note that typically, under the guidelines outlined in the Merged Process, USACE would not agree on a preliminary LEDPA this early in the process until more detailed information and analyses have been documented in a DEIS. To meet the deadlines and timeline constraints for this project, although it is early in the process, USACE can state that at this point Alternative C appears to be the preliminary LEDPA. This is based on a review of the draft technical reports, traffic analysis presented, draft chapters of the DEIS, interagency discussions, and other supplemental information provided. USACE looks forward to further working with VDOT and the other cooperating agencies and stakeholders as you further analyze and consider the hybridized alternative options discussed in this concurrence package. We also look forward to a more in-depth review in the DEIS on additional alternative analysis with justifications and supporting documentation for all of the other alternative options that have been brought forward during the public involvement period. As described above, this is a non-binding preliminary determination and new information and/or a change in circumstances can change the USACE determination.

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Mack Frost
Federal Highway Administration

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Scott Smizik
Virginia Department of Transportation

August 14, 2019
Updated September 4, 2019

Concurrence on Conceptual Mitigation

Credit purchase for all impacts should be the conceptual mitigation for the Martinsville Southern Connector Study/Route 220 EIS.

Stipulations:

1. This mitigation plan will be refined as necessary in the Final EIS in order to meet permit application needs under One Federal Decision.
2. Consistent with the preference hierarchy for mitigation strategies, the USACE conceptually agrees with credit purchase as the preferred method of mitigation. The USACE's agreement on the purchase of wetland and stream mitigation credits is contingent on the number of credits available and standard mitigation ratios at the time of construction for any improvements that advance from the Martinsville Southern Connector Study.

August 14, 2019
Updated September 4, 2019

Agency/Office	Name	I concur with conceptual mitigation as presented by VDOT	Comments
EPA, Region 3	Barbara Okorn	Barbara Okorn	EPA recommends the EIS and permitting package clearly demonstrate that the compensatory mitigation plan is ecologically preferable, based on available mitigation options in the appropriate service area, and provides the functional uplift to sufficiently offset the proposed impacts.
USACE, Norfolk District	Lee Fuerst		

Mack Frost
Federal Highway Administration

Scott Smizik
Virginia Department of Transportation

August 14, 2019
Updated September 4, 2019

Agency/Office	Name	I concur with conceptual mitigation as presented by VDOT	Comments
EPA, Region 3	Barbara Okorn		
USACE, Norfolk District	Lee Fuerst	Lee B. Fuerst	All proposed compensatory mitigation must be in accordance with 33 CFR Part 332 (Compensatory Mitigation for Losses of Aquatic Resources).

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Mack Frost
Federal Highway Administration

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Scott Smizik
Virginia Department of Transportation

August 14, 2019
Updated September 4, 2019