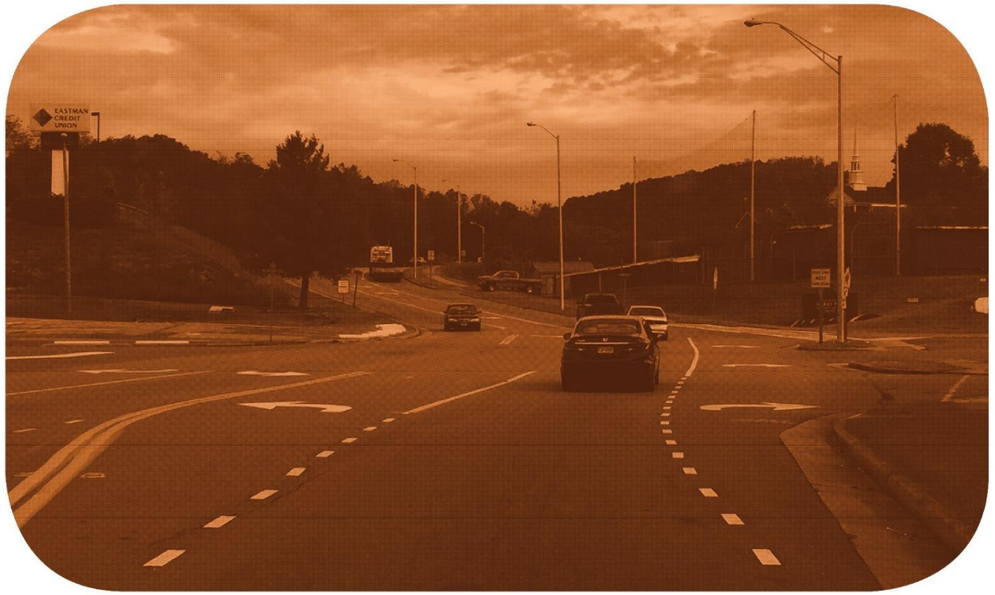

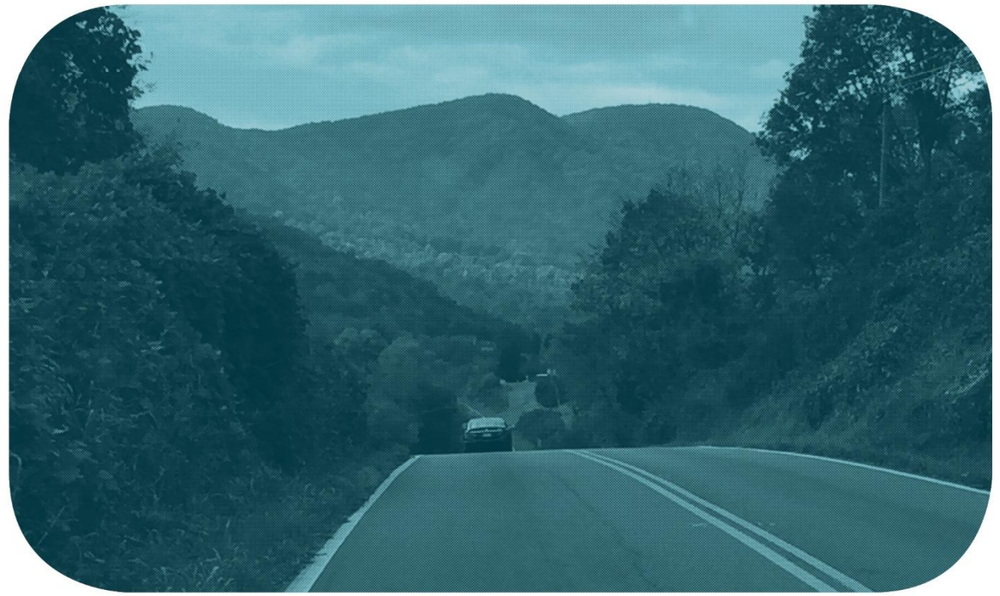

Moccasin Gap Corridor Study

January 7, 2019

Prepared For: VDOT Virginia Department of Transportation; Scott County Virginia 1814

Prepared By: Kimley»Horn

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1.0 Executive Summary

The Virginia Department of Transportation (VDOT) working in conjunction with Scott County and the Town Gate City have identified the need to address traffic and safety conditions associated with the "Moccasin Gap Corridor" in the absence of being able to construct a previously proposed new parallel "bypass" route. The Moccasin Gap Corridor connects areas of southwest Virginia and northeast Tennessee through the Clinch Mountains and operates as only one of two natural passes within 30 miles of each other. The corridor includes U.S. Route 58/U.S. Route 23 as it passes through the Moccasin Gap.

The Moccasin Gap Bypass Alternatives Study is intended to be used as a detailed planning tool by Scott County, Gate City, the Kingsport, TN Metropolitan Planning Organization (MPO), and VDOT to assist with identifying and prioritizing feasible transportation improvement projects that can implemented to enhance the flow and safety of traffic operations through this region. This will be accomplished by verifying operational constraints and safety issues along the described study area corridor/route and then developing, identifying, and prioritizing a list of improvements that mitigate existing constraints. The preferred improvements will ultimately be programmed into the VDOT's Six-Year Improvement Program (SYIP), and/or allow the locality to apply for alternative funding sources through such programs as SMART Scale or the Highway Safety Improvement Program (HSIP).

The study area corridor consists of a variety of roadway typical sections (e.g., two-lane, three-lane, and four-lane divided) and with a range of functional classifications (e.g., major collector, minor arterial, and principal arterial/freeway). Additionally, U.S. Route 58 is designated as a Corridor of Statewide Significance (CoSS), as well as a Mobility Enhancement Segment (MES) per the VDOT Arterial Preservation Program (APP) further emphasizing the importance of this corridor at the local and state levels. This corridor serves three schools and several high activity commercial areas in Gate City. A significant volume of railway freight is also transported parallel to/over U.S. Route 58/U.S. Route 23.

Corridors:

- U.S. Route 58/U.S. Route 23 (Main Street) from the U.S. Route 58/State Route 224 intersection in the south to the Kane Street intersection in the north
- Kane Street/Jones Street from the U.S. Route 58/U.S. Route 23 (Main Street) intersection in the south to the State Route 71 intersection in the north
- State Route 71 from the Jones Street intersection in the west to the State Route 72 intersection in the east

Intersections:

The study area for the Moccasin Gap Bypass Alternatives Study consists of the following intersections:

1. U.S. Route 58 (Bristol Highway) at State Route 224 (Wadlow Gap Highway) (Unsignalized)
2. U.S. Route 58/State Route 224 (Hilton Road) at U.S. Route 23 (Main Street) (Signalized)
3. U.S. Route 23 (Main Street) at Food City Shopping Center (Signalized)
4. U.S. Route 58/U.S. Route 23 (Main Street) at Kane Street/Gateway Plaza Shopping Center (Signalized)
5. Kane Street at Jones Street (State Route 904) (Signalized)
6. Kane Street at Bishop Street (State Route 769) (Unsignalized)
7. Jones Street at Beech Street (State Route 823) (Unsignalized)
8. Jones Street at Harry Fry Drive (State Route 836) (Unsignalized)
9. Jones Street at State Route 71 (Jackson Street) (Unsignalized)
10. State Route 71 at State Route 72 (Veterans Memorial Highway) (Unsignalized)

The process to develop the corridor study, recommendations, and implementation strategy consisted of the following efforts and are detailed in the sections contained within this document:

- Existing Conditions Analysis
- Environmental Assessment along the Corridor
- Future Traffic Volume Projections
- Traffic Operations and Model Simulations
- Intersection/Roadway Concepts
- Recommendations
- Planning Level Cost Estimates

A preliminary environmental review using select National Environmental Policy Act (NEPA) process criteria was conducted for this project to determine if sensitive sites may be present or potentially impacted by the construction of improvements within the study area. This preliminary environmental review identifies and assesses potential social and environmental impacts from the proposed conceptual improvements under consideration. Based on this preliminary environmental review, no environmental fatal flaws or items that would prohibit the construction of proposed intersection improvements were identified.

Future traffic volumes were developed for the study horizon year of 2030. These volumes represent the projected growth that is expected to occur within and around the study area. Based on the future operational analysis of the study area, it was found that many of the intersections are projected to operate with minimal delays and queues. However, deficiencies in operational conditions that were identified include inefficient traffic signal operation, sub-standard turn lanes, and access management issues.

Based on a review of these operational characteristics, safety conditions, and access management, recommendations were developed that help plan for the future growth and maintain efficient traffic progression and operations through the study area. The recommendations were developed based on the guiding principles established for this study:

- Develop recommended transportation improvements that have the support of the local jurisdictions
- Identify cost-effective transportation improvements that can receive future funding for implementation
- Provide justification for future transportation improvements and enhancements
- Enhance safety for all users
- Implement access management strategies
- Respond to projected future traffic volumes and vehicle mix
- Minimize impacts to natural and built environments

The character, scale, and function of the recommended improvements are a reflection of the feedback received during this study as well as extensive coordination with the Scott County, Gate City, local schools, the Kingsport MPO, and VDOT project team members. This includes consideration of the operational benefits of the proposed improvements, feasibility of construction, and estimated implementation costs. Recommendations for specific improvements to the study area intersections have been split into short-term (zero to five years), mid-term (five to fifteen years), and long-term (fifteen to twenty-five plus years) categories based on their scale as well as the time frame in which they will be needed. This approach allows communities to prioritize and program larger scale projects over time while also being able to implement shorter term projects that mitigate immediate needs at relatively lower costs.

Short-term recommendations were identified for the study area intersections to help address existing and future deficient operational conditions. These recommendations primarily represent improvements to existing signalized intersections and are intended to result in safer and more efficient operational conditions. It was determined that minor modifications to most of the existing study area intersections could be implemented at relatively low cost to help address potentially deficient operational conditions and extend the life-span of the existing traffic control measures. The proposed short-term improvements were identified separately from the mid- and long-term alternatives for the study area intersections. Short-term recommendations consist of the following:

- U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)
  - Add right-turn overlap phasing for the westbound and northbound right-turn movements
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- U.S. Route 23 at Food City (Signalized)
  - Add right-turn overlap phasing for the northbound right-turn movement
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- Kane Street at Jones Street (Signalized)
  - Implement coordinated, time of day plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
  - Install pedestrian accommodations (i.e., ADA Accessible ramps, countdown pedestrian signals)

The mid-term recommendations are anticipated to have some select implementation challenges that will likely place them outside of the time period otherwise associated with short-term improvements. These challenges consist of but are not limited to: additional coordination requirements with/between existing property owners for right-of-way, funding source considerations, and future developments. Mid-term recommendations include the following proposed improvements:

- U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)
  - Extend the southbound left-turn lanes
  - Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site
- U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)
  - Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)
- Kane Street at Bishop Street (Unsignalized)
  - Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)
- Jones Street at State Route 71 (Unsignalized)
  - Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to “T” into the new intersection and be served by STOP control.
  - New People’s Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road.

Long-term recommendations for the Moccasin Gap Bypass Alternatives study area are intended to address larger and/or more complex transportation infrastructure needs. The proposed long-term improvements will not only result in enhanced operations for vehicular traffic, but also improve pedestrian safety and mobility along Jones Street and between the Middle School/High School site and the Elementary School site. These recommendations will also facilitate improved on-site and off-site school related traffic operations for both buses and passenger vehicles. Due to the scale of the projects and the potential number of involved property owners (e.g., private property owners, VDOT, Scott County Schools, etc.), the long-term recommendations will require more coordination among interested parties and substantially more funding than that associated with proposed short- and mid-term recommendations resulting in a longer lead time before implementation.

Based on discussions with County staff, the “Hybrid” alternative which incorporated various elements from the other long-term alternatives was selected as the preferred alternative. The final preferred long-term improvements consisted of the following:

- Realign Beech Street with the Harry Fry Drive approach at Jones Street to create a conventional four-legged intersection
- Improve Beech Street to accommodate full-width travel lanes, curb and gutter, and sidewalks between Bishop Street and Jones Street
  - 11' to 12' travel lanes
  - 5' sidewalk
- Construct/install new sidewalks and intersection crosswalks
- Construct sidewalk path between Shoemaker Elementary School and the Middle/High Schools site.
- Improve Middle and High School parking lot, bus loop, and access driveways
  - Remove/close two of the existing access points to/from Jones Street to create a new internal bus circulation loop for the schools
  - Shift parking area and bus access point/driveway approximately 80 feet to the east of the existing location to align with the proposed bus loop
- Construct additional laneage and close identified access driveways along Jones Street to improve traffic flow/operations and reduce friction/conflict points along Jones Street.

In addition to the transportation improvement recommendations identified in this study, Scott County, as well as the Town of Gate City and the Town of Weber City should work together with the Commonwealth to develop an emergency response standard operating procedures (SOP) document in the event of a catastrophic incident, such as a train derailment that could impact the operations and accessibility along U.S. Route 23/U.S. Route 58.

The recommendations and planning-level cost estimates, expressed in year 2018 dollars, are summarized in Table ES 1 through Table ES 3 and are illustrated in Figure ES 1. It is also recommended that the proposed improvements should be prioritized into projects with both County and VDOT input. Each project should be thoroughly evaluated then identified for priority order, time frame from implementation, and potential funding sources. Preliminary recommendations regarding the prioritization of project implementation are provided in Appendix G of this report.

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Table ES 1: Summary of Short-Term Moccasin Gap Bypass Alternatives Study Recommendations

Improvement	Description	Planning Level Costs
Short-Term Recommendations (0 to 5 years)		
U.S. Route 58/U.S. Route 23 at Hilton Road Signal Improvements	• Add right-turn overlap phasing for the westbound and northbound right-turn movements • Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)	$ 17,500
U.S. Route 23 at Food City Signal Improvements	• Add right-turn overlap phasing for the northbound right-turn movements • Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)	$ 7,500
U.S. Route 58/U.S. Route 23 at Kane Street Signal Improvements	• Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)	$ 7,500
Kane Street at Jones Street Signal Improvements	• Implement coordinated, time of day plans • Install pedestrian accommodations (i.e., ADA Accessible, countdown pedestrian signals)	$ 89,000

Table ES 2: Summary of Mid-Term Moccasin Gap Bypass Alternatives Study Recommendations

Improvement	Description	Planning Level Costs
Mid-Term Recommendations (5 to 15 years)		
U.S. Route 58/U.S. Route 23 at Hilton Road Turn Lane and Access Management Improvements	• Extend the southbound left-turn lanes • Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site	$ 1,170,000
U.S. Route 58/U.S. Route 23 at Kane Street Turn Lane Improvements	• Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)	$ 1,365,000
Kane Street at Bishop Street Westbound Right-Turn Lane	• Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)	$ 341,000
Jones Street at State Route 71 Intersection Realignment	• Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to "T" into the new intersection and be served by STOP control • New People's Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road	$ 5,553,000

Table ES 3: Summary of Long-Term Moccasin Gap Bypass Alternatives Study Recommendations

Improvement	Description	Planning Level Costs
Long-Term Recommendation (15 to 25+ years)		
Realign Beech Street with Harry Fry Drive at Jones Street	o Realign Beech Street with the Harry Fry Drive approach at Jones Street o Improve Beech Street to accommodate full-width travel lanes, curb and gutter, and sidewalks between Bishop Street and Jones Street o Construct/install new sidewalks and intersection crosswalks o Construct sidewalk path between Shoemaker Elementary School and Middle/High Schools site	$ 4,550,400

Jones Street Access Management and Pedestrian Mobility/Safety enhancements	o Construct additional laneage and close identified access driveways along Jones Street to improve traffic flow/operations and reduce friction/conflict points along Jones Street
	o Enhance pedestrian mobility and safety at the Jones Street/Kane Street intersection
	  o Install pedestrian signals and crosswalks
	  o Improve/upgrade existing ADA ramps
	  o Improve/upgrade existing traffic signal equipment
	  o Construct/install 5' sidewalks along northbound and southbound Jones Street
		$ 2,382,700

Improve/Reconfigure Middle School and High School Parking Lot, Bus Loop, and access driveways	o Remove/close two (2) of the existing access points to/from Jones Street to create a new internal bus circulation loop for the schools o Shift parking area and bus access point/driveway approximately 80 feet to the east of its existing location to align with the proposed bus loop o Construct new bus loop o Construct new 10' wide sidewalk for bus pick-up/drop-off operations and pedestrian/student mobility	$ 2,650,400

Not To Scale

Legend

- Short-Term Recommendation
- Mid-Term Recommendations
- Long-Term Recommendations

Jones Street at State Route 71
Mid-Term:
- Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to "T" into the new intersection and be served by STOP control
- New People's Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road.

Jones Street - Preferred "Hybrid" Alternative
Long-Term:
- Realign Beech Street with the Harry Fry Drive approach at Jones Street
- Improve Beech Street to accommodate full-width travel lanes, curb and gutter, and sidewalks between Bishop Street and Jones Street
- Construct/install new sidewalks and intersection crosswalks
- Construct sidewalk path between Shoemaker Elementary School and Middle/High Schools site
- Improve Middle and High School parking lot, bus loop, and access driveways
- Remove/close two of the existing access points to/from Jones Street
- Shift parking area and bus access point approximately 80 feet to the east
- Construct additional laneage and close identified access driveways along Jones Street to improve traffic flow/operations and reduce friction/conflict points along Jones Street.

Kane Street at Bishop Street
Mid-Term:
- Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)

U.S. Route 58/U.S. Route 23 at Hilton Road
Short-Term:
- Add right-turn overlap phasing for the westbound and northbound right-turn movements
- Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)

Mid-Term:
- Extend the southbound left-turn lanes
- Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site

U.S. Route 58/U.S. Route 23 at Kane Street
Short-Term:
- Implement coordinated, time of day plans
- Install pedestrian accommodations (i.e., ADA Accessible, countdown pedestrian signals)

U.S. Route 58/U.S. Route 23 at Kane Street
Short-Term:
- Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)

Mid-Term:
- Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)

U.S. Route 58/U.S. Route 23 at Food City
Short-Term:
- Add right-turn overlap phasing for the northbound right-turn movements
- Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)

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Moccasin Gap Corridor Study
Scott County, VA

Short-, Mid-, and Long-Term Recommendations

Figure ES 1

2.0 Introduction

The Virginia Department of Transportation (VDOT) working in conjunction with Scott County and the Town Gate City have identified the need to address traffic and safety conditions associated with the "Moccasin Gap Corridor" in the absence of being able to construct a previously proposed new parallel "bypass" route. The Moccasin Gap Corridor connects areas of southwest Virginia and northeast Tennessee through the Clinch Mountains and operates as only one of two natural passes within 30 miles of each other. The corridor includes U.S. Route 58/U.S. Route 23 as it passes through the Moccasin Gap.

The Moccasin Gap Bypass Alternatives Study is intended to be used as a detailed planning tool by Scott County, Gate City, the Kingsport, TN Metropolitan Planning Organization (MPO), and VDOT to assist with identifying and prioritizing feasible transportation improvement projects that can implemented to enhance the flow and safety of traffic operations through this region.

2.1 Background

Scott County, Gate City, and VDOT, the Kingsport MPO have been continually investigating opportunities to enhance safety and traffic operations as well as potentially provide redundant connections through the Clinch Mountain range via the Moccasin Gap. Previous studies have been conducted that focused primarily on developing a new parallel connection through the Moccasin Gap area that would attract/divert traffic from the current U.S. Route 58/U.S. Route 23 corridor/route. An alternative roadway project was ultimately developed and considered for future implementation, known as the "Moccasin Gap Bypass". That project concept initially included the construction of a new four-lane divided highway, which was later scaled down to a two-lane facility that would connect U.S. Route 58 to State Route 71. The estimated cost of the scaled down two-lane version of the project was $46.8 million. Due to the cost, it was proven infeasible to fully fund and construct the proposed Moccasin Gap Bypass project, in a time frame that would have relevant impact and/or benefit to the local community. This project is still included in the Kingsport MPO 2040 Long-Range Transportation Plan (LRTP), but is not part of the financially constrained plan (i.e., Illustrative project – #L64).

In addition to not being able to realistically fund and construct the proposed Moccasin Gap Bypass project, the community has continued to express concerns over the operational conditions of the existing U.S. Route 58/U.S. Route 23 corridor. The local community has also voiced dire concerns over potential train derailments over U.S. Route 58/23 that could result in grid lock and adverse economic impacts, as no reasonable alternate route is located within approximately 30 miles of the grade separated Norfolk Southern Railway crossing along the described corridor/route.

2.2 Study Purpose and Goals

The intent of this study is to verify operational constraints and safety issues along the described study area corridor/route and then develop, identify, and prioritize a list of improvements that mitigate existing constraints.

The prioritized and agreed upon list can then be programmed into the VDOT's Six-Year Improvement Program (SYIP), and/or allow the locality to apply for alternative funding sources through such programs as SMART Scale or the Highway Safety Improvement Program (HSIP).

In addition to transportation improvement recommendations, it is anticipated that collaborative discussions with Scott County as well as the Town of Gate City and the Town of Weber City will result in the opportunity to update the existing or develop current emergency response standard operating procedures (SOP) in the event of a catastrophic incident such as a train derailment.

2.3 Methodology

The process to develop the corridor study, recommendations, and implementation strategy consisted of the following efforts:

- Project Team – Kimley-Horn coordinated with Scott County, Gate City, Scott County School Officials, the Kingsport MPO, and VDOT staff throughout the study process. The project team worked together to guide and assist with the development of the study to include the identification and selection of the preferred study recommendations.
- Data Collection and Baseline Conditions – This effort involved collecting and evaluating background information including existing traffic volumes, land use plans, traffic impact studies, geographic information system (GIS) data, future development plans, historical crash data, environmental/natural resources data, and other necessary information further establishing the baseline conditions. All analyses were conducted in accordance with the Highway Capacity Manual (2010/2016 Edition) and the VDOT Traffic Operations and Safety Analysis Manual (TOSAM).
- Future Traffic Volume Projections – Based on the data collection efforts, traffic volume forecasts were developed for future year scenarios to assess how growth and development will impact operations of the corridor if roadway geometry, access management, and traffic control conditions were to remain unchanged (i.e., No Build).
- Development of Improvement Concepts – Following the analysis of the existing and future year No Build traffic conditions, short-, mid-, and long-term improvements were developed to address identified operational and safety constraints, consistent with the intent of the study.
- Traffic Study Recommendations – Using input from the project team, traffic study recommendations were developed to improve safety and traffic operations along the study area corridor. Proposed improvements are packaged into the form of short-, mid-, and long-term recommendations that also include planning level cost estimates to assist with prioritization as well as identification of traditional and/or alternative funding sources.
- Implementation - Implementation of the proposed transportation improvements begins with approval and support from, Scott County officials and VDOT staff.

2.4 Study Area

The study area extends over a distance of approximately 3.25 miles, along three key segments of roadway within Scott County, VA. As illustrated in Figure 1, the three key segments of roadway are: 1) U.S. Route 58/U.S. Route 23 between the U.S. Route 58/State Route 224 intersection to the Kane Street intersection, 2) the Kane Street (BUS U.S. Route 58/BUS U.S. Route 23/BUS U.S. Route 421/Jones Street (State Route 904) segment between U.S. Route 58/U.S. Route 23 and State Route 71 (Jackson Street) and 3) State Route 71 between Jones Street and State Route 72 (Veterans Memorial Highway). U.S. Route 58/ U.S. Route 23 serves as a/the primary north/south connection between southwest Virginia and northeast Tennessee.

The study area corridor consists of a variety of roadway typical sections (e.g., two-lane, three-lane, and four-lane divided) and with a range of functional classifications (e.g., major collector, minor arterial, and principal arterial/freeway). Additionally, U.S. Route 58 is designated as a Corridor of Statewide Significance (CoSS), as well as a Mobility Enhancement Segment (MES) per the VDOT Arterial Preservation Program (APP) further emphasizing the importance of this corridor at the local and state levels. This corridor serves three schools and several high activity commercial areas in Gate City. A significant volume of railway freight is also transported parallel to/over U.S. Route 58/U.S. Route 23.

Corridors:

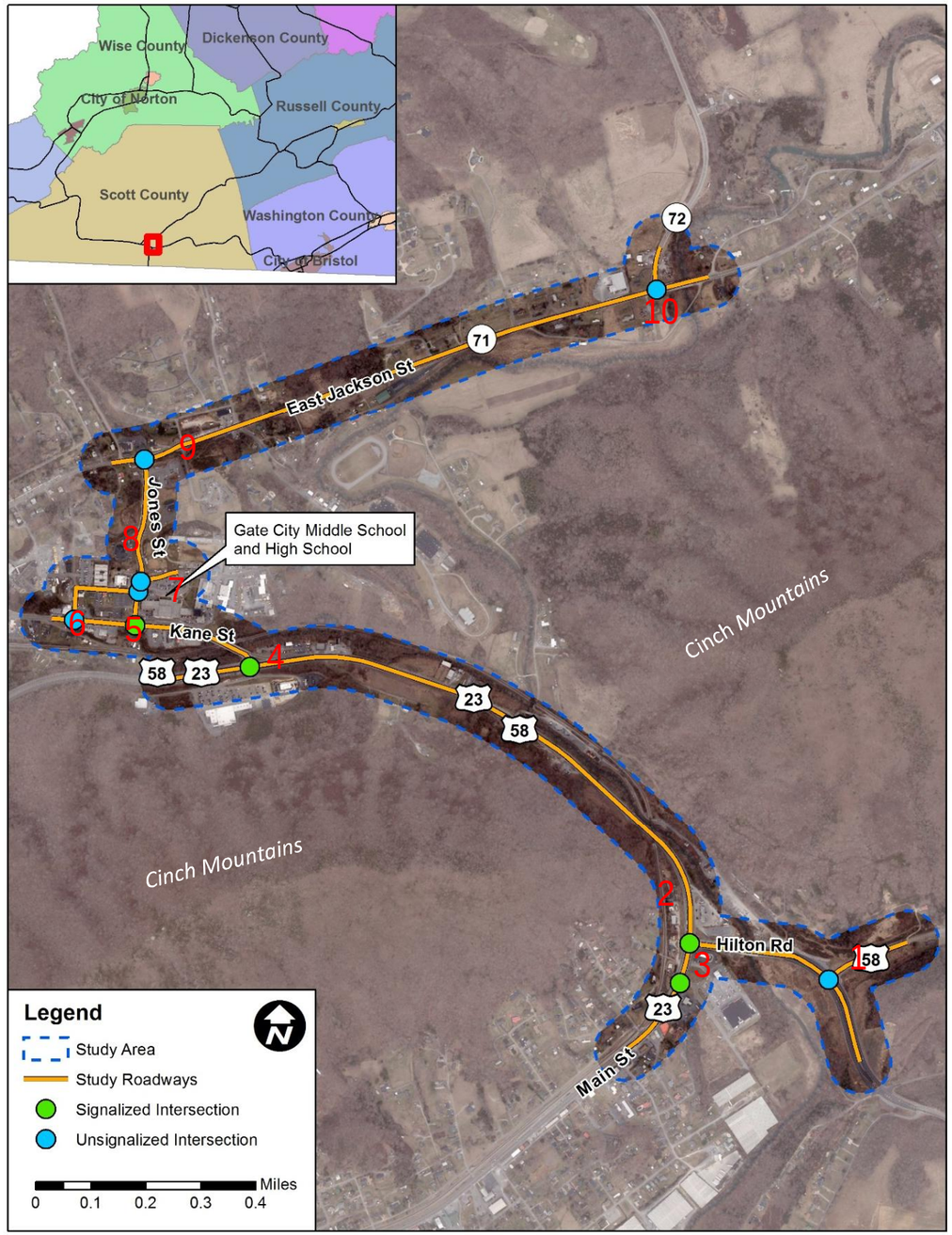
- U.S. Route 58/U.S. Route 23 (Main Street) from the U.S. Route 58/State Route 224 intersection in the south to the Kane Street intersection in the north
- Kane Street/Jones Street from the U.S. Route 58/U.S. Route 23 (Main Street) intersection in the south to the State Route 71 intersection in the north
- State Route 71 from the Jones Street intersection in the west to the State Route 72 intersection in the east

Intersections:

The study area for the Moccasin Gap Bypass Alternatives Study consists of the following roadways and intersections:

1. U.S. Route 58 (Bristol Highway) at State Route 224 (Wadlow Gap Highway) (Unsignalized)
2. U.S. Route 58/State Route 224 (Hilton Road) at U.S. Route 23 (Main Street) (Signalized)
3. U.S. Route 23 (Main Street) at Food City Shopping Center (Signalized)
4. U.S. Route 58/U.S. Route 23 (Main Street) at Kane Street/Gateway Plaza Shopping Center (Signalized)
5. Kane Street at Jones Street (State Route 904) (Signalized)
6. Kane Street at Bishop Street (State Route 769) (Unsignalized)
7. Jones Street at Beech Street (State Route 823) (Unsignalized)
8. Jones Street at Harry Fry Drive (State Route 836) (Unsignalized)
9. Jones Street at State Route 71 (Jackson Street) (Unsignalized)
10. State Route 71 at State Route 72 (Veterans Memorial Highway) (Unsignalized)

Figure 1: Study Area



3.0 Existing Conditions

3.1 Data Collection

Data obtained for this analysis was either provided by Scott County (e.g., other studies, approved developments, etc.) or VDOT (e.g., traffic counts, signal timings, etc.). Data not provided from these sources were obtained directly by Kimley-Horn for use in this study and included traffic counts, speed observations, and environmental databases.

As part of the traffic data collection effort, field visits to the study area were conducted on October 10, 2017. The field investigations were conducted to document existing traffic operations, existing roadway geometric conditions, and to compile an inventory of digital still photographs within the study area that captured elements of interest, such as signalized or unsignalized intersections, posted speed limits, roadway and intersection geometrics, geometric deficiencies, sight distance constraints, bike and pedestrian accessibility, potential safety concerns, utilities, and general operational deficiencies. The field investigation for the Environmental Assessment was conducted on May 2, 2018 to review local existing conditions, verify the results of the database review, and collect data on those sites not identified in the database review but observed in the field.

3.2 Existing Roadway Geometry

Effective storage lengths and lane designations for the study area are illustrated in Figure 2. The following provides a brief description of existing roadway characteristics of each facility:

- U.S. Route 58/U.S. Route 23 is a four-lane divided highway that connects to Kane Street from State Route 224. U.S. Route 58/U.S. Route 23 continues south towards the Tennessee Border and west towards Clinchport. The portion of U.S. Route 58/U.S. Route 23 to the east of Kane Street is a principal arterial as defined by VDOT. The 2017 traffic data provided by VDOT indicates that this section of U.S. Route 58/U.S. Route 23 carries approximately 27,000 vehicles per day (vpd). The posted speed limit is 45 mph for U.S. Route 58/U.S. Route 23 between Kane Street and State Route 224.
- Kane Street/Jones Street connects U.S. Route 58/U.S. Route 23 to State Route 71; Kane Street is a minor arterial and Jones Street is a major collector. Kane Street is a four-lane undivided highway which connects to Jones Street-a two lane undivided highway. The section of Jones street from U.S. Route 23 to State Route 71 has a volume of approximately 21,100 vehicles per day. Jones Street is a school zone with a posted speed limit of 25 mph.
- State Route 71 is an east-west minor arterial in the Moccasin Gap Corridor. State Route 71 is a two-lane undivided roadway with a speed limit of 45 mph.

3.3 Existing Traffic Volumes

Based on discussions with Scott County, weekday AM and PM peak hour traffic volumes were used to analyze existing conditions for the corridor. Turning movement counts (TMC) were obtained and collected for the study area intersections. AM and PM TMC data were collected at study area intersections #1 through #10 on December 13 and December 14, 2017. During the data collection period, inclement weather resulted in the local schools having a delayed start on December 13. It was observed that this delay impacted the counts collected at the following intersections:

- Kane Street at Jones Street
- Kane Street at Bishop Street
- Jones Street at Beech Street
- Jones Street at Harry Fry Drive
- Jones Street at State Route 71
- State Route 71 at State Route 72

Therefore, to ensure data consistency between the days the counts were collected, the AM peak period on December 13 (i.e., 9:30 am to 11:30 am) was “shifted” two hours back (i.e., 7:30 am to 9:30 am) to account for the delayed school start for those intersections. This adjustment brought the study area intersection volumes in line with a more typical day’s operation, as observed on December 14.

The resulting uniform peak hours determined for the analysis were generally found to be 7:30 AM to 8:30 AM and 4:45 PM to 5:45 PM for the AM and PM peak hours, respectively. Daily, AM and PM peak hour volumes from the counts used for this analysis are shown in Figure 3. Detailed count data is provided in Appendix A.

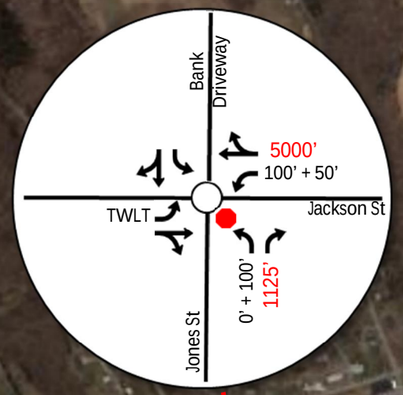
3.4 Historic Crash Data

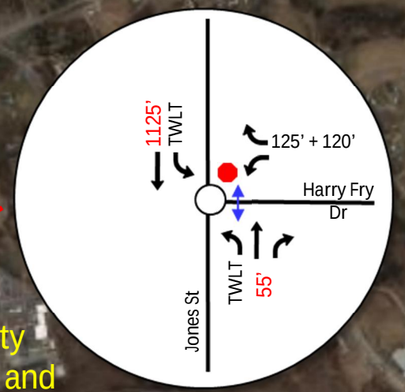
A qualitative safety analysis was conducted by reviewing the historic crash patterns on U.S. Route 58/U.S. Route 23, on Kane Street/Jones Street, and along State Route 71 within the study area. The latest five (5) years of crash data, collected between January 1, 2013, and December 31, 2017, was compiled and summarized within the study area. Historic crash densities were also determined along the study area and are presented in Figure 4. This illustrates the areas where higher frequencies of crashes were noted to occur. Based on the review of these crash densities, areas where with relatively higher frequencies of crashes can be identified through visual assessment. Relatively high frequency crash densities were consistently located in the vicinity of Kane Street and Jones Street near Gate City Middle and High School. U.S. Route 23 at U.S. Route 58 and U.S. Route 23 near Food City also were noted to experience a high frequency of crashes. It should be noted that U.S. Route 58/U.S. Route 23 at Filter Plant Road is also a location with a significant number of crashes. However, VDOT is currently working on a project to improve the safety conditions of this intersection by implementing access management strategies in this area.

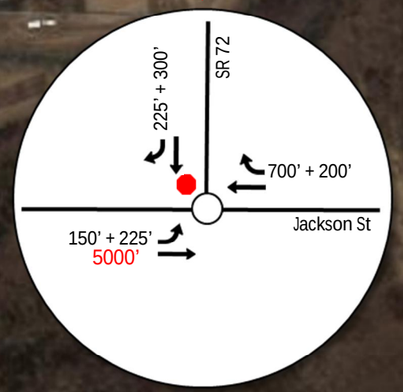
Not To Scale

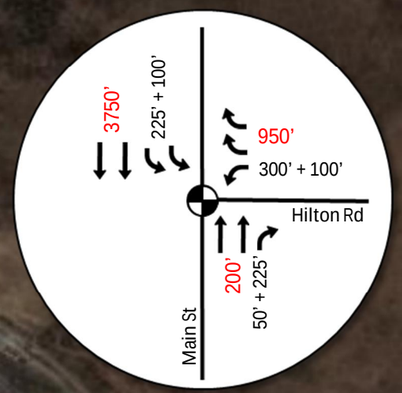
Legend

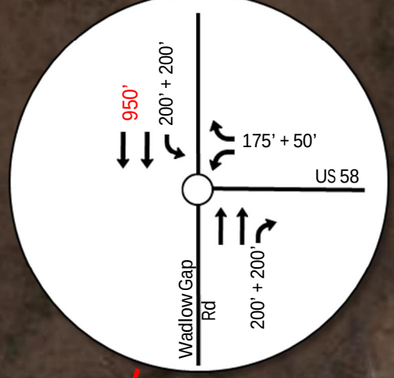
- Signalized Intersection
- Unsignalized Intersection
- (#) Study Intersection and ID
- Existing Laneage
- ### + ### Storage and Taper Length
- ###' Length to Next Upstream Intersection
- Channelized Right Turn
- Marked Pedestrian Crossing
- Yield Sign
- Stop Sign

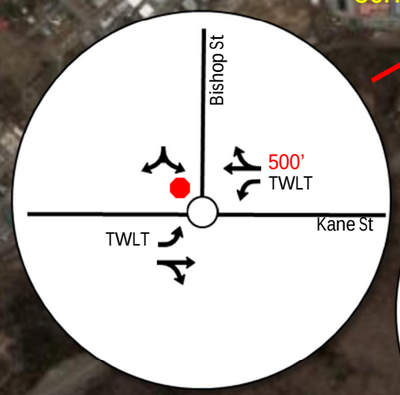


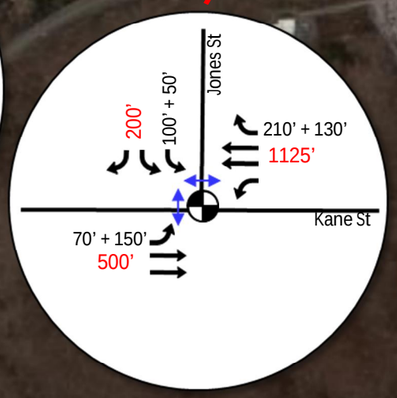


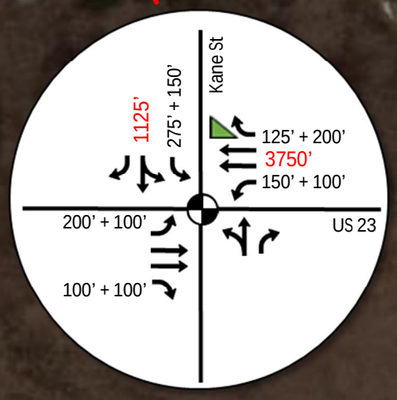


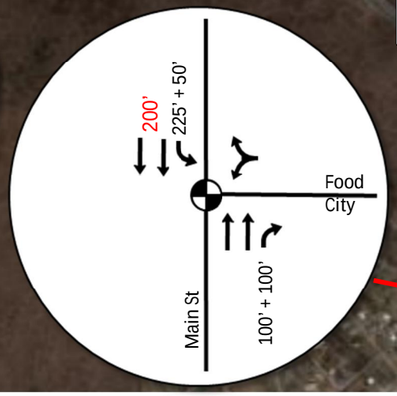












Shoemaker Elementary School

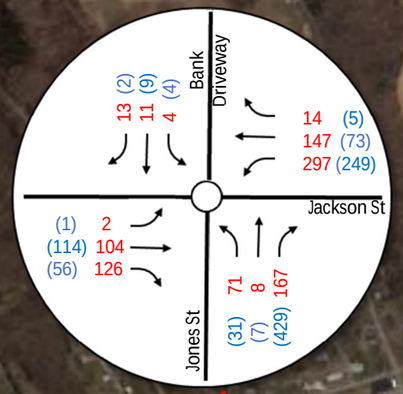
Gate City Middle and High School

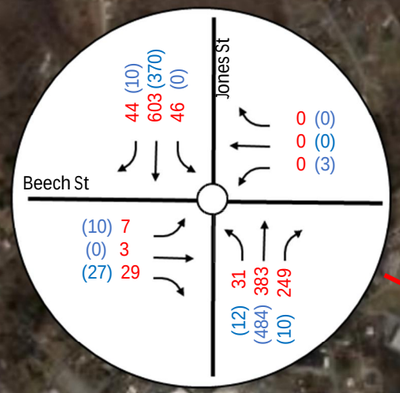
Moccasin Gap Corridor Study Scott County, VA	Existing Conditions	Figure 2

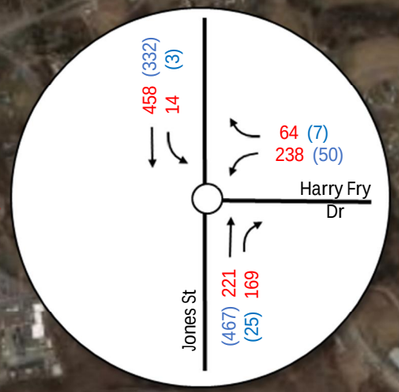
Not To Scale

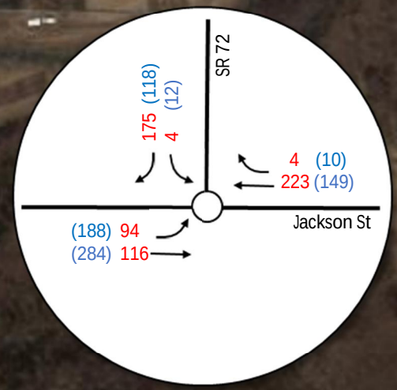
Legend

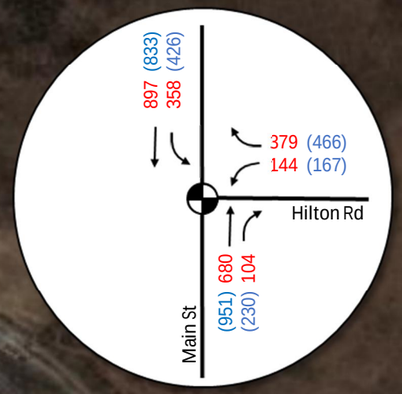
- Signalized Intersection
- Unsignalized Intersection
- # - Study Intersection and ID
- Turning Movement
- ### - AM Peak Hour Volumes
- (###) - PM Peak Hour Volumes

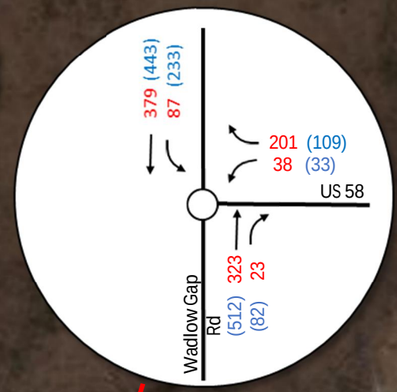


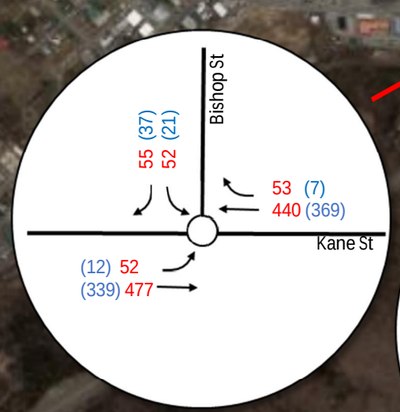


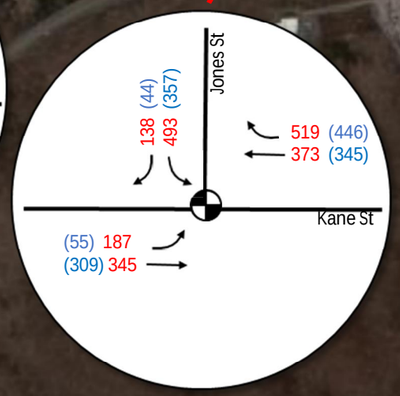


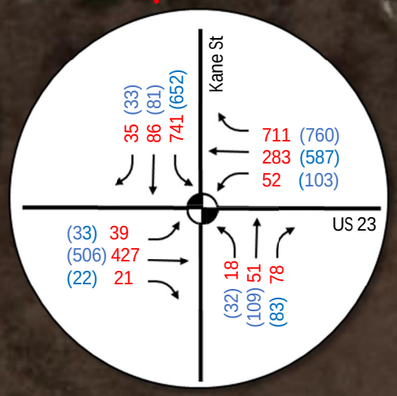


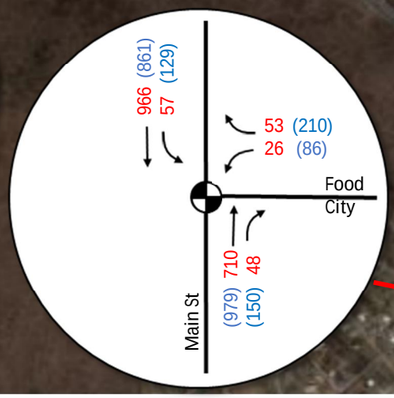




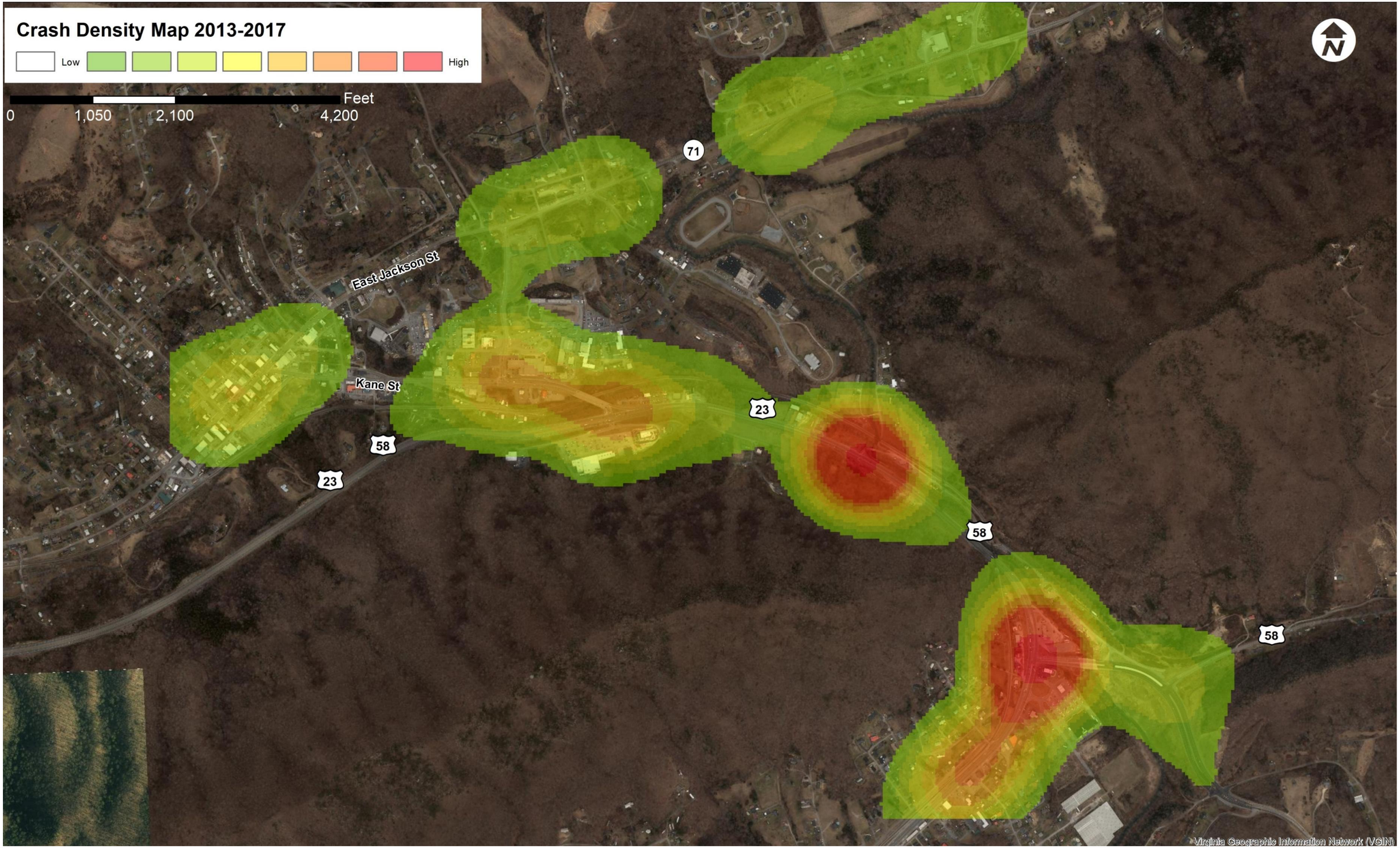








Moccasin Gap Corridor Study Scott County, VA	2017 Existing AM and PM Peak Hour Traffic Volumes	Figure 3



Moccasin Gap Corridor Study
Scott County, VA

2013 – 2017 Crash Density Map

Figure 4

3.4.1 Crashes by Severity

Figure 5 through Figure 9 illustrate the location and severity of crashes within the study area. Table 1 summarizes a breakdown of crash severity (i.e., proportion of the crashes involving an injury, fatality, or property damage only). During the five-year period, a total of 118 crashes occurred on the study corridors within the study area. The majority of crashes that occurred in the study area were property damage only (PDO) crashes, making up 77 percent of the total crashes. Twenty-three (23) percent of the crashes resulted in an injury and one fatality was documented at the intersection of U.S. Route 58 at Wadlow Gap Highway during the five-year period. This fatality was an angle collision that occurred in January 2017. Improvements were made to this intersection prior to the fatal crash. This intersection should continue to be monitored to ensure the roadway is safe and no additional improvements are needed.

Table 1: Crashes by Severity

ID	Location	Crash Severity										Total Crashes
		Ambulatory		Visible Injury		Non-visible		PDO		Fatal		
1	U.S. Route 58 at Wadlow Gap Highway	1	12.5%	1	12.5%	0	0%	5	62.5%	1	13%	8
2	U.S. Route 58/23 at Hilton Road	2	6%	1	3%	5	14%	28	78%	0	0%	36
3	U.S. Route 58/23 at Food City	0	0%	1	9%	0	0%	10	91%	0	0%	11
4	U.S. Route 58/23 at Kane Street	1	4%	8	32%	1	4%	15	60%	0	0%	25
5	Kane Street at Jones Street	1	6%	1	6%	1	6%	14	82%	0	0%	17
6	Kane Street at Bishop Street	0	0%	0	0%	0	0%	4	100%	0	0%	4
7	Jones Street at Beech Street	0	0%	0	0%	0	0%	3	100%	0	0%	3
8	Jones Street at Harry Fry Drive	0	0%	0	0%	0	0%	3	100%	0	0%	3
9	Jones Street at State Route 71	0	0%	1	17%	0	0%	5	83%	0	0%	6
10	State Route 71 at State Route 72	1	20%	0	0%	0	0%	4	80%	0	0%	5
Overall Study Corridor		6	5%	13	11%	7	6%	91	77%	1	1%	118

3.4.2 Crashes by Type

Figure 5 through Figure 9 illustrate the location and type of crash within the study area. Table 2 summarizes crash type percentages at each of the study area intersections. The predominant crash type within the study area were “rear end collisions”, comprising approximately 49 percent of the crashes on the corridor. Angle crashes were the second most prevalent crash type with 27 percent. Data indicate that rear end collisions occur most frequently at the signalized intersections along the corridor. Main Street at Hilton Road, Kane Street at U.S. Route 23, and Kane Street at Jones Street are signalized intersections with more than 50 percent of the crashes occurred being rear end collisions.

Angle collisions are common throughout the corridor but are most prevalent at unsignalized intersections. Jones Street at Beech Street and U.S. Route 58 at Wadlow Gap Highway are unsignalized intersections with majority of the crashes at these locations being angle collisions. Based on a review of the crashes on Jones Street at Beech Street, the density of access points in this vicinity results in an increased number of conflict points between turning vehicles, escalating the chances for angle collisions to occur. Based on the crash data, most of the rear end collisions are property damage only or non-visible injuries.

Table 2: Crashes by Type

ID	Location	Collision Type																Total Crashes
		Rear End		Backed Into		Angle		Head On		Sideswipe		Non-Collision/ Other		Fixed Object - Off Road		Deer/ Other Animal		
1	U.S. Route 58 at Wadlow Gap Highway	2	25%	0	0%	4	50%	0	0%	0	0%	0	0%	2	25%	0	0%	8
2	U.S. Route 58/23 at Hilton Road	21	58%	0	0%	8	22%	0	0%	4	11%	0	0%	3	8%	0	0%	36
3	U.S. Route 58/23 at Food City	4	36%	0	0%	5	45%	1	9%	0	0%	0	0%	1	9%	0	0%	11
4	U.S. Route 58/23 at Kane Street	14	56%	0	0%	5	20%	1	4%	2	8%	2	8%	0	0%	1	4%	25
5	Kane Street at Jones Street	11	65%	1	6%	3	18%	0	0%	1	6%	0	0%	1	6%	0	0%	17
6	Kane Street at Bishop Street	1	25%	1	25%	1	25%	0	0%	1	25%	0	0%	0	0%	0	0%	4
7	Jones Street at Beech Street	0	0%	0	0%	3	100%	0	0%	0	0%	0	0%	0	0%	0	0%	3
8	Jones Street at Harry Fry Drive	0	0%	0	0%	1	33%	0	0%	1	33%	0	0%	1	33%	0	0%	3
9	Jones Street at State Route 71	2	33%	0	0%	3	50%	0	0%	1	17%	0	0%	0	0%	0	0%	6
10	State Route 71 at State Route 72	4	80%	0	0%	0	0%	0	0%	0	0%	0	0%	1	20%	0	0%	5
Overall Study Corridor		59	50%	2	2%	33	28%	2	2%	10	8%	2	2%	9	8%	1	1%	118

3.4.3 Crash Conditions

Table 3, Table 4, and Table 5 summarize crash trends given weather, time-of-day, and lighting conditions, respectively. The following conclusions are noted from this data for the study area:

- Poor weather does not appear to be a major contributing factor with 85 percent of the overall crashes occurring under clear conditions.
  - However, approximately 33 percent of the documented crashes in the vicinity of the Jones Street at Harry Fry Drive intersection did occur during rainy conditions.
- The majority of crashes (i.e., 78 percent) occurred during daylight hours with 17 percent occurring during dark/night time conditions. Only 5 percent of the crashes occurred during dawn/dusk. Street lighting is provided along U.S. Route 58/U.S. Route 23, Kane Street/Jones Street, and State Route 71.
- Approximately 13 percent of the crashes occurred during the AM (6:00 am to 10:00 am) peak period
- Approximately 27 percent of the crashes occurred during the PM (3:00 pm to 6:00 pm) peak period
  - The PM peak period generally has more traffic, which increases the risks for crashes to occur.

Table 3: Crash Summary – Weather Conditions

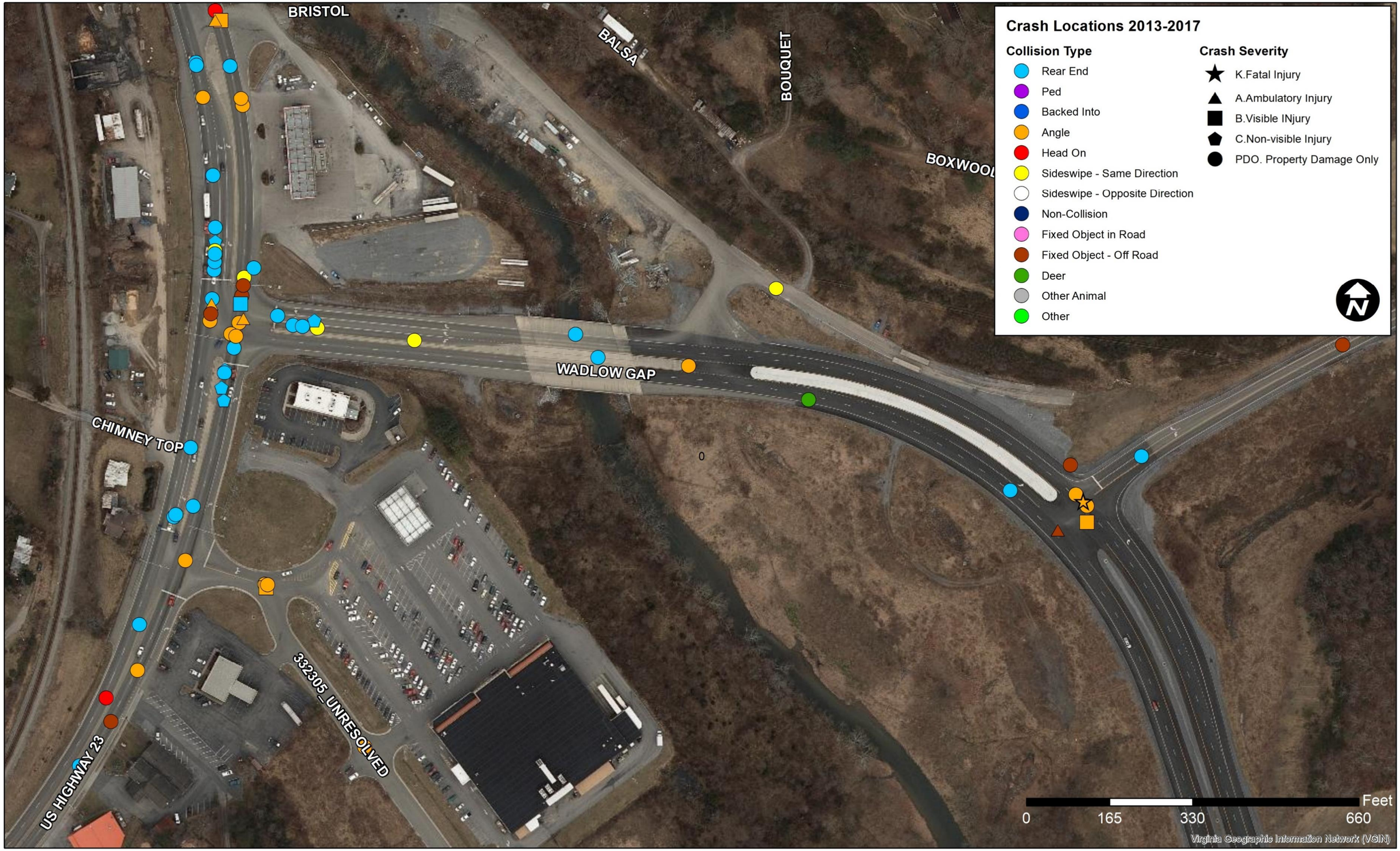
ID	Location	Weather Condition										Total
		Clear		Fog		Rain		Snow		Other		
1	U.S. Route 58 at Wadlow Gap Highway	6	75%	1	13%	1	13%	0	0%	0	0%	8
2	U.S. Route 58/23 at Hilton Road	29	81%	1	3%	4	11%	0	0%	2	6%	36
3	U.S. Route 58/23 at Food City	10	91%	0	0%	1	9%	0	0%	0	0%	11
4	U.S. Route 58/23 at Kane Street	23	92%	0	0%	1	4%	1	4%	0	0%	25
5	Kane Street at Jones Street	14	82%	0	0%	2	12%	1	6%	0	0%	17
6	Kane Street at Bishop Street	3	75%	0	0%	1	25%	0	0%	0	0%	4
7	Jones Street at Beech Street	3	100%	0	0%	0	0%	0	0%	0	0%	3
8	Jones Street at Harry Fry Drive	1	33%	0	0%	1	33%	1	33%	0	0%	3
9	Jones Street at State Route 71	6	100%	0	0%	0	0%	0	0%	0	0%	6
10	State Route 71 at State Route 72	5	100%	0	0%	0	0%	0	0%	0	0%	5
Overall Study Corridor		100	85%	2	2%	11	9%	3	3%	2	2%	118

Table 4: Crash Summary – Time of Day

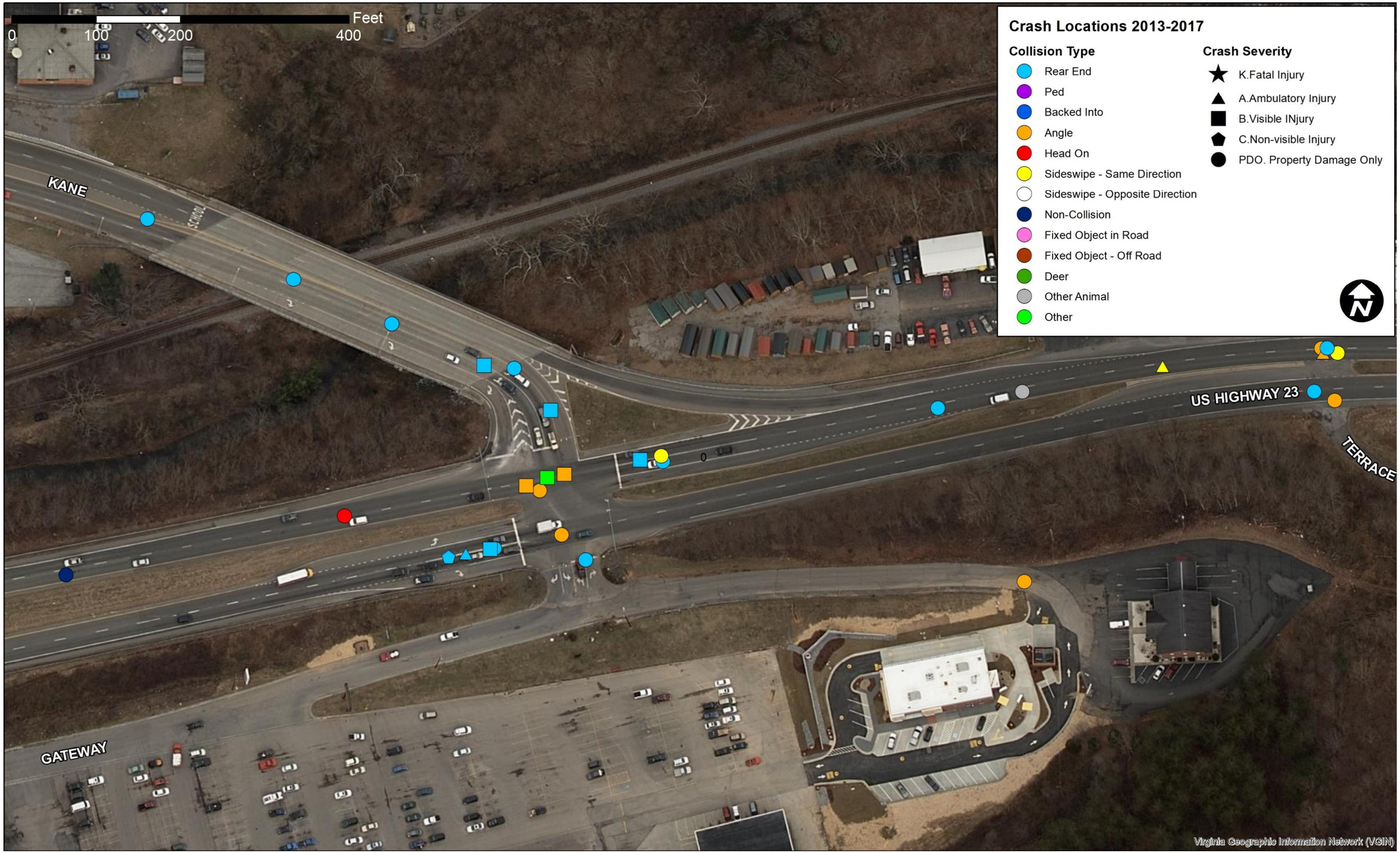
ID	Location	Peak Period				Off Peak		Total
		AM (6:00 - 9:00)		PM (3:00 - 6:00)				
1	U.S. Route 58 at Wadlow Gap Highway	3	38%	1	13%	4	50%	8
2	U.S. Route 58/23 at Hilton Road	4	11%	9	25%	23	64%	36
3	U.S. Route 58/23 at Food City	0	0%	2	18%	9	82%	11
4	U.S. Route 58/23 at Kane Street	5	20%	6	24%	14	56%	25
5	Kane Street at Jones Street	1	6%	11	65%	5	29%	17
6	Kane Street at Bishop Street	0	0%	0	0%	4	100%	4
7	Jones Street at Beech Street	0	0%	1	33%	2	67%	3
8	Jones Street at Harry Fry Drive	0	0%	1	33%	2	67%	3
9	Jones Street at State Route 71	1	17%	1	17%	4	67%	6
10	State Route 71 at State Route 72	1	20%	0	0%	4	80%	5
Overall Study Corridor		15	13%	32	27%	71	60%	118

Table 5: Crash Summary – Lighting Condition

ID	Location	Lighting Condition								Total
		Daylight		Dawn/Dusk		Dark - Road Lighted		Dark - Road Not Lighted		
1	U.S. Route 58 at Wadlow Gap Highway	5	63%	2	25%	0	0%	1	13%	8
2	U.S. Route 58/23 at Hilton Road	26	72%	2	6%	6	17%	2	6%	36
3	U.S. Route 58/23 at Food City	10	91%	0	0%	1	9%	0	0%	11
4	U.S. Route 58/23 at Kane Street	21	84%	1	4%	1	4%	2	8%	25
5	Kane Street at Jones Street	14	82%	0	0%	3	18%	0	0%	17
6	Kane Street at Bishop Street	4	100%	0	0%	0	0%	0	0%	4
7	Jones Street at Beech Street	1	33%	0	0%	2	67%	0	0%	3
8	Jones Street at Harry Fry Drive	1	33%	1	33%	1	33%	0	0%	3
9	Jones Street at State Route 71	6	100%	0	0%	0	0%	0	0%	6
10	State Route 71 at State Route 72	4	80%	0	0%	0	0%	1	20%	5
Overall Study Corridor		92	78%	6	5%	14	12%	6	5%	118



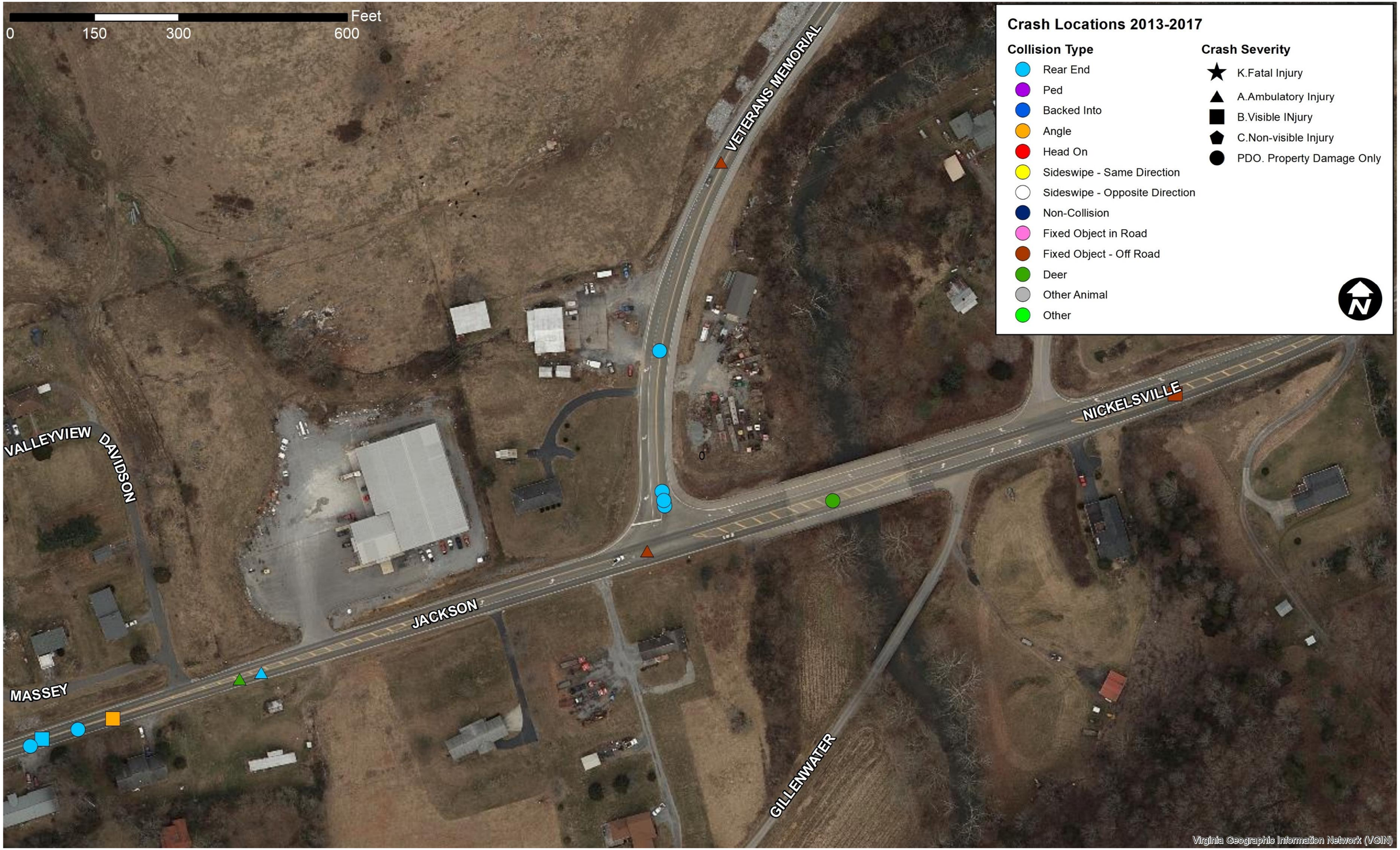
Moccasin Gap Corridor Study Scott County, VA	2013 – 2017 Historic Crash Data (1 of 5)	Figure 5



Moccasin Gap Corridor Study Scott County, VA	2013 – 2017 Historic Crash Data (2 of 5)	Figure 6

Moccasin Gap Corridor Study Scott County, VA	2013 – 2017 Historic Crash Data (3 of 5)	Figure 7

SCOTT COUNTY VIRGINIA 1814 · VDOT Virginia Department of Transportation · Kimley»Horn	Moccasin Gap Corridor Study Scott County, VA	2013 – 2017 Historic Crash Data (4 of 5)	Figure 8



Moccasin Gap Corridor Study Scott County, VA	2013 – 2017 Historic Crash Data (5 of 5)	Figure 9

3.5 Existing Operational Analysis

The existing traffic operations for this report consists of the analysis of the intersections located within the study area. Operational analyses for the study area intersections were analyzed using Synchro Professional (Version 9.2, Build 914, Revision 6) and SimTraffic, which is the microsimulation companion tool of Synchro.

Existing intersection turning movement counts were used in conjunction with existing geometric data (i.e., number of lanes, turn-lane storage lengths, intersection traffic control, etc.) and traffic signal timing/phasing plans to determine the existing vehicle delays, levels of service, and queue lengths at each study area intersection. "Effective storage length" distances (i.e., length of the full width storage area plus ½ of the taper length) are included with the queue length results in this section. For exclusive turn lanes, the modeled storage length distances reflect effective storage lengths as shown in Figure 2. For intersection movements without dedicated turn lanes, aerial imagery was used to obtain a distance to the next upstream intersection where queued vehicles would impede operations.

3.5.1 Model Validation and Calibration

For the operational analysis, inputs and analysis methodologies were kept consistent with VDOT's TOSAM. Four (4) main steps were completed for each of the AM and PM model simulations used in this study:

1. Network Development, Coding, and Model Inspection
2. Network Calibration
3. Inspection and Sample Size Determination
4. Analysis and Reporting

To calibrate the existing models, simulated volumes and speeds were compared with counted volumes (i.e., intersection turning movement count data) and average vehicle speeds (i.e., at the two locations where speed data was collected). Detailed summary sheets of the simulated volume and speed calibration process are provided in Appendix B. For the calibration process, 85 percent of the network links (i.e., based on volume) must meet the following threshold:

- Simulated average speed needs to be within:
  - ± 5 mph (for arterials) of detected speeds
- Simulated volumes must be within:
  - ± 20% for < 100 vph
  - ± 15% for ≥ 100 vph to < 300 vph
  - ± 10% for ≥ 300 vph to < 1,000 vph
  - ± 5% for ≥ 1,000 vph

The results of the calibration effort indicate that the existing traffic models were validated and are able to simulate the study areas volumes and speeds adequately to meet the criteria set forth by the TOSAM. Any differences within the calibration results were only minor and justification and/or reasoning for these discrepancies is provided in Appendix B.

3.5.2 Sample Size Determination

Per the TOSAM, an initial sample size of 10 simulation runs for the SimTraffic models were conducted before VDOT's Sample Size Determination process was performed. This ensures that an appropriate number of runs have been conducted and that simulation results are reasonable. For this analysis, simulated speeds were used from a critical link to validate the number of model simulations analyzed. Based on the sample size evaluation, a 10-simulation run sample size was verified as adequate for all models and scenarios analyzed in this study. The complete sample size evaluation results for the existing condition model simulation results are contained in Appendix B.

3.5.3 Intersection Level of Service and Queues

Level of service (LOS) and maximum queue lengths were reported for each of the study area intersections. LOS describes the amount of traffic congestion at an intersection or on a roadway and ranges from A to F (e.g., 'A' indicating a condition of little to no congestion and 'F' a condition with severe congestion, unstable traffic flow, and stop-and-go conditions). Delay and associated LOS for both signalized and unsignalized intersections are reported from the Synchro analysis. Table 6 shows the corresponding thresholds in delay for unsignalized and signalized intersections. In the following LOS/delay tables, values highlighted in "bold" represent movements operating at LOS E or worse.

The queuing tables summarize the maximum simulated queues for each movement during the AM and PM peak hours as they compare to the effective storage lengths. Effective storage lengths represent the amount of distance available for vehicles to queue without generally impacting the adjacent lanes. Values highlighted as "bold" represent queue lengths that exceed the available effective storage lengths/spill back to an upstream intersection. As part of the queuing analysis, "percent blocking" was noted in instances where significant queues impact adjacent turn- and/or through-lanes. This percentage represents the approximate amount of time during the peak hour when a lane was anticipated to be blocked (i.e., 10% blocking on a left-turn lane with 100 turning vehicles means that 10 vehicles were blocked from entering that turn lane during the peak hour). Detailed capacity summary data sheets are provided in Appendix C of this report.

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Table 6: Intersection Level of Service (LOS) Thresholds

LOS	Signalized Intersections Control Delay Per Vehicle [sec/veh]	Unsignalized Intersections Average Control Delay [sec/veh]	Relative Delay
A	≤ 10	≤ 10	Short Delays
	Free-flow traffic operations at average travel speeds. Vehicles completely unimpeded in ability to maneuver. Minimal delay at signalized intersections.		
B	> 10 – 20	> 10 – 15	
	Reasonably unimpeded traffic operations at average travel speeds. Vehicle maneuverability slightly restricted. Low traffic delays.		
C	> 20 – 35	> 15 – 25	
	Stable traffic operations. Lane changes becoming more restricted. Travel speeds reduced to half of average free flow travel speeds. Longer intersection delays.		
D	>35 – 55	> 25 – 35	Moderate Delays
	Stable traffic operations. Lane changes becoming more restricted. Travel speeds reduced to half of average free flow travel speeds. Longer intersection delays.		
E	>55 – 80	> 35 – 50	
	Significant delays. Travel speeds reduced to one third of average free flow travel speed.		
F	> 80	> 50	Long Delays
	Extremely low speeds. Intersection congestion. Long delays. Extensive traffic queues at intersections.		

Source: Highway Capacity Manual, Transportation Research Board, Washington, D.C., 2010

Based on the LOS results of the existing conditions analysis for the AM and PM peak hours, as shown in Table 7 and Table 8, all movements and approaches currently operate at a LOS D or better. Most of the approaches operate at LOS C or better. The only instances of a movement or approach experiencing LOS D or worse were noted to occur at the following locations:

Kane Street at U.S. Route 58/U.S. Route 23

- LOS D during the AM and PM peak hours
  - Northbound/Southbound approaches operate in "split phase" (i.e., movements do not run concurrently) and the existing signal timing and traffic progression priority is given to U.S. Route 58/23. The split phase condition, combined with the need to accommodate a heavy southbound Kane Street left-turn movement, (i.e., over 600 vehicles), results in the northbound and westbound approaches operating at LOS D.

Westbound Food City approach at U.S. Route 58/U.S. Route 23

- LOS D (35.3 sec/vehicle) during the AM peak hour and LOS D (42.8 sec/vehicle) during the PM peak hour.
  - High traffic volumes for the northbound and southbound approaches of U.S. Route 58/23 require signal timing/traffic progression priority. This results in the westbound Food City (minor street) approach operating at LOS D.

Westbound Hilton Road left-turn movement at U.S. Route 58/U.S. Route 23

- LOS D (36.9 sec/vehicle) during the AM peak hour and LOS D (40.0 sec/vehicle) during the PM peak hour.
  - High traffic volumes for the northbound and southbound approaches of U.S. Route 58/23 require signal timing/traffic progression priority. The left-turn movement operates with relatively heavy volumes (i.e., over 100 vehicles) and less available green time, which results in this movement operating at LOS D.

Southbound New People's Bank Exit left turn movement at Jones Street/State Route 71 intersection

- LOS F (63.2 sec/vehicle) during the PM peak hour.
  - However, this is a low volume (i.e., less than 5 vehicles) movement and does not significantly impact overall operations at this intersection.

The intersections with movements experiencing instances of queues exceeding their available storage or situations with vehicles being blocked are denoted for the AM and PM peak hours in Table 9 and Table 10. The majority of movements for the study area intersections do not experience significant queues or blocking conditions during the AM or PM peak hours, with the exception of the following intersections:

Kane Street at U.S. Route 58/U.S. Route 23

- Relatively significant queueing (i.e., over 200 feet), occurs in the westbound through and right-turn lanes.
  - However, this is due to the adjacent through traffic, which can queue up and block vehicles from being able to enter the adjacent right-turn lane.

Jones Street at Harry Fry Drive

- During the AM peak hour, westbound left-turn lanes queue up and block 11% of the traffic attempting to access the adjacent right-turn lane.
- The eastbound and westbound approaches are STOP controlled which results in longer queues during the peak hours.

Jones Street at State Route 71

- During the AM peak hour, the northbound left-turn movement experiences moderate queueing with 1% of the traffic queuing back to the upstream intersection.

Table 7: Existing LOS Summary: AM Peak Hour

ID	Intersection	Level of Service per Movement by Approach (Delay in sec/veh)															
		2017 Existing															
		Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour															
1	U.S. Route 58 at Wadlow Gap Highway	TWSC	A (3.5)	-	-	-	B (12.4)	-	B (12.4)	-	A (0.0)	A (0.0)	A (8.5)	A (0.0)	-
				-			B (12.4)			A (0.0)			A (1.6)		
2	U.S. Route 58/23 at Hilton Road	Signal	B (16.1)	-	-	-	D (36.9)	-	C (30.1)	-	A (9.6)	A (4.0)	D (35.5)	A (5.6)	-
				-			C (31.9)			A (8.8)			B (14.1)		
3	U.S. Route 58/23 at Food City	Signal	A (7.1)	-	-	-	D (35.3)	-	D (35.3)	-	A (8.1)	A (5.9)	D (44.1)	A (1.9)	-
				-			D (35.3)			A (8.0)			A (4.3)		
4	U.S. Route 58/23 at Kane Street	Signal	C (24.2)	D (43.9)	D (36.4)	C (29.9)	D (46.4)	C (34.2)	A (1.2)	D (41.5)		D (38.8)	C (29.6)	C (28.9)	B (18.2)
				D (36.8)			B (12.4)			D (40.1)			C (28.8)		
5	Kane Street at Jones Street	Signal	B (14.1)	A (10.0)	A (9.0)	-	-	C (22.9)	A (6.4)	-	-	-	C (22.5)	-	A (7.7)
				A (9.3)			B (13.3)			-			B (19.3)		
6	Kane Street at Bishop Street	TWSC	A (1.9)	A (8.9)	A (0.0)	-	-	A (0.0)		-	-	-	C (15.5)	-	C (15.5)
				A (0.9)			A (0.0)			-			C (15.5)		
7	Jones Street at Beech Street	TWSC	A (1.3)	D (26.9)			A (0.0)			A (9.4)	A (0.0)	A (0.0)	A (9.5)	A (0.0)	
										A (0.4)			A (0.6)		
8	Jones Street at Harry Fry Drive	TWSC	A (5.1)	-	-	-	C (19.5)	-	C (19.5)	-	A (0.0)	A (0.0)	A (8.3)	A (0.0)	-
				-			C (19.5)			A (0.0)			A (0.2)		
9	Jones Street at State Route 71	TWSC	A (7.0)	A (7.5)	A (0.0)		A (8.6)	A (0.0)		D (25.9)	B (11.0)		C (22.5)	B (13.8)	
				A (0.1)			A (5.6)			C (15.3)			B (14.9)		
10	State Route 71 at State Route 72	TWSC	A (4.6)	A (8.1)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (11.5)	-	B (11.5)
				A (3.6)			A (0.0)			-			B (11.5)		

Table 8: Existing LOS Summary: PM Peak Hour

ID	Intersection	Level of Service per Movement by Approach (Delay in sec/veh)															
		2017 Existing															
		Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
				LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
PM Peak Hour															
1	U.S. Route 58 at Wadlow Gap Highway	TWSC	A (3.6)	-	-	-	C (19.6)	-	C (19.6)	-	A (0.0)	A (0.0)	A (10.0)	A (0.0)	-
				-			C (19.6)			A (0.0)			A (3.4)		
2	U.S. Route 58/23 at Hilton Road	Signal	B (18.2)	-	-	-	D (40.0)	-	C (30.1)	-	B (12.3)	A (6.3)	D (40.8)	A (5.4)	-
				-			C (32.7)			B (11.1)			B (17.4)		
3	U.S. Route 58/23 at Food City	Signal	B (15.9)	-	-	-	D (42.8)	-	D (42.8)	-	B (15.9)	B (10.9)	D (43.0)	A (3.4)	-
				-			D (42.8)			B (15.2)			A (8.6)		
4	U.S. Route 58/23 at Kane Street	Signal	C (29.0)	D (47.1)	D (42.1)	C (32.2)	D (47.2)	D (38.2)	A (1.2)	D (44.3)		D (38.6)	C (34.5)	C (34.2)	C (23.0)
				D (42.0)			B (19.5)			D (42.2)			C (33.9)		
5	Kane Street at Jones Street	Signal	A (9.9)	A (6.9)	A (6.9)	-	-	B (14.8)	A (3.6)	-	-	-	B (16.5)	-	A (7.5)
				A (6.9)			A (8.5)			-			B (15.5)		
6	Kane Street at Bishop Street	TWSC	A (1.0)	A (8.9)	A (0.0)	-	-	A (0.0)		-	-	-	B (11.2)	-	B (11.2)
				A (0.3)			A (0.0)			-			B (11.2)		
7	Jones Street at Beech Street	TWSC	A (0.7)	B (13.0)			C (23.7)			A (8.1)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
										A (0.2)			A (0.0)		
8	Jones Street at Harry Fry Drive	TWSC	A (0.8)	-	-	-	B (12.4)	-	B (12.4)	-	A (0.0)	A (0.0)	A (8.4)	A (0.0)	-
				-			B (12.4)			A (0.0)			A (0.1)		
9	Jones Street at State Route 71	TWSC	A (9.1)	A (7.4)	A (0.0)		A (8.2)	A (0.0)		C (15.9)	B (13.8)		**F (63.2)**	B (14.3)	
				A (0.0)			A (6.3)			B (13.9)			D (26.5)		
10	State Route 71 at State Route 72	TWSC	A (3.8)	A (8.0)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (10.6)	-	B (10.6)
				A (3.2)			A (0.0)			-			B (10.6)		

Table 9: Existing Maximum Queues Summary: AM Peak Hour

ID	Intersection	Traffic Control	Maximum Queue Length by Movement (feet) 2017 Existing											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour														
1	Effective Storage Length	TWSC	-	-	-	Cont.	-	200	-	Cont.	300	300	950	-
	U.S. Route 58 at Wadlow Gap Highway		-	-	-	44	-	64	-	0	0	66	0	-
2	Effective Storage Length	Signal	-			350	-	950	-	200	250	275	3,750	-
	U.S. Route 58/23 at Hilton Road		-	-	-	166	-	110	-	208	135	170	151	-
3	Effective Storage Length	Signal	-	-	-	125			-	Cont.	150	250	200	-
	U.S. Route 58/23 at Food City		-	-	-	100			-	172	66	102	141	-
4	Effective Storage Length	Signal	200	Cont.	150	250	3,750	225	50		50	1,125	1,125	350
	U.S. Route 58/23 at Kane Street		70	201	30	112	288	223 *(1%)	112		80	306	317	52
5	Effective Storage Length	Signal	185	500	-	-	1,125	325	-	-	-	125	-	200
	Kane Street at Jones Street		164	233	-	-	287	231	-	-	-	242 **(6%) ^(1%)	-	112
6	Effective Storage Length	TWSC	500	Cont.	-	-	500		-			275		
	Kane Street at Bishop Street		53	0	-	-	< 25		-	-	-	104		
7	Effective Storage Length	TWSC	575			350			75	200	125	55	55	
	Jones Street at Beech Street		82			0			44	< 25	41	46	60	
8	Effective Storage Length	TWSC	-			Cont.	-	200	-	55	55	200	1,125	-
	Jones Street at Harry Fry Drive		-	-	-	394 **(11%) ^(1%)	-	172	-	< 25	< 25	33	0	-
9	Effective Storage Length	TWSC	150	Cont.		125	5,000		100	1,125		50	50	
	Jones Street at State Route 71		< 25	36		104	15		95 *(1%)	109		32	46	
10	Effective Storage Length	TWSC	300	5,000	-	-	Cont.	500	-			Cont.	-	375
	State Route 71 at State Route 72		53	0	-	-	0	0	-	-	-	40	-	83

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

Table 10: Existing Maximum Queues Summary: PM Peak Hour

ID	Intersection	Traffic Control	Maximum Queue Length by Movement (feet) 2017 Existing											
			Eastbound			Westbound			Northbound			Southbound		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
PM Peak Hour														
1	Effective Storage Length	TWSC	-	-	-	Cont.	-	200	-	Cont.	300	300	950	-
	U.S. Route 58 at Wadlow Gap Highway		-	-	-	71	-	54	-	0	26	120	0	-
2	Effective Storage Length	Signal		-		350	-	950	-	200	250	275	3,750	-
	U.S. Route 58/23 at Hilton Road		-	-	-	177	-	137	-	221	211	215	170	-
3	Effective Storage Length	Signal	-	-	-	125			-	Cont.	150	250	200	-
	U.S. Route 58/23 at Food City		-	-	-	274			-	286 **(6%)	150	153	152	-
4	Effective Storage Length	Signal	200	Cont.	150	250	3,750	225	50		50	1,125	1,125	350
	U.S. Route 58/23 at Kane Street		147	254 **(2%)	76	188	423 **(2%)	225 *(2%)	195		66	296	284	29
5	Effective Storage Length	Signal	185	500	-	-	1,125	325	-	-	-	125	-	200
	Kane Street at Jones Street		80	121	-	-	205	157	-	-	-	165	-	51
6	Effective Storage Length	TWSC	500	Cont.	-	-	500			-		275		
	Kane Street at Bishop Street		33	0	-	-	< 25		-	-	-	70		
7	Effective Storage Length	TWSC	575			350			75	200	125	55	55	
	Jones Street at Beech Street		48			26			30	0	0	0	0	
8	Effective Storage Length	TWSC	-			Cont.	-	200	-	55	55	200	1,125	-
	Jones Street at Harry Fry Drive		-	-	-	58	-	23	-	< 25	0	18	0	-
9	Effective Storage Length	TWSC	150	Cont.		125	5,000		100	1,125		50	50	
	Jones Street at State Route 71		0	17		83	0		84	158 **(2%)		27	39	
10	Effective Storage Length	TWSC	300	5,000	-	-	Cont.	500	-			Cont.	-	375
	State Route 71 at State Route 72		64	0	-	-	0	< 25	-	-	-	24	-	51

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

4.0 Environmental Assessment

The preliminary environmental review identifies and assesses potential impacts from the proposed project on natural and historical resources. This review was limited to available database information and a site visit of the project corridor conducted from the public thoroughfares. The environmental study area for the proposed project generally consists of an approximate 500-foot wide corridor along State Route 71 from its intersection with State Route 72 to Jones Street; Jones Street between State Route 71 and Kane Street; Kane Street from Bishop Street to U.S. Route 58/U.S. Route 23; U.S. Route 58/U.S. Route 23 from Kane Street to Wadlow Gap Highway; and Wadlow Gap Highway to U.S. Route 58. The study area location and topographic vicinity is shown in Figure 10.

The following areas were preliminarily reviewed to identify potential impacts:

- Cultural and Historic Resources
- Section 4(f) and Section 6(f)
- Natural Resources
- Hazardous Materials

4.1 Cultural and Historic Resources

Kimley-Horn reviewed the Virginia Department of Historic Resources' (VDHR) Cultural Resources Information System (V-CRIS) database to identify known architectural or archaeological sites within the study area or within the immediate vicinity of the project corridor that are eligible or potentially eligible for the National Register of Historic Places (NRHP). Under Federal law, a historic property is any district, site, building, structure, or object that is listed in or eligible for listing in the National Register of Historic Places (NRHP). To be eligible for listing, sites must meet at least one of the National Register Criteria for Evaluation, which involves examining the age, integrity, and significance of the site. Historic sites that are eligible for listing on the NRHP and/or are recommended for preservation in place by VDHR are also protected under Section 4(f). Section 4(f) is further discussed in Section 4.2

Twenty-five architectural resources were identified within the project corridor and five (5) architectural resources were identified within the immediate vicinity of the project corridor. Additionally, three (3) archaeological resources were identified within the project corridor. Table 11 below presents a summary of the architectural and archaeological resources and their eligibility status as identified in the V-CRIS database. Figure 11 depicts the identified historic resources data available for review.

Based on field observations or documentation in V-CRIS the following structures appear to have been demolished or are no longer standing:

- VDHR # 084-5155, Old McDavid House
- VDHR # 324-0005, McDavid House
- VDHR # 324-0006, Edwards House

Upon selection of a preferred alternative and advancement of the project, the project's Area of Potential Effect (APE) should be determined. A Phase I Cultural Resource Survey may be required within the APE to identify, evaluate, and determine the eligibility of historic resources. Further assessment of the project's effects to historic properties and coordination with VDHR will then be necessary for concurrence on an effect determination. If adverse effects are identified, then additional consultation including evaluation of avoidance, minimization and mitigation of impacts would be required.

In addition to the resources identified in V-CRIS, Historical Highway Markers are located along U.S. Route 421/ U.S. Route 58 on the north side of the roadway in two separate areas, between the roadway and North Fork of the Holston River, west of the overhead railroad bridge crossing. The Historical Highway Markers are associated with McConnell's Birthplace, First Court of Scott County, Big Moccasin Gap, Donelson's Indian Line, and Carter Musical Family. Three (3) Historical Highway Markers are also located along the south side of Kane Street and are associated with Blackmore's Fort, Gate City, and Faris (Ferris) Station. Relocations of markers would require additional coordination.

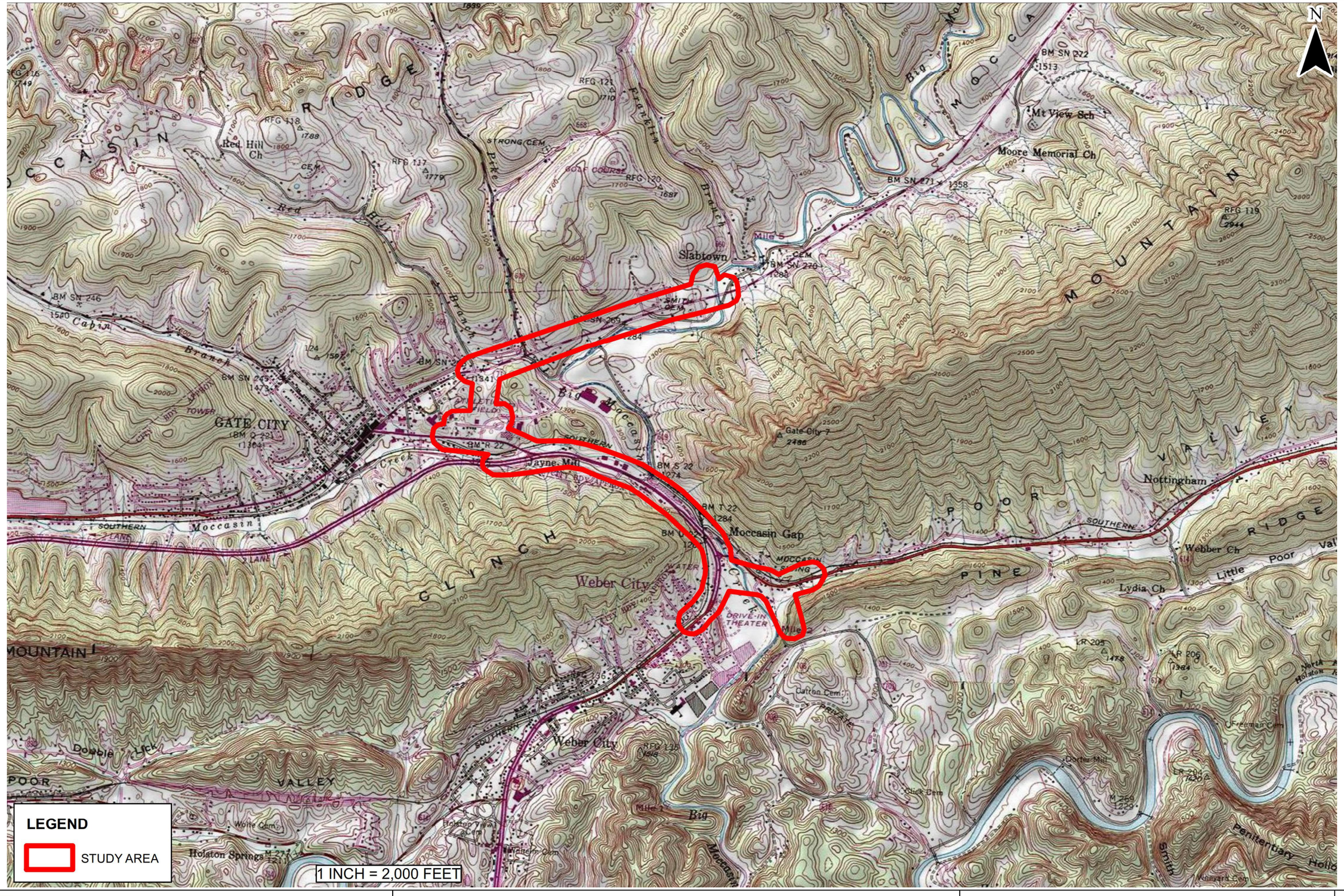
4.2 Section 4(f) & Section 6(f)

Section 4(f) of the Department of Transportation Act of 1966 stipulates that federal agencies cannot approve the use of land from publicly owned parks, recreation areas, wildlife and waterfowl refuges, or historic sites unless there is no prudent and feasible alternative to using that land, and the program or project includes all possible planning to minimize harm to the Section 4(f) resource. A "use" of a Section 4(f) property includes any acquisition of right-of-way or a permanent easement, temporary occupancy, or constructive use.

Gate City Middle School (170 Harry Fry Drive) and Gate City High School (178 Harry Fry Drive) were identified within the study area. The school's sports complex, including a softball field and a football field, is located to the north of the school buildings across Harry Fry Drive. In some cases, recreational facilities associated with schools are open to the public outside of school hours and may be considered a Section 4(f) resource.

Picnic tables were observed adjacent to the Historical Highway Markers located along northbound and southbound U.S. Route 58/U.S. Route 23 within the public right-of-way. A public park with a small information booth, maintained grassy areas, and a fenced in area seemingly for pets, was also observed along U.S. Route 58/U.S. Route 23. Additional investigation on the use of these properties should be conducted to determine if the site is a recreational area that may be protected under Section 4(f).

No other local, state, or national parks, recreational areas or wildlife and waterfowl refuges that are protected under Section 4(f) were identified within the study area. The locations of all potential Section 4(f) items are represented within Figure 12.



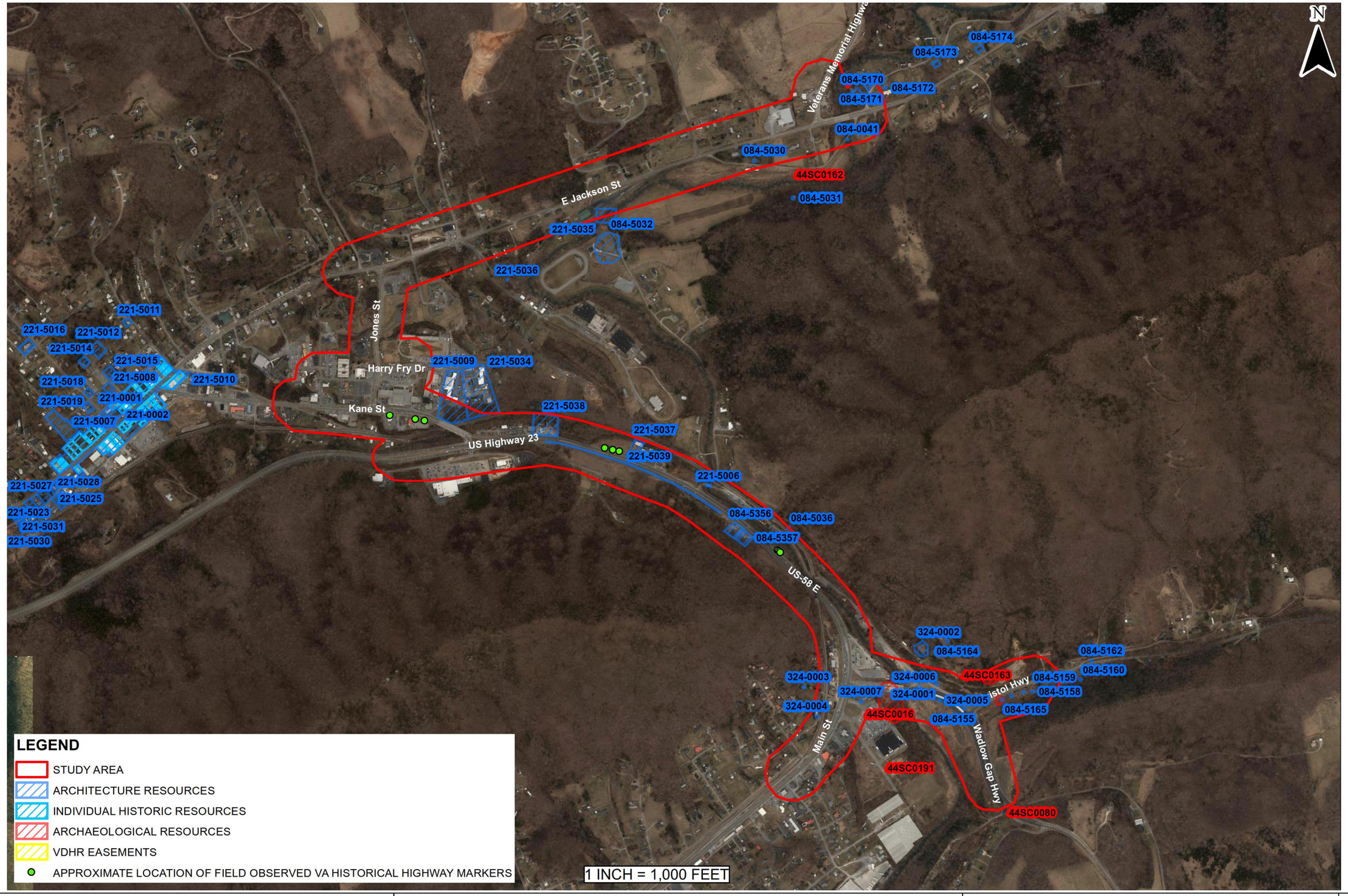
Moccasin Gap Corridor Study Scott County, VA	Topographic Vicinity	Figure 10

Table 11: Summary of Resources Identified within the Project Corridor or Immediate Vicinity

VDHR #	Resource Name	Address or Site Characteristic	Eligibility or Status
Architectural Resources			
084-0041	Bridge, Route 769	Route 769	DHR Staff: Not Eligible
084-5030	Gillenwater House	Route 796, North Side	
084-5032	John L. Q. Moore, Jr. House	Route 619, West Side	
084-0536	Lane House	Southeast of Route 619	
084-5155	Old McDavid House	143 Hilton Road (Route 58)	DHR Staff: Not Eligible
084-5156	Edith Moore House	146 Hilton Road (Route 58)	
084-5157	McDavid House Ramsey House	Route 58 Route 4 Hilton Road	DHR Staff: Not Eligible
084-5158	Robert C. McDavid House	Route 4 Box 345, Hilton Road (Route 58)	
084-5159	William E. McDavid House	Route 4 Box 346, Hilton Road (Route 58)	
084-5165	Depew House	147 Hilton Road (Route 58)	
084-5170	Williams, Selma K. House	West of Route 792 and Route 71 Intersection	DHR Staff: Not Eligible
084-5171	House	Route 792	DHR Staff: Not Eligible
084-5172	Fletcher House	Route 71	DHR Staff: Not Eligible
084-5356	Commercial Building, Route 23	3469 Route 23 South Route 58/421	
084-5357	Terry's Tack Shop Commercial Building, US Highway 23 N	3445 US Highway 23 North Route 58/421	
221-5006	Bridge 6366, Filter Plant Ford Road (Route 619), Crossing Big Moccasin Creek	Filter Plant Ford Route 619	DHR Staff: Not Eligible
221-5009	Gate City Armory Gate City Readiness Center	157 Beech Street	DHR Staff: Not Eligible
221-5034	Gate City Organizational Maintenance Shop #9	317 Harry Fry Street	DHR Staff: Not Eligible
221-5035	Footbridge 84-9004, Big Moccasin Creek, near Old Nickelsville Road (Route 793)	Old Nickelsville Road Route 793	
221-5036	Bridge #6357, Old Nickelsville Road (Route 619), crossing Pike Branch	Old Nickelsville Road Route 619	DHR Staff: Not Eligible

Table 11: Summary of Resources Identified within the Project Corridor or Immediate Vicinity

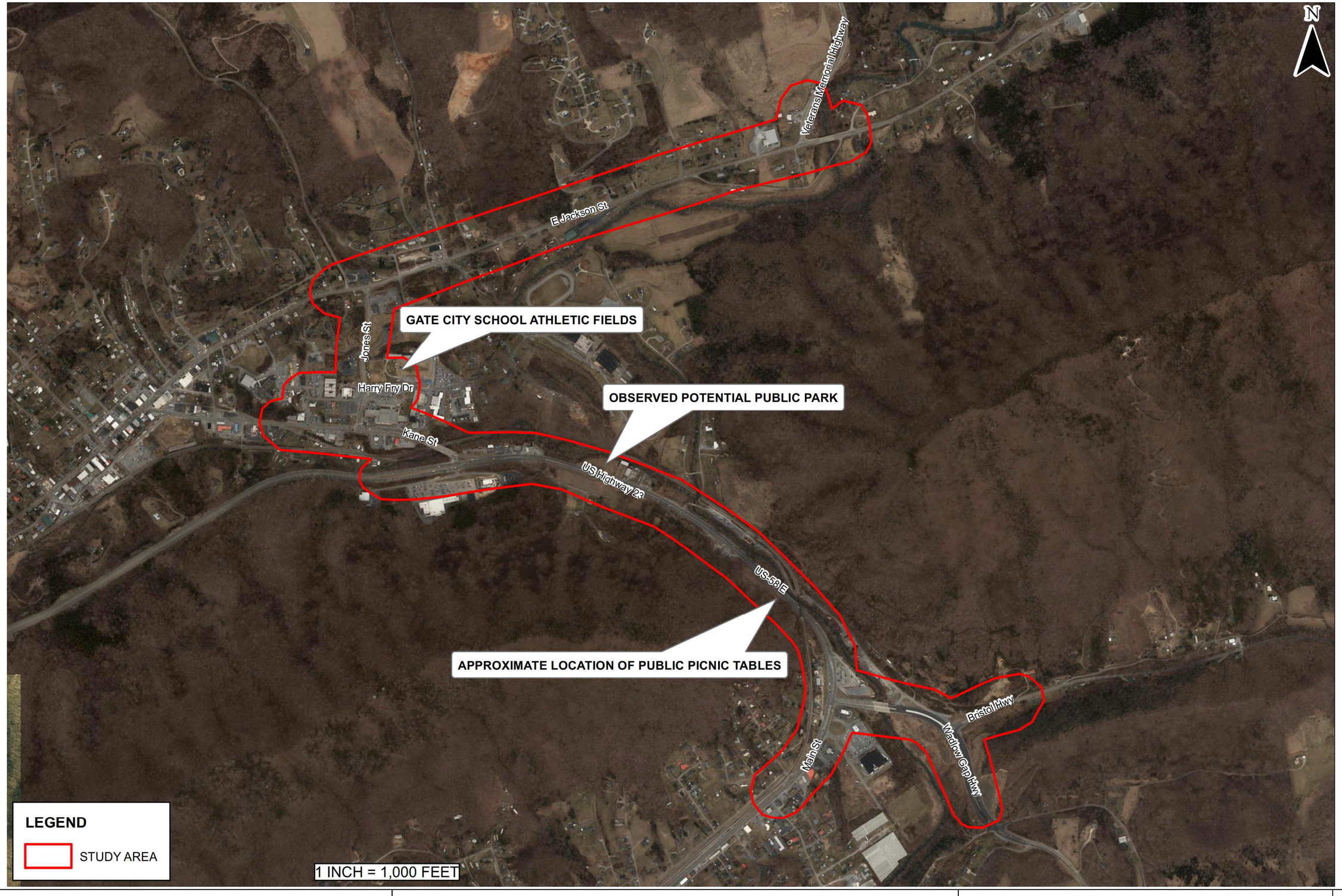
VDHR #	Resource Name	Address or Site Characteristic	Eligibility or Status
221-5037	Commercial Garage, Route 23 (function/location)(abandoned)	3762 US Highway 23 South	DHR Staff: Not Eligible
221-5038	Patriot Fuel, US Highway 23 (function/location)	3652 US Highway 23 South	DHR Staff: Not Eligible
221-5039	Stone Retaining Wall, US Highway 23 (function/location)	US Highway 23 South	DHR Staff: Not Eligible
324-0001	Thomas Moore House (current)	140 Hilton Road (Route 58)	
324-0002	Harris House (current)	North Side Hilton Road (Route 58)	
324-0003	Frame Bungalow (current)	479 U.S. Route 23, West Side	
324-0004	Spears House (current)	121A Broad Street	
324-0005	McDavid House (current)(demolished)	141 Hilton Road	
324-0006	Edwards House (current)(demolished)	131 Hilton Road (Route 58)	
324-0007	Frank Smith House (current)	482 U.S. Route 23, East Side	
Archaeological Resources			
44SC0016	Addington Spring Terrestrial, open air Native American Campsite	Early Woodland, Late Woodland, Middle Woodland (1200 B.C.E – 1606 C.E.)	DHR Staff: Not Eligible
44SC0079	Terrestrial, open air Native American Campsite	Early Archaic Period, Early Woodland, Late Archaic Period, Late Woodland, Middle Archaic Period, Middle Woodland, Paleo-Indian (15000 B.C.E. – 1606 C.E.)	DHR Staff: Not Eligibile
44SC0163	Terrestrial, open air Cemetery	Reconstruction Growth (1875 – 1899 C.E) Post Cold War, Reconstruction and Growth, The New Dominion, World War I to World War II (1900 – 1999 C.E.)	DHR Staff: Not Eligible



Moccasin Gap Corridor Study
Scott County, VA

Historic Resources Locations

Figure 11



Moccasin Gap Corridor Study Scott County, VA	Potential 4(F) Features	Figure 12

Potential historic resources identified within the project study area are described in Section 4.1. Depending upon the impacts to historic resources and the effect determination, additional coordination regarding Section 4(f) as it pertains to historic resources may be required.

The Land and Water Conservation Fund Act (LWCFA) of 1965 (16 USC 4601-4 et seq.) established a funding source to assist state and federal agencies in the acquisition and development of public outdoor recreational areas and facilities. Section 6(f) of the LWFCA requires that all properties "acquired or developed, either partially or wholly, with LWCFA funds" must be maintained as such in perpetuity.

4.3 Natural Resources

Impacts to natural resources were reviewed in the following areas:

- Floodplain
- Wetlands and Surface Waters
- Habitat

4.3.1 Floodplain

The Federal Emergency Management Agency (FEMA) defines the 100-year floodplain as the area that will be inundated by the flood event having a one percent chance of being equaled or exceeded in any given year. The study area is shown on Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for Scott County, Virginia, Community Panel Numbers 51169C0290C and 51169C0295C, dated January 07, 2015. Big Moccasin Creek is shown as Regulatory Floodway (floodway areas in Zone AE which is defined as the channel of the stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights). In addition, areas adjacent to the Regulatory Floodway around Big Moccasin Creek are shown as Zone AE (defined as areas subject to inundation by the 1% annual chance flood where base flood elevations have determined) and shaded Zone X (areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage area less than 1 square mile; and areas protected by levees from 1% annual chance flood). The remained of the Study Area is shown as unshaded Zone X which are areas determined to be outside the 0.2% annual chance floodplain. The FEMA information is located within Figure 13.

4.3.2 Wetlands and Surface Waters

Tidal and non-tidal wetlands and Waters of the US (WOUS) are subject to the jurisdiction of the US Army Corps of Engineers (USACE) and the Virginia Department of Environmental Quality (VDEQ). Subaqueous lands, tidal wetlands, and waters with a drainage area greater than five square miles are subject to the jurisdiction of Virginia Marine Resources Commission (VMRC). Permit types and the level of coordination will be determined based on the amount of impact to these jurisdictional areas. Permit issuance is subject to the level of effort during the design to first avoid, and then minimize impacts to jurisdictional areas.

GIS data, including topographic and National Wetland Inventory (NWI) mapping, National Hydrography Dataset (NHD), aerial photography, and U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey data were reviewed to identify potential wetlands, water bodies, and streams within the study area. In addition, a site visit was conducted and general locations of wetlands viewed from public thoroughfares were identified. Likely stream and wetland areas are represented within Figure 14 and described below.

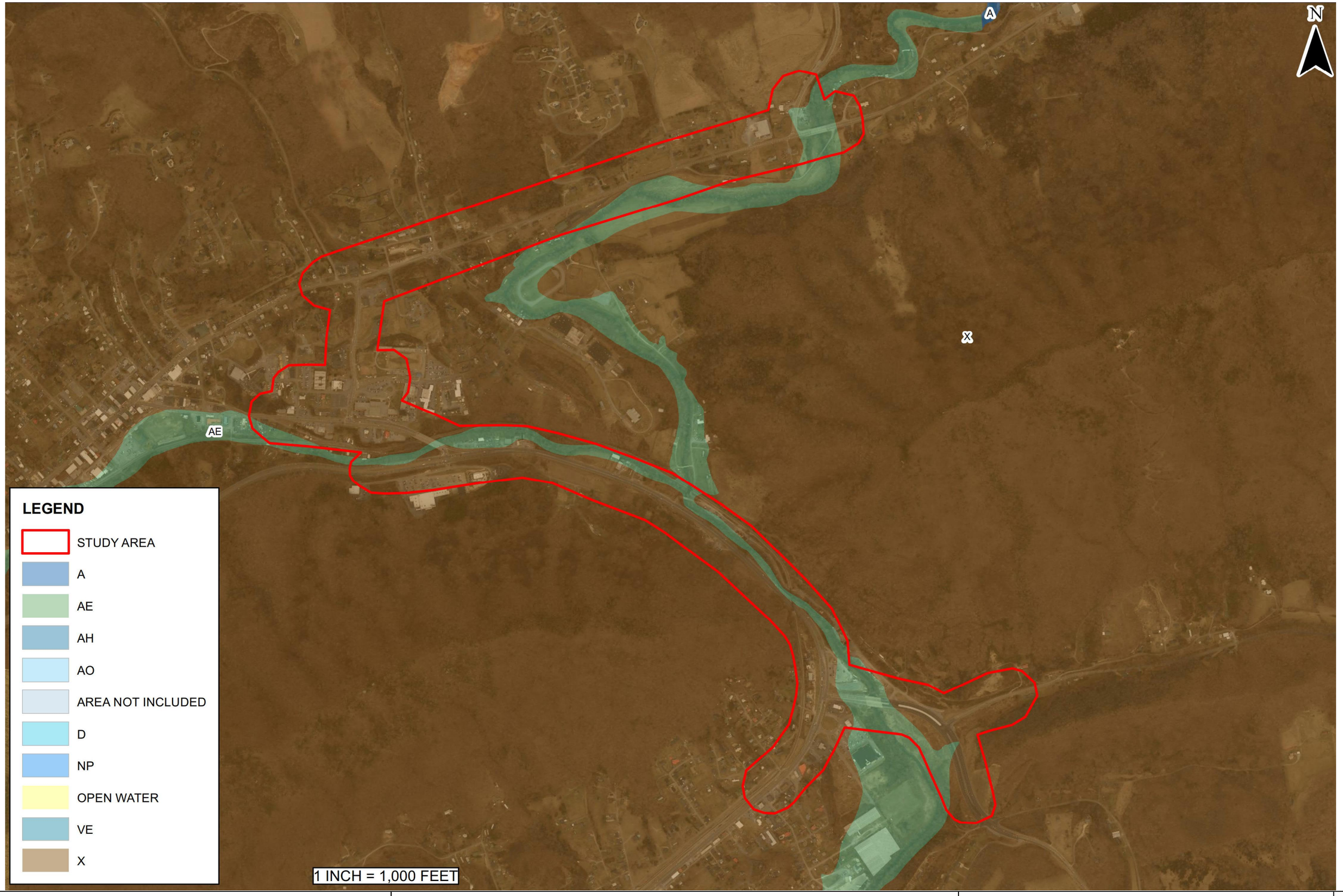
- Big Moccasin Creek is located within the northeastern and southeastern portions of the study area. This system is identified by NWI as a riverine lower perennial unconsolidated bottom system that is permanently flooded (R2UBH).
- A small palustrine emergent persistent wetland with a hydrologic regime of seasonally saturated (PEM1B) is potentially located within the southeastern portion of the study area.
- Little Moccasin Creek, Red Hill Branch and Pike are located within the central portion of the study area.

Several unnamed tributaries are associated with the identified streams. A field delineation of wetlands and WOUS in accordance with the USACE Wetland Delineation Manual (1987) and applicable Regional Supplement has not been conducted. If encroachment within the wetland and WOUS features identified is proposed, additional coordination with the USACE to determine the jurisdiction status of these features should be conducted. Following a formal delineation of the wetland and WOUS systems within the project corridor, efforts to avoid and minimize impacts to these features to the maximum extent practicable should be incorporated into the design.

4.3.3 Wildlife and Habitat

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that an undertaking is not likely to jeopardize the continued existence of species that are listed as endangered or threatened.

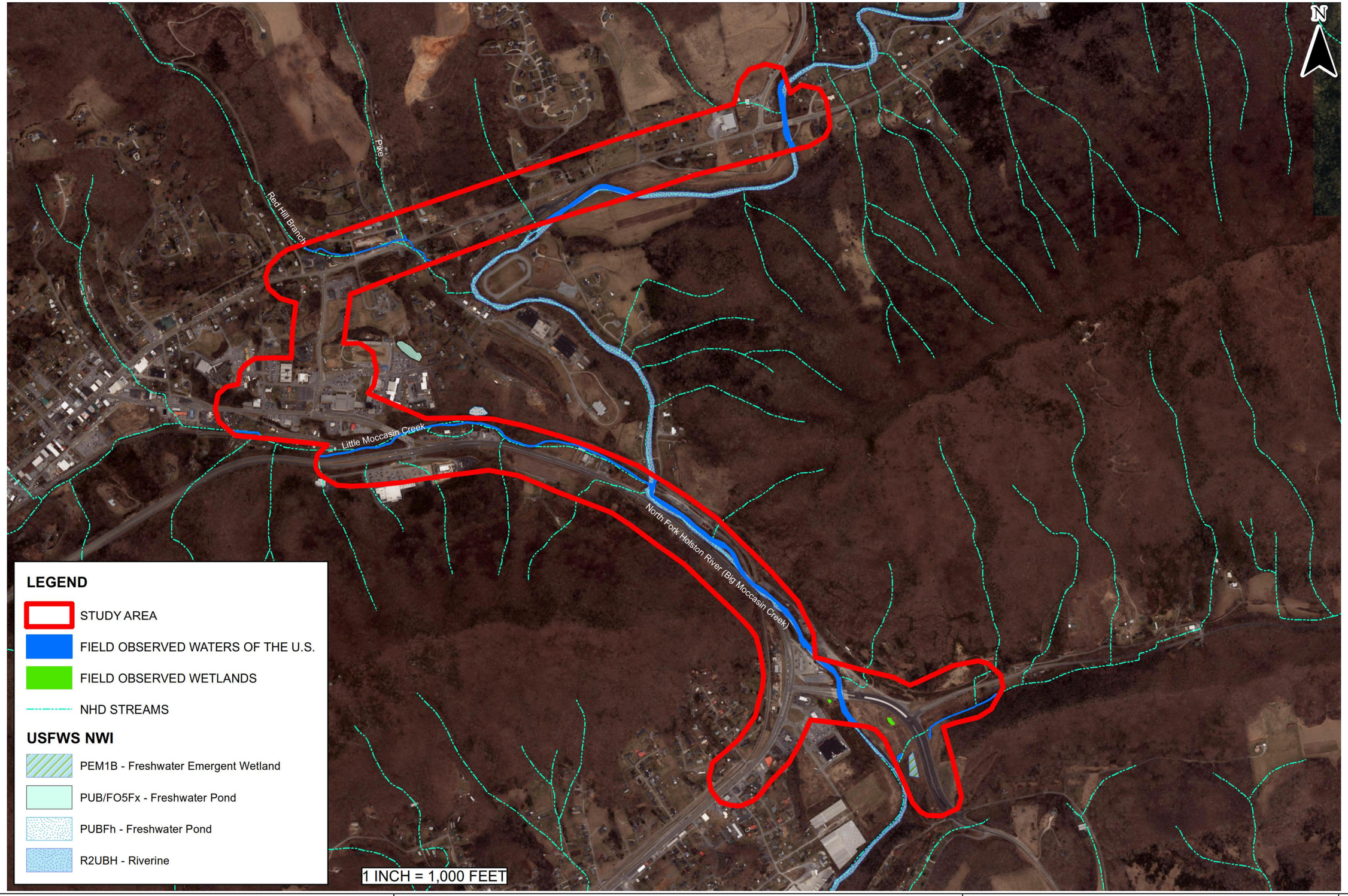
The U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Consultation (IPaC) System, the Department of Game and Inland Fisheries (VDGIF) Virginia Fish and Wildlife Information Service (VaFWIS) database, VDGIF's Wildlife Environmental Review Map Service (WERMS), VDGIF's Northern Long-Eared Bat (NLEB) Winter Habitat and Roost Trees Application, VDGIF's Little Brown Bat (MYLU) and Tri-colored Bat (PESU) Winter Habitat and Roosts Application, the Center for Conservation Biology's (CCB) Eagle Nest Locator, and the Department of Conservation and Recreation (DCR) Natural Heritage Data Explorer interactive map were reviewed to identify known federal or state listed endangered and threatened species and critical habitats within the project corridor. A summary of the species identified on the referenced databases reviewed and a preliminary evaluation of potential habitat within the study area is provided as Table 12. The WERMS database results are shown in Figure 15. The preliminary evaluation of potential habitat was based on available desktop and site-specific field studies and determinations were not conducted.



Moccasin Gap Corridor Study
Scott County, VA

FEMA Flood Zones

Figure 13



Moccasin Gap Corridor Study Scott County, VA	Potential Surface Waters	Figure 14

Table 12: Summary of Identified Threatened and Endangered Species

Species & Listing	Agency Identified By	Notes	Preliminary Habitat Conclusions
Mammals			
Gray Bat (*Myotis grisescens*) FESE	USFWS VaFWIS	Gray Bats typically live in caves year-round. During the winter, they hibernate in deep, vertical caves. In the summer, they roost in caves which are scattered along rivers. These caves are in limestone karst areas of the southeastern United States. They do not use houses or barns.	Maternity roost and winter hibernacula likely not present. Summer habitat potentially present.
Indiana Bat (*Myotis sodalis*) FESE	USFWS	There is final critical habitat for this species. The project corridor is located outside of the critical habitat. Indiana Bats hibernates primarily in caves or mines. Maternity sites generally are behind loose bark of trees or in tree cavities.	Maternity roost and winter hibernacula likely not present. Summer habitat potentially present.
Northern Long-eared Bat (*Myotis sodalis*) FESE	USFWS VaFWIS	Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Maternity roost sites and winter hibernacula were not identified on DGIF's NLEB Winter Habitat and Roost Trees Application.	Maternity roost and winter hibernacula likely not present. Summer habitat potentially present.
Virginia Big-eared Bat (*Corynorhimus townsendii virginianus)* FE	USFWS	Virginia Big-eared Bats inhabit caves in limestone karst regions dominated by mature hardwood forests. There is final critical habitat for this species. The study area is located outside the critical habitat.	Maternity roost, winter hibernacula, and summer habitat likely not present
Little Brown Bat (*Myotis lucifugus*) SE	VaFWIS	Little Brown Bats typically utilizes human dwellings (barns, sheds, attics, buildings, ect.) as well as trees and caves for maternity roosts. DGIF's Winter habitat and Roost Trees Application did not identify winter habitat within 0.25 mile of the study area or known maternity roost trees within 150 feet of the study area. However, the study area lies within the 5.5-mile outer hibernaculum buffer according to the MYLU PESU Habitat Mapper.	Maternity roost and winter hibernacula likely not present
Tri-colored Bat (*Perimyotis subflavus*) SE	VaFWIS	Tri-colored Bats typically utilize human dwellings (barns, sheds, attics, buildings, ect.) as well as trees for maternity roosts. VDGIF is not aware of any tri-colored bat roosts in Virginia.	Maternity roost and winter hibernacula likely not present
Fish			
Slender Chub (*Erimystax cahni*) FTST	USFWS VaFWIS	Slender Chub inhabit medium to fairly large rivers and are restricted to major bars and shoals of medium gravel. This species was listed on VaFWIS as having confirmed sightings within a 2-mile radius of the study area. There is final critical habitat for this species. The project corridor is located outside the critical habitat designated for this species.	Habitat potentially present

Table 12: Summary of Identified Threatened and Endangered Species

Species & Listing	Agency Identified By	Notes	Preliminary Habitat Conclusions
Spotfin Chub (*Erimonax monachus*) FTST	USFWS VaFWIS	Spotfin Chub inhabit medium to fairly large rivers. This species was listed on VaFWIS as having confirmed sightings within a 2-mile radius of the study area. There is final critical habitat for this species. The study area is located outside the critical habitat.	Habitat potentially present
Yellowfin Madtom (*Noturus flavipinnis*) Experimental Population, Non-Essential FTST	USFWS VaFWIS	Yellowfin Madtom are listed as threatened in specified portions of the Holston River and its watershed. This species is found in medium to large sized creeks and small rivers. More specifically, this species prefers slow pools and riffles under cover. This species was listed on VaFWIS as having confirmed sightings within a 2-mile radius of the study area.	Habitat potentially present
Clams			
Birdwing Pearlymussel (*Lemiox rimosus*) FE	USFWS VaFWIS	The Birdwing Pearlymussel inhabits riffle pool areas with stable sand and gravel substrates in small to medium sized rivers.	Habitat potentially present
Cumberlandian Bean (*Villosa trabalis*) FE	USFWS	Cumberlandian Beans inhabit sand, gravel, and cobble substrates in waters with moderate to swift currents and depths less than 1 meter. No critical habitat has been designated for this species.	Habitat potentially present
Cumberlandian Monkeyface (pearlymussel) (*Quadrula intermedia*) FESE	USFWS VaFWIS	The Cumberland Monkeyface inhabits shallow riffle pool areas and shoal areas within headwater streams and large rivers. No critical habitat has been designated for this species.	Habitat potentially present
Cumberlandian Combshell (*Epioblasma brevidens*) FESE	USFWS VaFWIS	Cumberlandian Combshell inhabit large creeks to large rivers, in substrates ranging from coarse sand to mixtures of gravel, cobble, and boulder-sized particles. This species was listed on VaFWIS as having confirmed sightings within a 2-mile radius of the study area. There is final critical habitat for this species. The project study area is located outside of the designated critical habitat.	Habitat potentially present
Finerayed Pigtoe (*Fusconaia cuneolus*) FE	USFWS VaFWIS	The Finerayed Pigtoe inhabits shoals of creeks and rivers. It prefers smaller streams with stable gravel substrates and a moderate current. This species was listed on VaFWIS as having confirmed sightings inside the boundaries of the study area.	Habitat potentially present
Fluted Kidneyshell (*Ptychobranchus subtentum*) FE	USFWS VaFWIS	The Fluted Kidneyshell inhabits small to medium rivers in areas with swift current or riffles. It is often embedded in sand, gravel, and cobble substrates.	Habitat potentially present
Green Blossom (*Epidoblasma torulosa gubernaculum*) FE	USFWS VaFWIS	Green Blossum is known to inhabit the substrate within shallow riffle and shoal areas of clean, fast-flowing water. VaFWIS has listed confirmed sightings of this species within a 2-mile radius of the study area. No critical habitat has been designated for this species.	Habitat potentially present

Table 12: Summary of Identified Threatened and Endangered Species

Species & Listing	Agency Identified By	Notes	Preliminary Habitat Conclusions
Littlewing Pearlymussel (*Pegias fabula*) FESE	USFWS VaFWIS	The Littlewing Pearlymussel inhabits small creeks and small to medium sized rivers. It prefers riffle pools with sand or gravel substrates.	Habitat potentially present
Oyster Mussel (*Epioblasma capsaeformis*) FESE	USFWS VaFWIS	This species usually inhabits riffle areas exhibiting high energy flows, high water quality, and rocky substrates. There is final critical habitat for this species. The project study area is located outside of the critical habitat designated for this species.	Habitat potentially present
Purple Bean (*Villosa perpurpurea*) FESE	USFWS VaFWIS	Purple Beans inhabit riffles in creeks to medium-sized rivers and occasionally headwaters. This species was listed on VaFWIS as having confirmed sightings within a 2-mile radius of the study area. There is final critical habitat for this species. The project study area is located outside of the critical habitat designated for this species.	Habitat potentially present
Rough Rabbitsfoot (*Quadrula cylindrica strigillata*) FESE	USFWS VaFWIS	Rough Rabbitsfoot inhabit small headwater tributaries near banks or in shoals with clean water and gravel bottoms. VaFWIS listed confirmed sightings of the species inside of the study area. There is final critical habitat for this species. The project study area is located outside of the critical habitat designated for this species.	Habitat potentially present
Shiny Pigtoe (*Fusconaia cor*) FE	USFWS VaFWIS	The Shiny Pigtoe is commonly found in shoals and riffle pools within small to medium sized rivers with clear water and a moderate to fast current. VaFWIS has listed confirmed sightings of this species within a 2-mile radius of the study area.	Habitat potentially present
Slabside Pearlymussel (Pleuronaia dolabelloides) FESE	USFWS VaFWIS	Slabside Pearlymussels inhabit high gradient riffles systems in creeks and large rivers.There is final critical habitat for this species. The study area is located outside of the critical habitat designated for this species.	Habitat potentially present
Snuffbox Mussel (*Epioblasma triquetra*) FESE	USFWS VaFWIS	Snuffbox Mussels inhabit riffles of small and medium creeks, large rivers, and in shoals of lakes. VaFWIS has listed confirmed sightings of this species within a 2-mile radius of the study area. No critical habitat has been designated for this species.	Habitat potentially present
Spectaclecase Mussel (*Cumberlandia monodonta*) FESE	USFWS VaFWIS	Spectaclecase Mussels inhabit riverine microhabitats that are sheltered from the main force of current. No critical habitat has been designated for this species.	Habitat potentially present
Tennessee Bean (Venustaconcha trabalis) FESE	VaFWIS	VaFWIS has listed confirmed sightings for this species inside the study area. No critical habitat has been designated for this species.	Habitat potentially present
Other			
Bald Eagle (*Haliaeetus leucocephalus*) FS	CCB	The CCB's Eagle Nest Locater did not depict bald eagle nests within 660-feet of the study area.	No nests identified

Note: FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FS=Federal Species of Concern

The project site was submitted to DCR through the Virginia Natural Heritage Data Explorer (NHDE) to identify natural heritage resources within the vicinity of the project site. Natural heritage resources are defined by DCR as "the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations." DCR also typically provides comments regarding anticipated negative impacts and recommendations to avoid, minimize or mitigate impacts.

According to the initial project report, dated April 30, 2018, DCR identified the following:

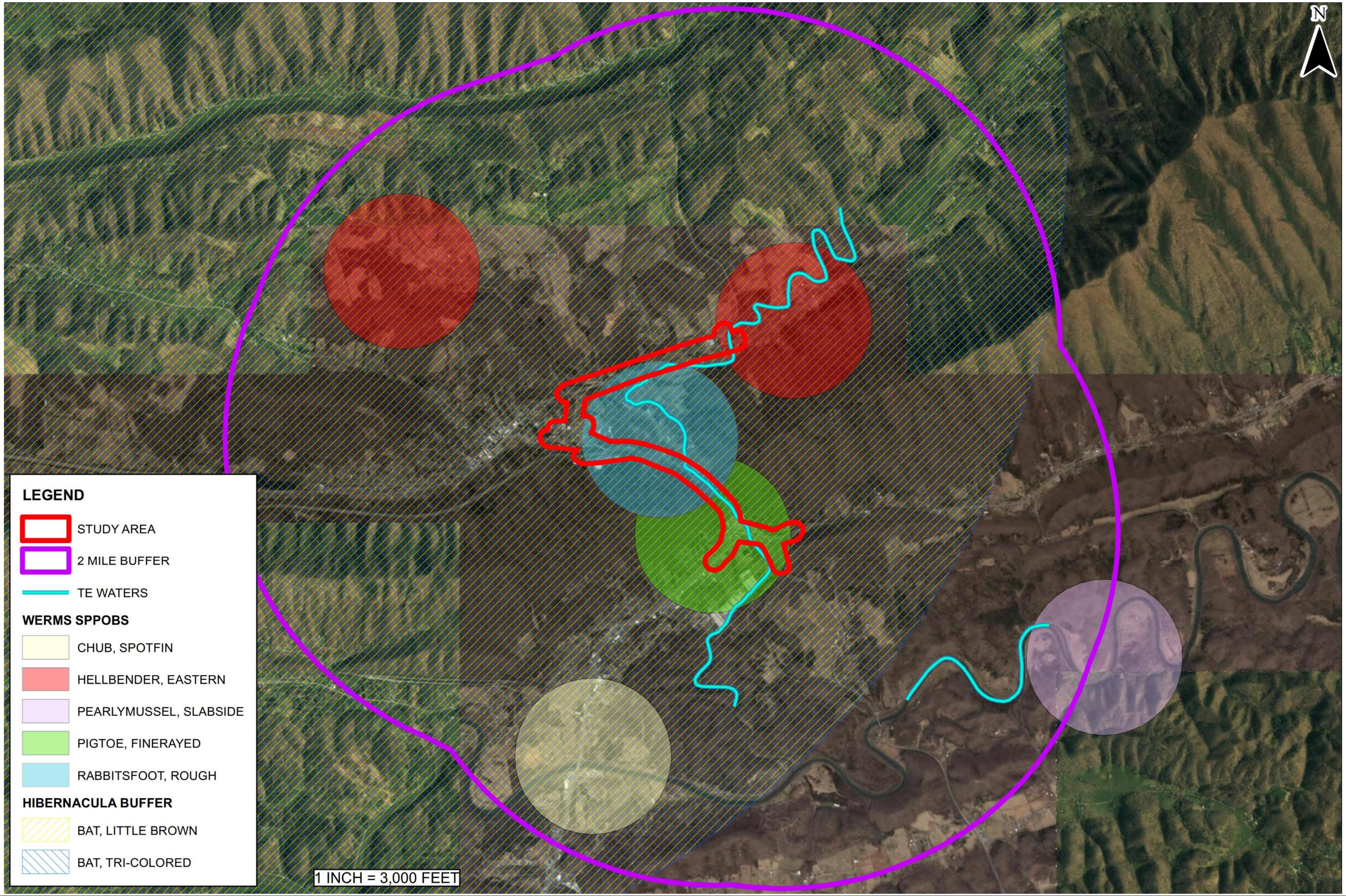
- General Location of Natural Heritage Resources (GLNHR) – four (4) GLNHR sites were identified within a 2-mile radius of the study area.
- Conservation Sites - two (2) conservation sites were identified within the study area. The Coley Herron and Blair Collins conservation sites are located ± 1.5 miles north of the study area and are described as a site encompassing land containing one (1) or more biologically significant karst resources.
- Stream Conservation Units (SCUs) – three (3) SCUs identified as Big Moccasin Creek SCU, Clinch River-Little River SCU, and North Fork Holston River – Big Moccasin Creek- Hilton Creek SCU were identified within a 2-mile radius of the study area. The North Fork Holston River – Big Moccasin Creek- Hilton Creek SCU is located within the project corridor and is described as an SCU that delineates riparian reaches that provide habitat for one (1) or more rare aquatic plants or animals. Based on the mapping, it appears that the other two (2) identified SCUs are located outside of the study area but within a 2-mile radius.

Upon selection of a preferred alternative and advancement of the project additional coordination with resource agencies regarding threatened and endangered species may be required.

4.4 Hazardous Materials

The Virginia Department of Environmental Quality's (VDEQ) GIS datasets and Virginia Environmental Geographic Information Systems (VEGIS) were reviewed for known petroleum releases, tank facilities, and Voluntary Remediation Program (VRP) sites within the study area.

The study area is developed with a mix of commercial and residential land uses. Commercial land uses consist of retail, restaurants, gas stations, and hotels. Based on a review of the VDEQ GIS data, petroleum release sites and registered tank facilities were identified within the study area. No VRP sites were identified within the study area. Specifically, nineteen (19) petroleum releases and eleven (11) registered tank facilities were identified within the study area or immediately adjacent to the study area. Table 13 and Table 14 provides a summary of petroleum and registered tank facilities within the study area, respectively, with their locations illustrated in Figure 16.



Moccasin Gap Corridor Study
Scott County, VA

VDGIF WERMS Database Results

Figure 15

Table 13: Summary of Petroleum Releases

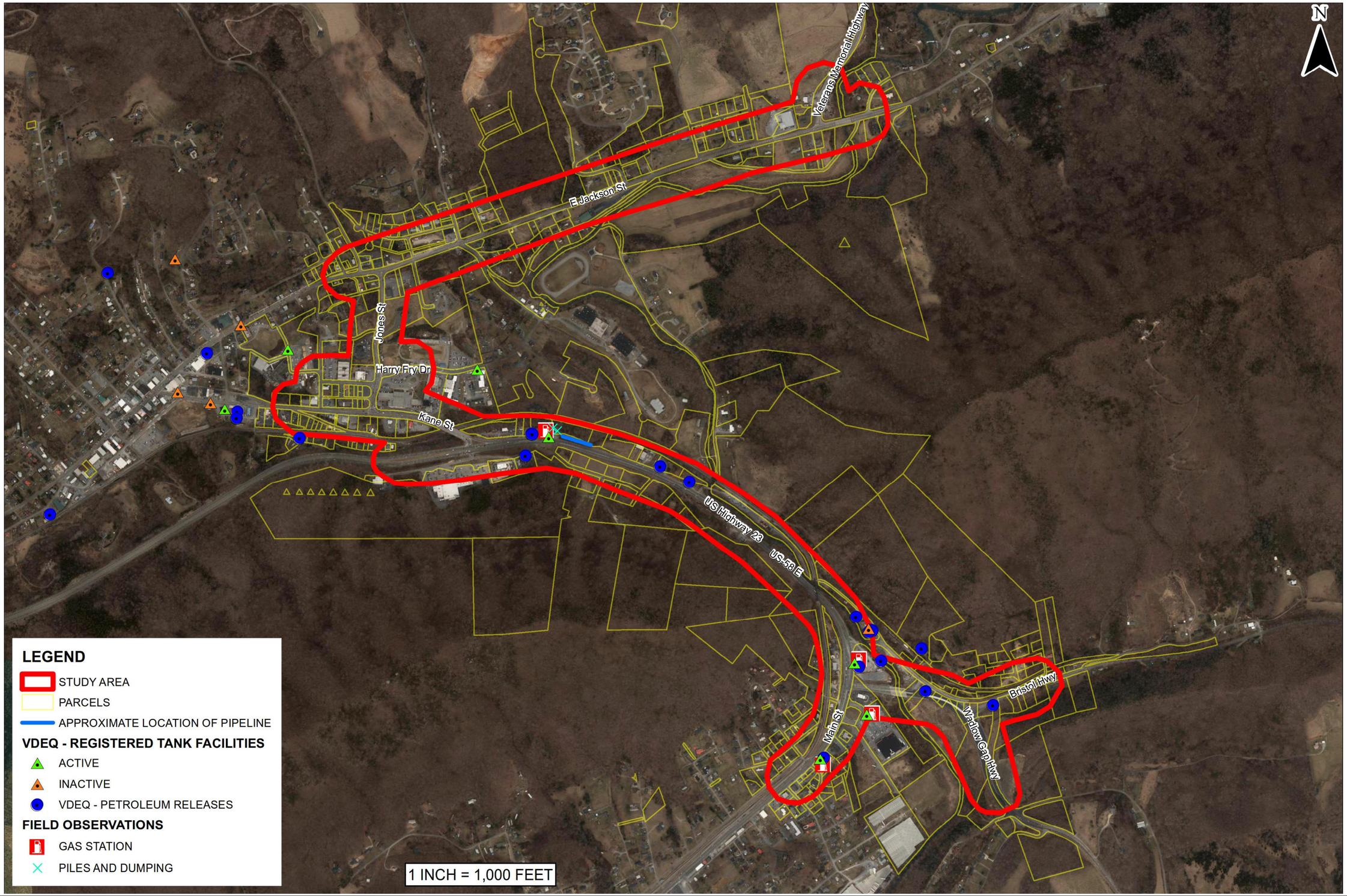
Facility Name	Facility Address	PC Number	Case Status	Release Status	Release Reported Date	Date Case Closed
Gate City 66 Station	744 Kane Street	19943046	Closed	Suspected	3/23/1994	4/21/1994
Addington Oil Co's Abandonded Site/Gate City	243 Kane Street	19990385	Closed	Confirmed	3/24/1999	2/12/2001
Mid-Town Quik Stop Market	241 Kane Street	20061060	Closed	Confirmed	1/29/2006	12/22/2009
Cornette Fostina Property	122 Magnolia Avenue	20051023	Closed	Confirmed	9/21/2004	11/17/2004
Wilderness Road Market	3952 US Highway 23 North	20011028	Closed	Suspected	10/12/2000	1/26/2001
Wilderness Road Market Release #2	3952 US Highway 23 North	20051025	Closed	Suspected	9/30/2004	6/13/2005
		20041037	Closed	Suspected	11/11/2003	1/12/2004
Smith Electric Property	N/A	20011035	Closed	Confirmed	9/21/2000	2/03/2005
Gate City Ford	Intersection of US Route 23 & State Route 619	20011036	Closed	Confirmed	10/12/2000	10/26/2000
Gate City Area Headquarters (VDOT)	Intersection Route 58 & 23 North	20041027	Closed	Suspected	10/03/2003	12/17/2003
		19960181	Closed	Confirmed	11/17/1995	8/12/1996
		19942676	Closed	Confirmed	4/22/1994	6/05/1995
		19950128	Closed	Confirmed	11/28/1994	9/18/1996
Fugate, Jim Ray Property	Near intersection of US58/421 and US 58	20011103	Closed	Confirmed	6/01/2001	7/18/2001
Bright's 76 Station	498 US Highway 23 North	19900727	Closed	Confirmed	12/12/1989	6/19/1990
VDOT – Former Harris Residence	117 Bouquet Drive	20121007	Closed	Confirmed	1/04/2012	1/20/2012
Frank Smith Property	On US 58/421	20011102	Closed	Confirmed	6/01/2001	7/16/2001
McDavid Property	Route 58	20041022	Closed	Confirmed	10/06/2003	2/12/2004
Weber City Quik Stop Market	452 US Highway 23 North	20081051	Closed	Suspected	2/29/2008	9/16/2008

Table 14: Summary of Registered Tank Facilities

Facility Name	Facility Address	Facility ID	Facility Type	Facility Active	Active UST	Inactive UST
Twin Springs High School	273 Titan Lane	1022960	Local	No	0	2
Scott County School Bus Garage	200 Bishop Street	1018182	Local	Yes	2	3
Gate City 66	744 Kane Street	1010492	Gas Station	No	0	4
Broadwater Veterinary Hospital	133 Kane Street	1007238	Commercial	No	0	3
Mid-Town Quik Stop Markey	241 Kane Street	1012724	Gas Station	Yes	4	6
VDMA – Gate City Armory FMS 9	312 Harry Dry Drive	1008219	State	Yes	0	4
Wilderness Road Enterprises	3952 US Highway 23 North	1010460	Gas Station	Yes	5	3
Gate City Area Headquarters	Intersection of Route 58 & 23 North	1019538	State	No	0	4
Big Break Food Store 1	498 US Highway 23 North	1018176	Gas Station	Yes	4	4
Food City Gas N Go #820	480 US Highway 23 North	1037643	Gas Station	Yes	2	0
Weber City Quik Stop Market	2882 US Highway 23 North	1012725	Gas Station	Yes	5	4

In addition to a review of GIS data, a site visit was conducted on May 2, 2018 to review the project corridor and adjacent properties from the study area public thoroughfares. A Patriot Fuels gas station was observed between U.S. Route 23/58 and Little Moccasin Creek. A large amount of old metal debris covered in dirt was observed behind Patriot Fuels on the toe slope leading down to Little Moccasin Creek. A metal pipeline was also observed to the east of Patriot Fuels at the base of the slope. The current usage of the pipeline was unable to be determined but no apparent staining, leaks, or sheens were observed within its vicinity. An Exxon gas station was observed in the northeast quadrant of the Wadlow Gap Highway and Main Street intersection. A Gas n' Go gas station was observed along the southern edge of Wadlow Gap Highway in the Food City parking lot. A Quick Stop gas station was observed along the east side of Main Street, approximately 500 feet south of the Food City shopping center intersection.

Prior to the implementation of any corridor improvements that could impact these areas, it is recommended that a detailed review be conducted to assess and identify the potential for the selected contractor to encounter contamination during construction. In addition, if right-of-way acquisition will be required for the proposed project, a Phase I Environmental Site Assessments (ESA), conducted in accordance with American Society of Testing and Materials (ASTM) Standard 1527-13, may be required.



Moccasin Gap Corridor Study
Scott County, VA

Hazardous Materials

Figure 16

5.0 Future Conditions Analysis

Future traffic volumes were developed for the study horizon year of 2030. These volumes represent the projected growth that is expected to occur within and around the study area. This section details the methods and process for determining future traffic volumes for the study area corridor and intersections.

5.1 Future Traffic Volumes

To establish 2030 horizon year traffic volumes within the study area, several growth and developmental factors were taken into consideration. Anticipated future traffic volumes based on historical trends, previous studies, and regional projections were determined through conversations with VDOT staff, Scott County staff, and/or obtained from the Kingsport MPO. For the purposes of this study, existing traffic patterns/travel behaviors were assumed to remain consistent through 2030. The following sections detail the sources of data that were reviewed and considered in the development of the future horizon year traffic volume projections.

5.1.1 Historical VDOT Annual Average Traffic Volume Estimates

Using historical data from VDOT's daily traffic volume estimates, annual growth rates were calculated for the study corridor to assist in the development of future mainline traffic volume projections. Ten (10) years (2008 – 2017) of historic traffic volume estimates along the Kane Street/Jones Street and State Route 71 were obtained from VDOT and are shown in Table 15. Based on these trends, traffic volumes have shown little to no growth during the past 10 years. Rather than assume a 0% growth rate, other sources of future growth projections were considered as part of the development of future traffic volumes.

Table 15: 10-Year Historic Average Annual Traffic Volumes

Roadway	Location	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
U.S. Route 58	SR 224 to Kane Street	31,000	27,000	27,000	27,000	27,000	27,000	27,000	26,000	27,000	27,000
Growth Rate to 2017		*-1.5%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*1.9%*	*0.0%*	-
Kane Street/Jones Street	U.S. Route 23 to Jackson Street	19,800	19,800	19,900	19,800	21,300	20,100	21,200	19,700	19,900	21,100
Growth Rate to 2017		*0.7%*	*0.8%*	*0.8%*	*1.1%*	*-0.2%*	*1.2%*	*-0.2%*	*3.5%*	*6.0%*	-
State Route 71	Jones Street to State Route 72	14,000	14,000	14,000	17,000	17,000	18,000	16,000	17,000	18,000	18,000
Growth Rate to 2017		*2.8%*	*3.2%*	*3.7%*	*1.0%*	*1.1%*	*0.0%*	*4.0%*	*2.9%*	*0.0%*	-

Source: VDOT Traffic Engineering Division: Annual Average Daily Traffic Volume Estimates By Section of Route

5.1.2 Travel Demand Model Growth Projections

The Kingsport MPO's Regional Travel Demand Model (TDM) that includes the roadways in the study area was also reviewed to assist in determining future growth projections. The TDM has a base year of 2015 and a horizon year of 2040. Based on the projected daily traffic volumes produced from the TDM for the study area roadways, an average growth rate of 0.5% per year was determined. Outputs from the TDM are included in Appendix E. This growth rate was vetted by VDOT and Scott County and then applied to the background traffic to calculate 2030 traffic volumes projections.

5.1.3 Known/Approved Developments

In addition to the background traffic growth rate, anticipated and approved developments were also included in the development of future traffic volumes. At the time of this study, the only known and approved development within the study area included a proposed Taco Bell restaurant located on Kane Street. The traffic impact analysis (TIA) that was conducted for the proposed development was provided by VDOT. Trips generated by the proposed Taco Bell were directly assigned to the study area intersections proportionally based on existing turning movement counts or using the methods contained within the provided TIA. The additional development related traffic volumes then were incorporated into the future 2030 traffic volume projections.

5.1.4 2030 Future Traffic Volumes

The 2030 future AM and PM peak hour traffic volumes are illustrated in Figure 17. Detailed traffic volume worksheets used as a part of the future conditions analysis are provided in Appendix E.

5.2 Future No Build Conditions

To conduct 2030 No Build operational analyses, future traffic volumes were assigned the existing model network to evaluate projected vehicle delays, LOS, and maximum queues lengths at each study area intersection. For each of the future No Build condition analysis scenarios (i.e., AM and PM), existing traffic signal timings were updated and optimized to account for the proposed changes in future volumes and/or roadway geometry (i.e., committed or programmed projects anticipated to be constructed and in place by 2030). This included reviewing each intersection's cycle length, splits, and offsets. In all future analysis models, it was assumed that study area signalized study intersections would be coordinated where applicable to enhance traffic progression.

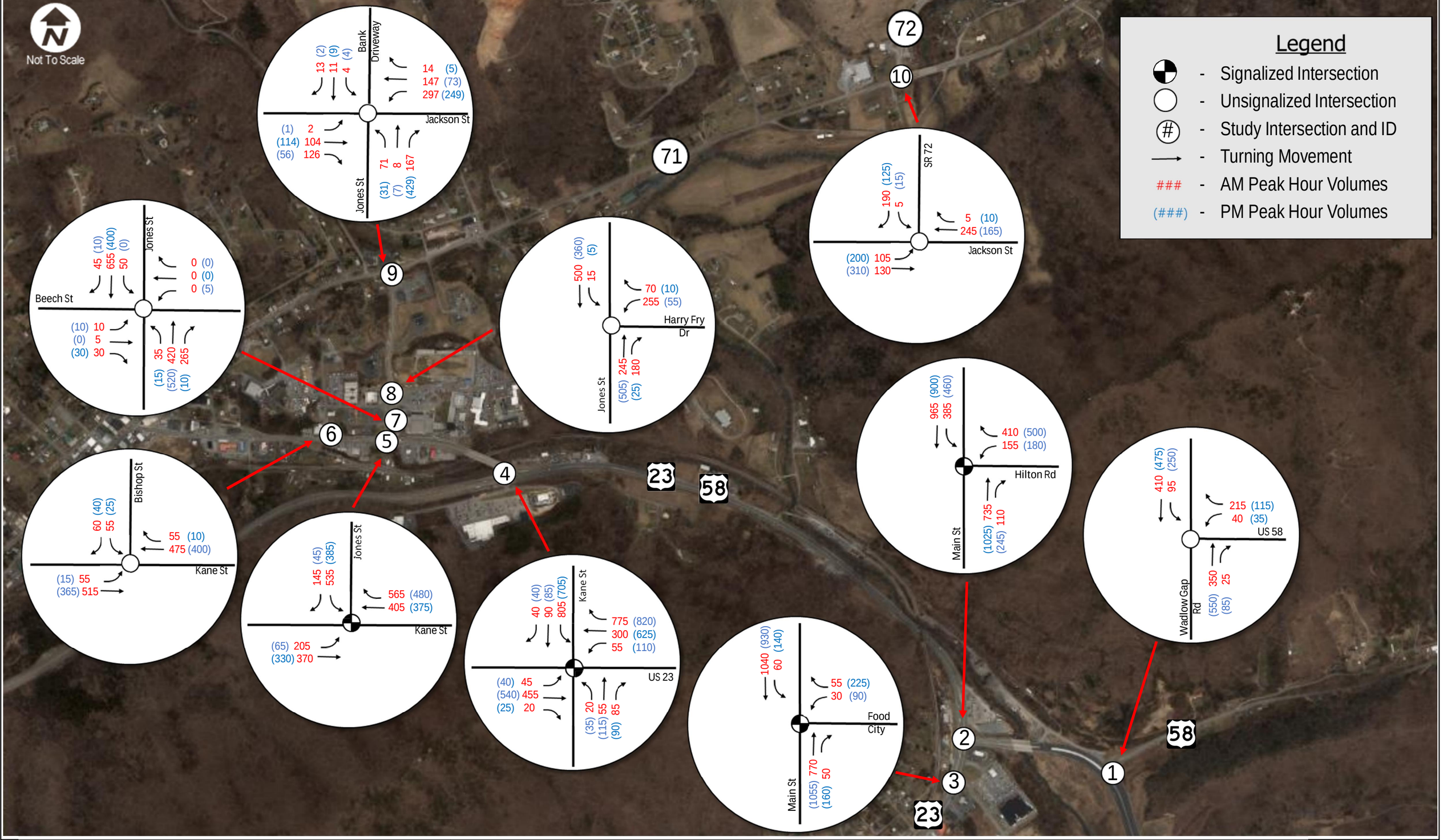
Per the TOSAM, an initial sample size of 10 simulation runs for the future SimTraffic models were conducted before VDOT's Sample Size Determination process was performed. This ensures that an appropriate number of runs have been conducted and that simulation results are reasonable. For this analysis, simulated speeds were used from a critical link to validate the number of model simulations analyzed. Based on the sample size evaluation, a 10-simulation run sample size was verified as adequate for all future models analyzed in this study. The complete sample size evaluation results for the future condition model simulation results are contained in Appendix B.

Table 16 through Table 35 presented in Section 5.4 summarize future AM and PM peak hour vehicular delay, LOS, and maximum simulated queue length results for each intersection, movement, and approach. Existing condition results are also shown for each study area intersection for comparison purposes. Delays in "bold" represent movements operating at LOS E or worse, while queue lengths in "bold" represent queues that exceed the available storage lengths and spill back to an upstream intersection.

Not To Scale

Legend

- Signalized Intersection
- Unsignalized Intersection
- # - Study Intersection and ID
- Turning Movement
- ### - AM Peak Hour Volumes
- (###) - PM Peak Hour Volumes



Moccasin Gap Corridor Study Scott County, VA	2030 AM and PM Peak Hour Traffic Volumes	Figure 17

5.2.1 Future No Build Operational Analysis Summary

Based on the future No Build operational analysis of the study area, it was found that most of the intersections are projected to operate with minor delays and/or queues. However, select improvements were identified to enhance critical movement operations and improve overall traffic flows under short- and mid- term conditions.

5.3 Proposed Improvements

Based on the future No Build operational analysis, various levels of improvements and alternatives were considered for the study area intersections. These alternatives were divided into three categories based on the anticipated cost, impacts to adjacent properties, time to implementation, and the general scale of the proposed improvement:

- Short-Term Alternatives (e.g., adding/extending turn-lanes, traffic signal phasing modifications, etc.)
- Mid-Term Alternatives (e.g., minor intersection construction, innovative intersections, etc.)
- Long-Term Alternatives (e.g., major intersection construction, new roadways, innovative intersections, etc.)

The following sections describe the various improvements and alternatives considered as part of this study and present the operational benefits/findings associated with the proposed improvements.

5.3.1 Short-Term Improvements

It was determined that minor modifications at several of the study area intersections could be implemented at a relatively low cost to mitigate deficient operational conditions and extend the life-span of the existing facilities. The improvements were identified separately from the mid- and long-term alternatives for the study area intersections and include the following improvements:

- U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)
  - Add right-turn overlap phasing for the westbound and northbound right-turn movements
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- U.S. Route 23 at Food City (Signalized)
  - Add right-turn overlap phasing for the northbound right-turn movement
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- Kane Street at Jones Street (Signalized)
  - Implement coordinated, time of day plans traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
  - Install pedestrian accommodations (i.e., ADA Accessible, countdown pedestrian signals, etc.)

5.3.2 Mid-Term Improvements

The mid-term improvements were identified for the following study area intersections:

- U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)
  - Extend the southbound left-turn lanes
  - Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site
- U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)
  - Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)
- Kane Street at Bishop Street (Unsignalized)
  - Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)
- Jones Street at State Route 71 (Unsignalized)
  - Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to "T" into the new intersection and be served by STOP control.
  - New People's Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road.
- Jones Street Access Management
  - Implement right-in/right-out access controls at select site access driveways on Jones Street
  - Realign Beech Street to Harry Fry Drive
  - Modify Middle and High School bus circulation and parking areas

5.4 Future Build Conditions Operational Analysis

The short- and mid-term improvement were analyzed to evaluate their effectiveness on operations and to compare the differences between No Build and Build conditions. This section describes the methods and results of the operational analysis. The proposed improvements for the study area intersections were combined into a 2030 "Build Scenario" and were analyzed using Synchro and SimTraffic models. The proposed short- and mid-term improvement alternatives were combined into a 2030 "Build Scenario" and were analyzed using Synchro and SimTraffic models. For each of the future conditions analysis scenarios, existing signal timings were updated/optimized to account for the proposed changes in future volumes and roadway geometry. This included reviewing each intersection's cycle length, splits, phasing, and offsets. In all future analysis models, it was assumed that all signalized study area intersections would be coordinated where applicable to enhance traffic progression and operational efficiency. Detailed analysis for the 2030 Build Scenario is provided below with the delay, LOS, and maximum queuing results summarized in Table 16 through Table 35. Discussion and comparisons to the No Build scenario are also provided in the following sections for each study area intersection. Discussion of the long-term alternatives impacts are provided in Section 5.5. Detailed Synchro and SimTraffic outputs for future conditions analyses are provided in Appendix F of the report.

5.4.1 U.S. Route 58 at Wadlow Gap Highway (Unsignalized)

Future delay, LOS, and queue length results for the U.S. Route 58 at Wadlow Gap Highway intersection are summarized in Table 16 and Table 17, respectively. No improvements were identified for this intersection under future Build conditions. Under future conditions (i.e., No Build and Build), this intersection will remain unsignalized and is expected to operate at an overall LOS A during the AM and PM peak hours, with all individual movements operating at LOS C or better. This intersection is also expected to experience minor queues with no instances of blocking projected under 2030 future conditions.

Overall, the intersection of U.S. Route 58 at Wadlow Gap Highway is projected to experience little to minor delays and queue lengths. No additional geometric improvements or recommendations are proposed for this intersection.

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Table 16: U.S. Route 58 at Wadlow Gap Highway 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (3.5)	-	-	-	B (12.4)	-	B (12.4)	-	A (0.0)	A (0.0)	A (8.5)	A (0.0)	-
			-		B (12.4)			A (0.0)			A (1.6)		
2030 No Build	A (3.5)	-	-	-	B (12.5)	-	B (12.5)	-	A (0.0)	A (0.0)	A (8.5)	A (0.0)	-
			-		B (12.5)			A (0.0)			A (1.6)		
2030 Build	A (3.5)	-	-	-	B (12.5)	-	B (12.5)	-	A (0.0)	A (0.0)	A (8.5)	A (0.0)	-
			-		B (12.5)			A (0.0)			A (1.6)		
PM Peak Hour													
2017 Existing	A (3.6)	-	-	-	C (19.6)	-	C (19.6)	-	A (0.0)	A (0.0)	A (10.0)	A (0.0)	-
			-		C (19.6)			A (0.0)			A (3.4)		
2030 No Build	A (4.0)	-	-	-	C (23.3)	-	C (23.3)	-	A (0.0)	A (0.0)	B (10.4)	A (0.0)	-
			-		C (23.3)			A (0.0)			A (3.6)		
2030 Build	A (4.0)	-	-	-	C (22.6)	-	C (22.6)	-	A (0.0)	A (0.0)	B (10.7)	A (0.0)	-
			-		C (22.6)			A (0.0)			A (3.7)		

Table 17: U.S. Route 58 at Wadlow Gap Highway 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	-	-	-	Cont.	-	200	-	Cont.	300	300	950	-
AM Peak Hour												
2017 Existing	-	-	-	44	-	64	-	0	0	66	0	-
2030 No Build	-	-	-	51	-	78	-	0	0	74	0	-
2030 Build	-	-	-	51	-	71	-	0	< 25	75	0	-
PM Peak Hour												
2017 Existing	-	-	-	71	-	54	-	0	26	120	0	-
2030 No Build	-	-	-	61	-	52	-	0	< 25	138	0	-
2030 Build	-	-	-	47	-	66	-	< 25	27	171	0	-

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.2 U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)

Future delay, LOS, and queue length results for the U.S. Route 58/U.S. Route 23 at Hilton Road intersection are summarized in Table 18 and Table 19, respectively. Under future No-Build conditions, this intersection is expected to operate at an overall LOS B during AM and PM peak hours, with all individual movements operating at LOS D or better. For the future Build conditions, the following improvements were identified to help improve operations and safety: extend the southbound left-turn lane storage by 100 feet and implement right-turn overlap phasing, for the northbound and westbound right-turn movements. With these improvements, the overall delay of the intersection is projected to be reduced slightly, resulting in more efficient operational conditions.

This intersection is expected to experience minor instances of queuing to the extent that it impedes northbound approach operations. During the AM and PM peak hours, the maximum queue lengths for the through movement can result in blocking the adjacent right-turn lane and spill back to the next upstream intersection (i.e., Food City). However, this is only projected to impact 1% percent of traffic and is not significant.

With the proposed improvements in place, the intersection of U.S. Route 58/U.S. Route 23 at Hilton Road is projected to experience little to only minor delays and minimal instances of excessive queueing.

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Table 18: U.S. Route 58/U.S. Route 23 at Hilton Road 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	B (16.1)	-	-	-	D (36.9)	-	C (30.1)	-	A (9.6)	A (4.0)	D (35.5)	A (5.6)	-
			-		C (31.9)			A (8.8)			B (14.1)		
2030 No Build	B (15.8)	-	-	-	D (40.4)	-	C (33.4)	-	B (12.2)	A (5.2)	C (28.7)	A (3.2)	-
			-		D (35.3)			B (11.3)			B (10.5)		
2030 Build	B (13.6)	-	-	-	D (39.4)	-	B (18.2)	-	B (12.8)	A (2.8)	C (26.9)	A (4.0)	-
			-		C (24.0)			B (11.5)			B (10.5)		
PM Peak Hour													
2017 Existing	B (18.2)	-	-	-	D (40.0)	-	C (30.1)	-	B (12.3)	A (6.3)	D (40.8)	A (5.4)	-
			-		C (32.7)			B (11.1)			B (17.4)		
2030 No Build	B (18.7)	-	-	-	D (45.7)	-	C (33.6)	-	B (12.0)	A (3.3)	D (40.5)	A (5.6)	-
			-		D (36.8)			B (10.3)			B (17.4)		
2030 Build	B (15.4)	-	-	-	D (42.1)	-	B (18.6)	-	B (13.6)	A (2.3)	D (40.5)	A (1.0)	-
			-		C (24.9)			B (11.4)			B (14.4)		

Table 19: U.S. Route 58/U.S. Route 23 at Hilton Road 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)		-		350	-	950	-	200	250	275	3,750	-
AM Peak Hour												
2017 Existing	-	-	-	166	-	110	-	208	135	170	151	-
2030 No Build	-	-	-	174	-	121	-	228 *(1%) ^(1%)	199	213	140	-
2030 Build	-	-	-	175	-	142	-	225 *(1%) ^(1%)	148	206	142	-
PM Peak Hour												
2017 Existing	-	-	-	177	-	137	-	221	211	215	170	-
2030 No Build	-	-	-	202	-	153	-	225	210	226	163	-
2030 Build	-	-	-	191	-	158	-	230 *(1%) ^(1%)	185	221	114	-

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.3 U.S. Route 58/U.S. Route 23 at Food City (Signalized)

Future delay, LOS, and queue length results for the U.S. Route 58/U.S. Route 23 at Food City intersection are summarized in Table 20 and Table 21, respectively. Under future No-Build conditions, this intersection is expected to operate at an overall LOS A and LOS B during AM and PM peak hours, respectively, with all individual movements operating at LOS D or better. For the future Build conditions, right-turn overlap phasing was implemented where applicable to help improve intersection operations.

Under 2030 Build conditions, this intersection is expected to still operate at overall LOS A and LOS B during the AM and PM peak hours, respectively. Overall operations are projected to experience a slight improvement in delay between No-Build and Build. All individual movements are still projected to operate at LOS D or better.

This intersection is also expected to experience instances of blocking attributed to longer queues forming under the 2030 No- Build and Build PM peak hour conditions. The northbound through movement in particular, is anticipated to create queue lengths that extend to the point of blocking vehicles from accessing the adjacent right-turn lane. This queueing condition results in approximately 11% to 12% of traffic being blocked from entering the adjacent right turn lane under No-Build and Build conditions.

However, with the proposed geometric improvements in place the overall intersection of U.S. Route 58/ U.S. Route 23 at Food City is projected to operate with little to minor delays and nominal instances of excessive queueing.

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Table 20: U.S. Route 58/U.S. Route 23 at Food City 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (7.1)	-	-	-	D (35.3)	-	D (35.3)	-	A (8.1)	A (5.9)	D (44.1)	A (1.9)	-
			-		D (35.3)			A (8.0)			A (4.3)		
2030 No Build	A (7.2)	-	-	-	D (40.5)	-	D (40.5)	-	A (7.5)	A (5.5)	D (50.4)	A (1.7)	-
			-		D (40.5)			A (7.4)			A (4.4)		
2030 Build	A (7.1)	-	-	-	D (40.5)	-	D (40.5)	-	A (7.5)	A (1.8)	D (50.7)	A (1.9)	-
			-		D (40.5)			A (7.2)			A (4.5)		
PM Peak Hour													
2017 Existing	B (15.9)	-	-	-	D (42.8)	-	D (42.8)	-	B (15.9)	B (10.9)	D (43.0)	A (3.4)	-
			-		D (42.8)			B (15.2)			A (8.6)		
2030 No Build	B (17.9)	-	-	-	D (44.5)	-	D (44.5)	-	B (17.9)	B (12.1)	D (40.2)	A (6.6)	-
			-		D (44.5)			B (17.2)			B (11.0)		
2030 Build	B (16.6)	-	-	-	D (46.8)	-	D (46.8)	-	B (18.3)	A (3.0)	D (45.1)	A (2.4)	-
			-		D (46.8)			B (16.3)			A (8.0)		

Table 21: U.S. Route 58/U.S. Route 23 at Food City 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	-	-	-	125			-	Cont.	150	250	200	-
AM Peak Hour												
2017 Existing	-	-	-	100			-	172	66	102	141	-
2030 No Build	-	-	-	110			-	155	82	112	121	-
2030 Build	-	-	-	112			-	191	98	108	126	-
PM Peak Hour												
2017 Existing	-	-	-	274			-	286 **(6%)	150	153	152	-
2030 No Build	-	-	-	257			-	339 **(11%)	150	175	207	-
2030 Build	-	-	-	308			-	387 **(12%)	150 *(1%)	175	187	-

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.4 U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)

Future delay, LOS, and queue length results for the U.S. Route 58/U.S. Route 23 at Kane Street intersection are summarized in Table 22 and Table 23. Under future No-Build conditions, this intersection is expected to operate at an overall LOS C during AM and PM peak hours, with all individual movements operating at LOS D or better. The one exception is that the westbound left-turn movement is projected to operate at LOS E during the AM peak hour. For the future Build conditions, signal timings were updated and optimized and the existing exclusive turn lanes were improved to meet current VDOT standards (i.e., 200 feet storage and 200 feet taper). As a result of the adjustments to the signal timing plans, all individual movements are projected to operate at LOS D or better under future AM and PM peak hour conditions.

With the implementation of the proposed improvements, the U.S. Route 58/U.S. Route 23 at Kane Street intersection is projected to experience only minor delays and minimal queues.

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Table 22: U.S. Route 58/U.S. Route 23 at Kane Street 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	C (24.2)	D (43.9)	D (36.4)	C (29.9)	D (46.4)	C (34.2)	A (1.2)	D (41.5)		D (38.8)	C (29.6)	C (28.9)	B (18.2)
		D (36.8)			B (12.4)			D (40.1)			C (28.8)		
2030 No Build	C (24.7)	D (41.8)	C (28.3)	C (23.9)	**E (57.4)**	B (19.6)	A (1.2)	D (42.3)		D (37.8)	D (39.6)	D (39.8)	B (18.0)
		C (29.3)			A (8.8)			D (39.9)			D (38.8)		
2030 Build	C (22.6)	D (39.6)	C (28.7)	C (24.2)	D (54.9)	C (25.2)	A (1.2)	D (41.7)		D (37.5)	C (31.5)	C (31.7)	B (17.9)
		C (29.5)			B (10.2)			D (39.5)			C (31.0)		
PM Peak Hour													
2017 Existing	C (29.0)	D (47.1)	D (42.1)	C (32.2)	D (47.2)	D (38.2)	A (1.2)	D (44.3)		D (38.6)	C (34.5)	C (34.2)	C (23.0)
		D (42.0)			B (19.5)			D (42.2)			C (33.9)		
2030 No Build	C (26.2)	D (44.1)	C (33.9)	C (25.9)	D (41.3)	B (18.0)	A (1.1)	D (47.3)		C (34.9)	D (46.4)	D (45.3)	C (21.3)
		C (34.3)			B (10.7)			D (42.7)			D (44.7)		
2030 Build	C (26.6)	D (39.7)	C (33.1)	C (25.6)	D (39.2)	D (38.0)	A (1.2)	D (44.6)		C (34.3)	C (34.0)	C (32.5)	C (21.9)
		C (33.2)			B (18.7)			D (40.7)			C (32.7)		

Table 23: U.S. Route 58/U.S. Route 23 at Kane Street 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	200 / 350	Cont.	150 / 250	250 / 300	3,750	225	50		50	1,125	1,125	350
AM Peak Hour												
2017 Existing	70	201	30	112	288	223 *(1%)	112		80	306	317	52
2030 No Build	77	196	< 25	91	143	80	100		70	321	335	53
2030 Build	78	202	< 25	102	160	32	111		80	317	326	< 25
PM Peak Hour												
2017 Existing	147	254 **(2%)*	76	188	423 **(2%)*	225 *(2%)	195		66	296	284	29
2030 No Build	144	238	48	157	212	216	172		75	320	312	41
2030 Build	70	239	< 25	159	297	216	192		76	314	303	42

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.5 Kane Street at Jones Street (Signalized)

Future delay, LOS, and queue length results for the Kane Street at Jones Street intersection are summarized in Table 24 and Table 25. Under future No-Build conditions, this intersection is expected to operate at an overall LOS B during AM and PM peak hours, with all individual movements operating at LOS C or better. For the future Build conditions, the optimized and coordinated timing plans help improve the overall intersection operations. Under 2030 Build conditions, this intersection is expected to maintain an overall LOS B during the AM and PM peak hours with all individual movements operating at LOS C or better.

This intersection is expected to experience moderate queues under 2030 No-Build conditions. Analysis results indicate instances of the southbound left-turn lane queue extending to the point of blocking traffic from accessing the adjacent through lane. With the implementation of the proposed timings and coordination, queues are projected to be reduced under Build conditions when compared to the No-Build conditions.

Overall, the intersection of Main Street at Kane Street is projected to operate with little to minor delays and reduced queue lengths as a result of the proposed traffic signal timing improvements.

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Table 24: Kane Street at Jones Street 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	B (14.1)	A (10.0)	A (9.0)	-	-	C (22.9)	A (6.4)	-	-	-	C (22.5)	-	A (7.7)
		A (9.3)			B (13.3)			-			B (19.3)		
2030 No Build	B (13.4)	A (8.9)	A (8.1)	-	-	B (10.9)	A (3.8)	-	-	-	C (30.4)	-	B (14.3)
		A (8.4)			A (6.8)			-			C (27.0)		
2030 Build	B (14.9)	A (7.3)	A (7.3)	-	-	A (8.8)	B (13.1)	-	-	-	C (31.8)	-	B (16.6)
		A (7.3)			B (11.1)			-			C (30.3)		
PM Peak Hour													
2017 Existing	A (9.9)	A (6.9)	A (6.9)	-	-	B (14.8)	A (3.6)	-	-	-	B (16.5)	-	A (7.5)
		A (6.9)			A (8.5)			-			B (15.5)		
2030 No Build	B (11.5)	A (5.8)	A (6.1)	-	-	A (5.0)	A (3.6)	-	-	-	C (32.3)	-	B (19.7)
		A (6.0)			A (4.2)			-			C (31.0)		
2030 Build	B (10.6)	A (4.8)	A (5.4)	-	-	A (7.8)	A (0.2)	-	-	-	C (33.8)	-	C (23.3)
		A (5.3)			A (3.8)			-			C (33.3)		

Table 25: Kane Street at Jones Street 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	185	500	-	-	1,125	325	-	-	-	125 / 200	-	200
AM Peak Hour												
2017 Existing	164	233	-	-	287	231	-	-	-	242 *(6%) ^(1%)	-	112
2030 No Build	175	188	-	-	279	268	-	-	-	266 *(11%) ^(3%)	-	142
2030 Build	136	181	-	-	206	180	-	-	-	210	-	77
PM Peak Hour												
2017 Existing	80	121	-	-	205	157	-	-	-	165	-	51
2030 No Build	91	128	-	-	231	149	-	-	-	229 *(4%) ^(1%)	-	71
2030 Build	35	156	-	-	204	84	-	-	-	180	-	51

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.6 Kane Street at Bishop Street (Unsignalized)

Future delay, LOS, and queue length results for the Kane Street at Bishop Street intersection are summarized in Table 26 and Table 27. Under future build conditions, this intersection will remain unsignalized and is expected to operate at an overall LOS A during the AM and PM peak hours.

For the future Build conditions, an exclusive westbound right-turn lane is proposed to help accommodate turning traffic. Volumes associated with this movement meet or exceed the necessary thresholds set for a right-turn lane warrant analysis. With the addition of the proposed turn lane and improved progression of traffic from the signal coordination, delays do increase slightly at this intersection when compared to the No-Build conditions. The increase in delay is primarily associated with the left and right-turning movements from southbound Bishop Street and attributed to fewer gaps in the approaching westbound traffic. . However, these increases are minimal and the intersection is still expected to operate at an overall LOS A during the AM and PM peak hours, with all individual movements operating at LOS C or better.

This intersection is also expected to experience minimal queues under 2030 No Build conditions. None of the individual movements or approaches are anticipated to have maximum queue lengths that will exceed the effective storage length or encounter significant instances of blocking.

Under future Build conditions the intersection of Kane Street at Bishop Street is projected to experience minor delays and minimal queuing.

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Table 26: Kane Street at Bishop Street 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (1.9)	A (8.9)	A (0.0)	-	-	A (0.0)		-	-	-	C (15.5)	-	C (15.5)
		A (0.9)			A (0.0)			-			C (15.5)		
2030 No Build	A (1.9)	A (8.9)	A (0.0)	-	-	A (0.0)		-	-	-	C (15.8)	-	C (15.8)
		A (0.9)			A (0.0)			-			C (15.8)		
2030 Build	A (5.8)	A (9.0)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	C (23.7)	-	C (23.7)
		A (2.1)			A (0.0)			-			C (23.7)		
PM Peak Hour													
2017 Existing	A (1.0)	A (8.9)	A (0.0)	-	-	A (0.0)		-	-	-	B (11.2)	-	B (11.2)
		A (0.3)			A (0.0)			-			B (11.2)		
2030 No Build	A (1.0)	A (8.3)	A (0.0)	-	-	A (0.0)		-	-	-	B (11.8)	-	B (11.8)
		A (0.3)			A (0.0)			-			B (11.8)		
2030 Build	A (2.9)	A (8.4)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (13.7)	-	B (13.7)
		A (1.5)			A (0.0)			-			B (13.7)		

Table 27: Kane Street at Bishop Street 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	500	Cont.	-	-	500		-			275		
AM Peak Hour												
2017 Existing	53	0	-	-	< 25		-	-	-	104		
2030 No Build	53	0	-	-	< 25		-	-	-	129		
2030 Build	84	0	-	-	< 25		-	-	-	195 ^(1%)		
PM Peak Hour												
2017 Existing	33	0	-	-	< 25		-	-	-	70		
2030 No Build	31	0	-	-	0		-	-	-	66		
2030 Build	54	0	-	-	< 25		-	-	-	125		

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.7 Jones Street at Beech Street (Unsignalized)

Future delay, LOS, and queue length results for the Jones Street at Beech Street intersection are summarized in Table 28 and Table 29. Under 2030 No Build conditions, this intersection is expected to operate at an overall LOS A during the AM and PM peak hours, with all individual movements operating at LOS D or better. This intersection is also expected to experience minimal queues under 2030 No Build conditions during the AM and PM peak hours. None of the individual movements or approaches have maximum queue lengths that will exceed the effective storage length or instances of blocking.

Under 2030 Build conditions, it is proposed that Beech Street be realigned with the Harry Fry Drive approach at Jones Street in an effort to improve access management as well as enhance intersection safety and operations. Therefore, the existing intersection configuration will be eliminated and no operational conditions are reported for the 2030 Build Scenario. However, operational and queueing analysis results of the reconfigured intersection under 2030 Build conditions are provided in Tables 30 and 31 as a part of the Jones Street/Harry Fry Drive intersection.

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Table 28: Jones Street at Beech Street 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (1.3)	D (26.9)			A (0.0)			A (9.4)	A (0.0)	A (0.0)	A (9.5)	A (0.0)	
								A (0.4)			A (0.6)		
2030 No Build	A (1.4)	D (28.5)			A (0.0)			A (9.4)	A (0.0)	A (0.0)	A (9.5)	A (0.0)	
								A (0.5)			A (0.6)		
2030 Build	-	-			-			-			-		
PM Peak Hour													
2017 Existing	A (0.7)	B (13.0)			C (23.7)			A (8.1)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
								A (0.2)			A (0.0)		
2030 No Build	A (0.8)	B (14.6)			C (24.1)			A (8.2)	A (0.0)	A (0.0)	A (0.0)	A (0.0)	
								A (0.2)			A (0.0)		
2030 Build	-	-			-			-			-		

Table 29: Jones Street at Beech Street 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	575			350			75	200	125	55	55	
AM Peak Hour												
2017 Existing	82			0			44	< 25	41	46	60	
2030 No Build	97			0			49	< 25	31	44	78	
2030 Build	-			-			-			-		
PM Peak Hour												
2017 Existing	48			26			30	0	0	0	0	
2030 No Build	55			30			30	0	0	0	< 25	
2030 Build	-			-			-			-		

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.8 Jones Street at Harry Fry Drive (Unsignalized)

Future delay, LOS, and queue length results for the Jones Street at Harry Fry Drive intersection are summarized in Table 30 and Table 31. Under future No-Build conditions, this unsignalized intersection is expected to operate at an overall LOS A during AM and PM `peak hours, with all individual movements operating at LOS C or better. For the future Build conditions, it is proposed that a new eastbound approach will be constructed as part of the realignment of Beech Street to this intersection. For the purposes of this analysis, it was assumed this intersection would remain unsignalized.

Under Build conditions, this intersection is expected to continue to operate at an overall LOS A during the AM and PM peak hours. With the addition of a fourth leg to this intersection, delays are expected to only increase slightly.

This intersection is also expected to experience only minimal queues under future Build conditions. Due to the heavy volume of school related traffic during the AM peak hour, the westbound left-turn lane is projected to experience periods of significant queuing, which will result in approximately 3% to 24% of the adjacent right-turn lane traffic being block. This occurrence of queuing is reduced with the proposed realignment of Beech Street, as the reconfigured laneage on Jones Street allows for a second receiving lane for traffic traveling southbound. So, vehicles turning left from Harry Fry Drive have more opportunities to enter the flow of traffic on Jones Street. This result was confirmed when observing the 2030 No-Build and Build simulations side by side.

Overall, under future Build conditions the improved intersection of Jones Street at Harry Fry Drive/Beech Street is projected to perform with little to minor delays and queues.

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Table 30: Jones Street at Harry Fry Drive 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (5.1)	-	-	-	C (19.5)	-	C (19.5)	-	A (0.0)	A (0.0)	A (8.3)	A (0.0)	-
		-			C (19.5)			A (0.0)			A (0.2)		
2030 No Build	A (4.8)	-	-	-	C (18.2)	-	C (18.2)	-	A (0.0)	A (0.0)	A (8.3)	A (0.0)	-
		-			C (18.2)			A (0.0)			A (0.2)		
2030 Build	A (6.9)	B (13.0)	B (11.1)		C (23.4)		C (23.4)	A (8.1)	A (0.0)	A (0.0)	A (8.8)	A (0.0)	-
		B (11.5)			C (23.4)			A (0.8)			A (1.6)		
PM Peak Hour													
2017 Existing	A (0.8)	-	-	-	B (12.4)	-	B (12.4)	-	A (0.0)	A (0.0)	A (8.4)	A (0.0)	-
		-			B (12.4)			A (0.0)			A (0.1)		
2030 No Build	A (0.9)	-	-	-	B (12.8)	-	B (12.8)	-	A (0.0)	A (0.0)	A (8.6)	A (0.0)	-
		-			B (12.8)			A (0.0)			A (0.1)		
2030 Build	A (2.0)	B (13.1)	B (10.1)		B (13.9)		B (13.9)	A (8.0)	A (0.0)	A (0.0)	A (8.3)	A (0.0)	-
		B (10.9)			B (13.9)			A (0.7)			A (0.1)		

Table 31: Jones Street at Harry Fry Drive 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	200[a]	415[a]		Cont.	-	185 / 200	100[a]	55	55 / 200	200	1,125	-
AM Peak Hour												
2017 Existing	-	-	-	394 **(11%) ^(1%)	-	172	-	< 25	< 25	33	0	-
2030 No Build	-	-	-	494 **(24%)	-	185 **(1%)	-	< 25	< 25	31	< 25	-
2030 Build	26	69		283 **(3%)		156	43	0	41	59	< 25	
PM Peak Hour												
2017 Existing	-	-	-	58	-	23	-	< 25	0	18	0	-
2030 No Build	-	-	-	69	-	25	-	< 25	< 25	31	0	-
2030 Build	27	58		73		52	36	0	0	26	0	

Notes:
a. – Build Scenarios Only
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.9 Jones Street at State Route 71 (Unsignalized)

Future delay, LOS, and queue length results for the Jones Street at State Route 71 intersection are summarized in Table 32 and Table 33. Under future No-Build conditions, this unsignalized intersection is expected to operate at an overall LOS A during AM and PM peak hours, with all individual movements operating at LOS D or better. It should be noted that the southbound left-turn movement, which originates from a driveway serving a bank, operates at LOS F during the PM peak hour. This is a low volume movement and does not impact the overall operation of the intersection.

Based on the predominant turning movements at this intersection today, (i.e., heavy northbound right and westbound left), it was determined that the roadway should be realigned so the northbound to eastbound and westbound to southbound movements could operate as free flow, and the existing eastbound approach and the associated movements become stop controlled. Reconfiguration of the intersection also includes removing access to/from the bank off of State Route 71, and future access being provided solely via Red Hill Road. Under these Build conditions this intersection is expected to operate at an improved overall LOS A during the AM and PM peak hours when compared to the No-Build. The delays projected for the northbound approach improve from LOS D and C to LOS A for the AM and PM peak hours, respectively with the proposed improvements.

This intersection is expected to experience minor queues under future No-Build and Build conditions. The noted instances of queues exceeding the available storage, resulting in blocked vehicles under Existing and No-Build conditions, were eliminated as a result of the proposed geometric improvements under the Build scenario.

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Table 32: Jones Street at State Route 71 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (7.0)	A (7.5)	A (0.0)		A (8.6)	A (0.0)		D (25.9)	B (11.0)		C (22.5)	B (13.8)	
		A (0.1)			A (5.6)			C (15.3)			B (14.9)		
2030 No Build	A (7.9)	A (7.6)	A (0.0)		A (8.8)	A (0.0)		D (32.6)	B (11.6)		D (29.4)	B (14.1)	
		A (0.1)			A (5.8)			C (17.6)			C (16.5)		
2030 Build	A (3.8)	B (12.2)	-	B (10.2)	-	-	-	A (7.8)	A (0.0)	-	-	A (0.0)	A (0.0)
		B (11.6)			-			A (1.8)			A (0.0)		
PM Peak Hour													
2017 Existing	A (9.1)	A (7.4)	A (0.0)		A (8.2)	A (0.0)		C (15.9)	B (13.8)		**F (63.2)**	B (14.3)	
		A (0.0)			A (6.3)			B (13.9)			D (26.5)		
2030 No Build	A (9.8)	A (7.4)	A (0.0)		A (8.3)	A (0.0)		C (17.6)	B (14.6)		**F (85.7)**	B (14.0)	
		A (0.2)			A (6.3)			B (14.8)			D (31.1)		
2030 Build	A (3.0)	B (14.8)	-	A (9.8)	-	-	-	A (7.8)	A (0.0)	-	-	A (0.0)	A (0.0)
		B (14.2)			-			A (0.3)			A (0.0)		

Table 33: Jones Street at State Route 71 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	150 / 250	Cont.		125[a]	5000[a]		100	1,125		50[a]	50 / 1995	50 / 200
AM Peak Hour												
2017 Existing	< 25	36		104	15		95 **(1%)	109		32	46	
2030 No Build	< 25	28		93	0		93 **(1%)	190 ***(1%)*		31	46	
2030 Build	84	-	59	-	-	-	28	0		-	0	26
PM Peak Hour												
2017 Existing	0	17		83	0		84	158 ***(2%)*		27	39	
2030 No Build	< 25	27		81	0		88	167 ***(3%)*		31	42	
2030 Build	111	-	25	-	-	-	< 25	0		-	0	< 25

Notes:
a. – No Build Scenarios Only
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.4.10 State Route 71 at State Route 72 (Unsignalized)

Future delay, LOS, and queue length results for the State Route 71 and State Route 72 intersection are summarized in Table 34 and Table 35. Under 2030 future conditions, this intersection will remain unsignalized and is anticipated to continue to operate at LOS A during AM and PM peak hours. All individual movements and approaches are expected to operate at LOS B or better.

This intersection is expected to experience minor queues during the AM and PM peak hours under both future No-Build and Build conditions. The storage lengths are appropriate to support the expected queues for all approaches under future conditions.

Overall, the intersection of State Route 71 and State Route 72 is projected to perform with little to minor delays and queues. No geometric or operational improvements proposed for this intersection.

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Table 34: State Route 71 at State Route 72 2030 LOS Summary

Scenario	Overall LOS	Level of Service per Movement by Approach (Delay in sec/veh)											
		Eastbound			Westbound			Northbound			Southbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
AM Peak Hour													
2017 Existing	A (4.6)	A (8.1)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (11.5)	-	B (11.5)
		A (3.6)			A (0.0)			-			B (11.5)		
2030 No Build	A (4.6)	A (8.1)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (11.5)	-	B (11.5)
		A (3.6)			A (0.0)			-			B (11.5)		
2030 Build	A (4.6)	A (8.1)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (11.5)	-	B (11.5)
		A (3.6)			A (0.0)			-			B (11.5)		
PM Peak Hour													
2017 Existing	A (3.8)	A (8.0)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (10.6)	-	B (10.6)
		A (3.2)			A (0.0)			-			B (10.6)		
2030 No Build	A (3.8)	A (8.1)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (11.1)	-	B (11.1)
		A (3.2)			A (0.0)			-			B (11.1)		
2030 Build	A (3.9)	A (8.1)	A (0.0)	-	-	A (0.0)	A (0.0)	-	-	-	B (11.5)	-	B (11.5)
		A (3.2)			A (0.0)			-			B (11.5)		

Table 35: State Route 71 at State Route 72 2030 Maximum Queue Summary

Scenario	Maximum Queue Length by Movement (feet)											
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT/UT	TH	RT	LT	TH	RT	LT	TH	RT
Effective Storage Length (No Build/Build)	300	5,000	-	-	Cont.	500	-			Cont.	-	375
AM Peak Hour												
2017 Existing	53	0	-	-	0	0	-	-	-	40	-	83
2030 No Build	51	0	-	-	0	0	-	-	-	55	-	80
2030 Build	56	0	-	-	0	< 25	-	-	-	50	-	95
PM Peak Hour												
2017 Existing	64	0	-	-	0	< 25	-	-	-	24	-	51
2030 No Build	62	0	-	-	0	0	-	-	-	30	-	56
2030 Build	65	0	-	-	0	< 25	-	-	-	66	-	56

Notes:
**(X%) - Maximum queue extends full length of storage bay for X% of the analysis period*
***(Y%) - Queue in lane adjacent to storage bay extends beyond end of storage bay for Y% of the analysis period*
^(Z%) - Maximum queue extends back to upstream intersection for Z% of the analysis period

5.5 Long-Term Improvements

Long-term improvements for the study corridor were identified to help address more significant operational concerns and to help extend the life cycle of the existing facilities. These improvements are intended serve as an alternative to the construction of a major parallel route (i.e., Moccasin Gap Bypass). The previously proposed Bypass was identified as a regional roadway infrastructure improvement, necessary to address growth and maintain safe and efficient north/south traffic flows through the Moccasin Gap. Based on these criteria, the Jones Street corridor was identified as a potential bottleneck to traffic flow through this this area. Vehicles traveling north/south through the Gap rely on Jones Street for travelling between U.S. Route 58/U.S. Route 23 to State Route 71 and/or State Route 72. Therefore, the following long-term improvement alternatives were identified for the Jones Street corridor and are illustrated in Figure 18 through Figure 21. It should be noted that the proposed mid-term alternative of realigning State Route 71 with Jones Street is included in the long-term alternative concepts to illustrate the potential ultimate configuration of this corridor.

- Alternative #1 – Parallel Route to Jones Street (Figure 18)
  - Improve and extend Bishop Street/Nena Road to State Route 71.
  - Alternative #1 provides a parallel route to Jones Street and could help alleviate congestion during peak hours.
- Alternative #2 – Parallel Route to Jones Street and Realignment of Beech Street (Figure 19)
  - Expands upon the improvements presented in Alternative #1 by realigning Beech Street with the Harry Fry Drive approach at Jones Street to create a conventional four-legged intersection.
  - Alternative #2 provides a parallel route and improves access management along Jones Street.
- Alternative #3 – Additional Capacity on Jones Street (Figure 20)
  - Widen/improve Jones Street to a four-lane, divided roadway to increase overall capacity.
  - The additional through lanes associated with Alternative #3 will allow for more traffic to traverse north/south on Jones Street and the raised median will help restrict and reduce the number of access points along the corridor.
- Alternative #4– Additional Capacity on Jones Street and Realignment of Beech Street (Figure 21)
  - Expands upon the improvements presented in Alternative #3 by including the realignment Beech Street with the Harry Fry Drive approach at Jones Street to create a conventional four-legged intersection.
  - Alternative #4 improves traffic flow by providing additional capacity and introducing access management strategies that reduce access and the number of friction points along Jones Street.

5.6 School Operations and Considerations

In addition to the improvements considered along Jones Street and at other study area intersections, significant consideration was also given to the impact that Gate City Middle and High School peak period traffic operations have on corridor traffic flows. Gate City Middle School and Gate City High School are located along the east of Jones Street and their existing driveway configurations create numerous potential conflicts between pedestrians, passenger vehicles, and buses. Currently, multiple full access driveways to/from the schools are located along Jones Street. During peak periods, these access driveways can lead to unsafe conditions along Jones Streets and contribute to increased periods of delay. Additionally, there are no designated crosswalks for pedestrians to cross Jones Street to/from the school. It has been noted that students often cross Jones Street at multiple and random locations to access the parking areas on the west side of Jones Street where they are getting picked up after school. Marked crosswalks are located across the north and east legs of the Jones Street at Kane Street. Currently, these crosswalks do not include pedestrian signals/pushbuttons and the schools rely on a crosswalk guard to direct students when to cross during peak periods. It was observed that school buses stage along Beech Street before entering the Gate City Middle and High School bus loop for the afternoon pick up. Buses will wait on Beech Street and an off-duty police officer will stop traffic on Jones Street so the buses can traverse across to the school parking area/bus loop. This results in additional conflicts and potential delays during the start and release of school.

The existing school operations result in numerous safety issues along the Jones Street corridor and significantly impact peak period traffic flow/operations. Therefore, two concepts were developed that reduce the number of conflict points by restricting or modifying existing access while also improving traffic flow between the Middle School/High School site and Jones Street.

Option #1, as illustrated in Figure 22, involves closing two of the existing access points from Jones Street and creating a new one-way access point directly adjacent from Beech Street. Access to the schools would be restricted to all vehicles except for on buses. This entrance and its alignment with the associated bus loop will help reduce or eliminate the need to stack buses on Beech Street. Providing physical separation between the bus loop and the parking area, will further reduce the potential for conflicts between buses and passenger vehicles as they enter/exit the schools. By realigning the entrance to Beech Street, buses will also have an easier time entering the school pick-up/drop-off loop. This improvement will also result in the parking field being improved and redefined, which will result in additional parking capacity for the schools. It is anticipated that approximately 110 parking spaces will be stripped out, resulting in a net gain of approximately 2 spaces under this option. By modifying the entrances from Jones Street, access management along Jones Street will be improved.

Option #2, as illustrated in Figure 23, removes two of the existing access points from Jones Street and creates a new internal bus circulation loop for the schools. The primary entrance to the parking field and the bus circulation loop would occur at Harry Fry Drive.

The existing school entrance along Harry Fry Drive will shift approximately 80 feet to the east of the current location to align with the proposed bus circulation loop. Under this option, buses will no longer stack on Beech Street but would stack internally on the school site. Passenger cars accessing the parking field will also enter/exit from the relocated driveway on Harry Fry Drive. It is anticipated that approximately 136 parking spaces will be stripped out, resulting in a net gain of approximately 28 spaces under this option. By removing the entrances from Jones Street and permitting the necessary space for buses to stage on the school property, access management along Jones Street will be significantly improved.

These two options were presented to members of the School Board for input. Following their review, Option #2 was identified as the preferred alternative.

With all future improvement alternatives along Jones Street, ADA crossings, ramps, and signage need to be implemented where appropriate. Another option to consider would involve the construction of a pedestrian bridge over Jones Street. Such a structure could potentially be tied into the existing school building. If the schools are interested in pursuing such an option, they should coordinate with VDOT to identify potential funding sources and structural evaluation of the school building to see if a bridge could be implemented.

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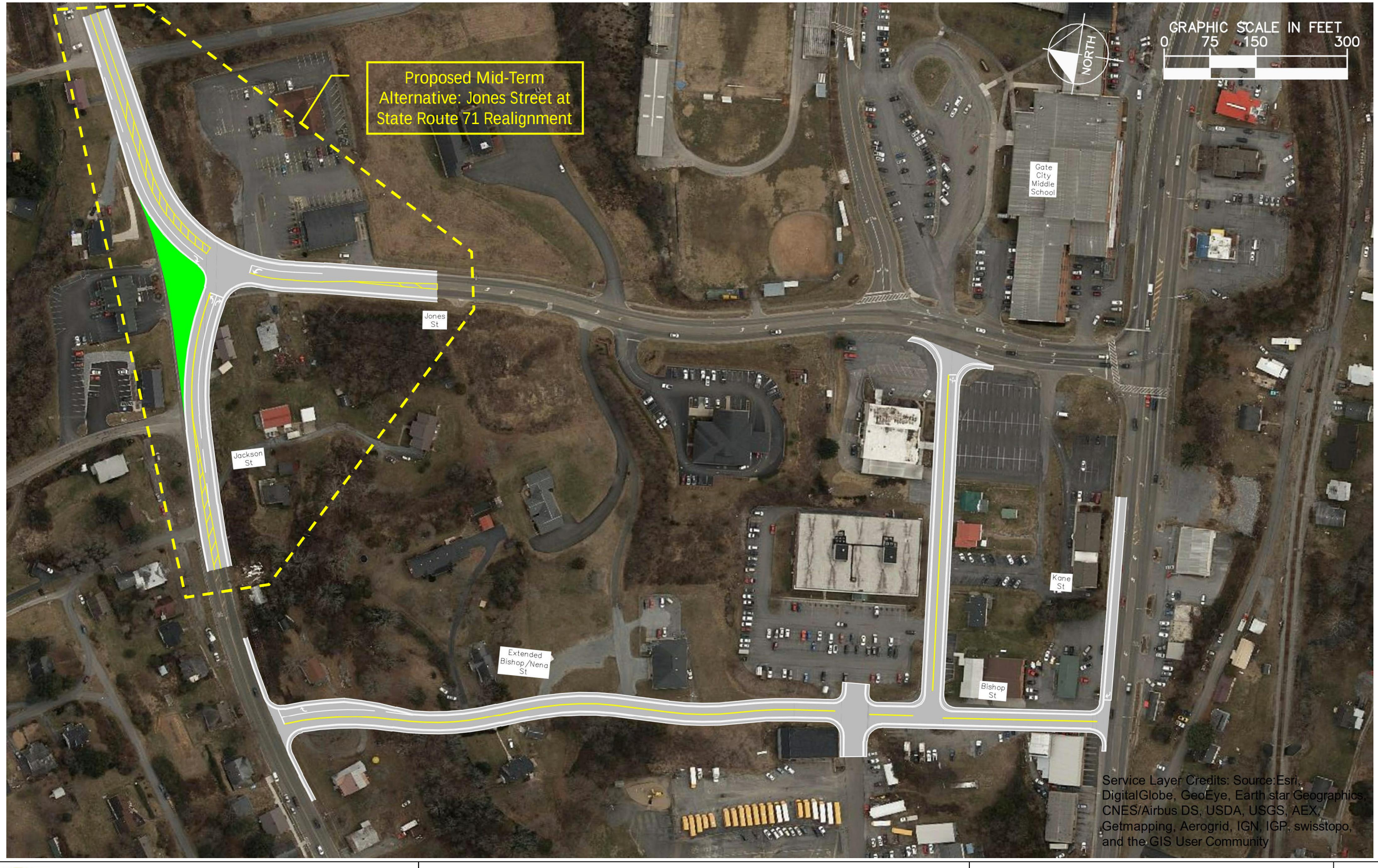
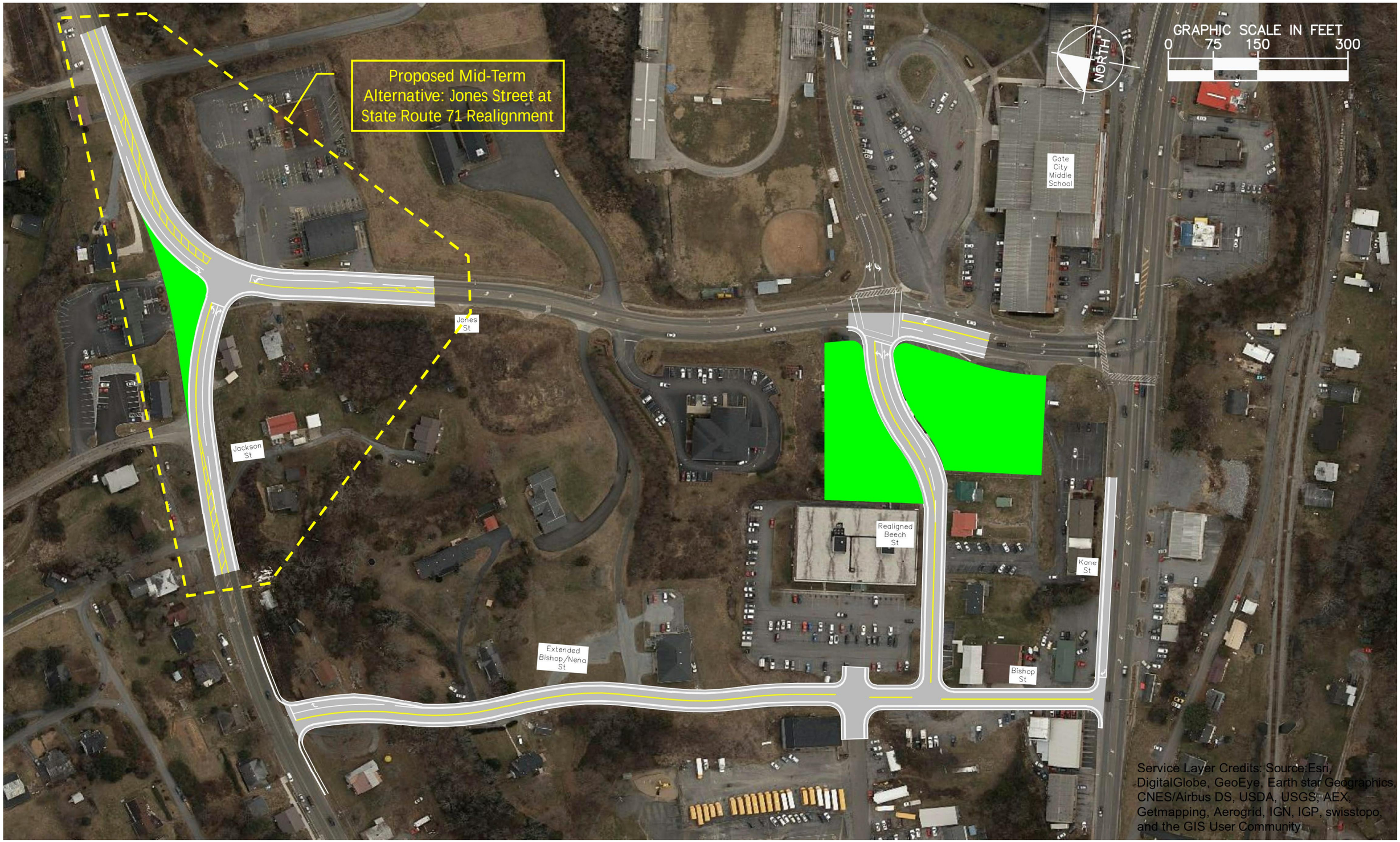


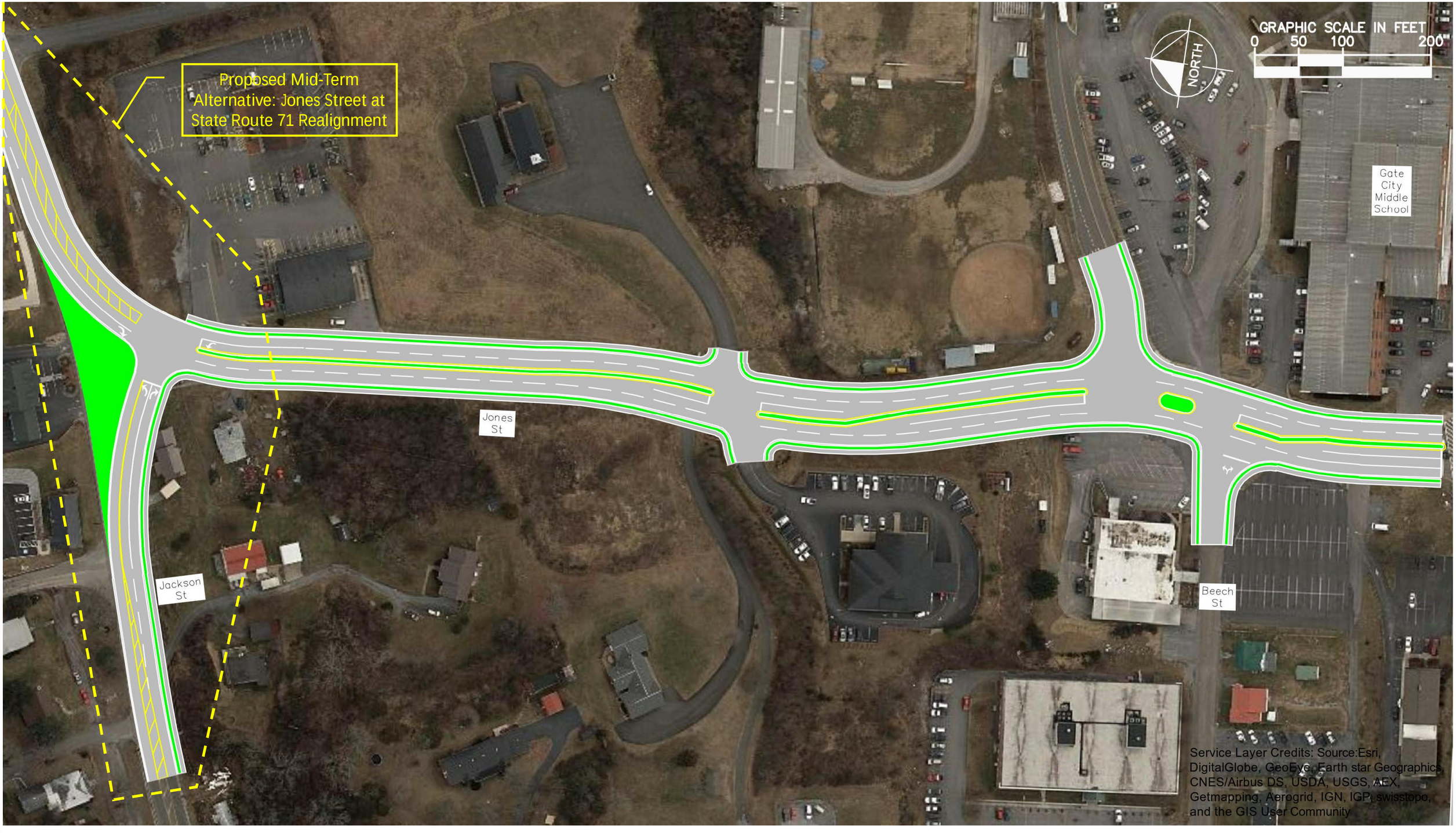
Moccasin Gap Corridor Study Scott County, VA	Alternative #1 – Parallel Route to Jones Street	Figure 18



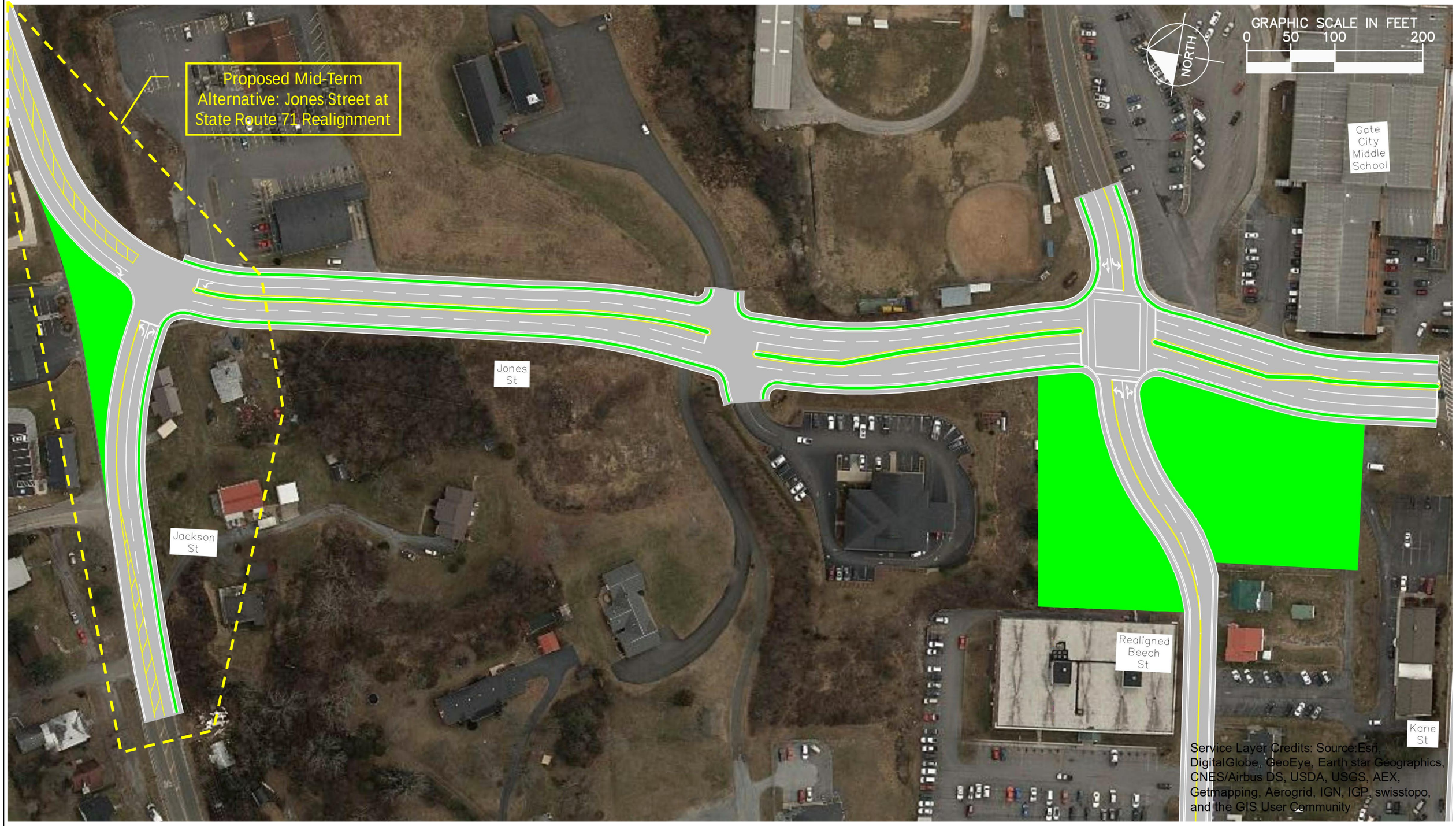
Moccasin Gap Corridor Study
Scott County, VA

Alternative #2 – Parallel Route to Jones Street and Realignment of Beech Street

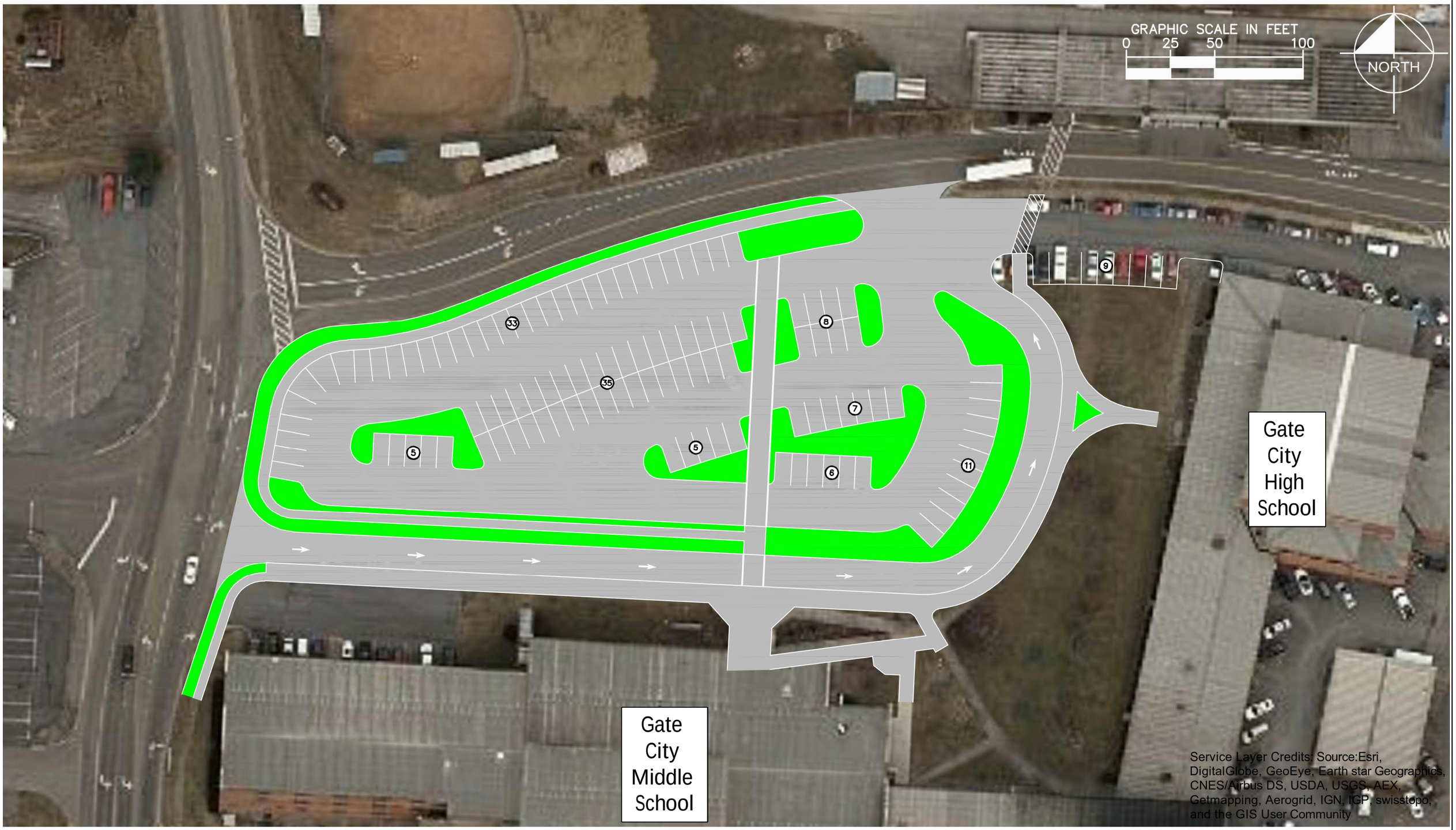
Figure 19



Moccasin Gap Corridor Study Scott County, VA	Alternative #3 – Additional Capacity on Jones Street	Figure 20



SCOTT COUNTY VIRGINIA 1814 · VDOT Virginia Department of Transportation · Kimley»Horn	Moccasin Gap Corridor Study Scott County, VA	Alternative #4 – Additional Capacity on Jones Street and Realignment of Beech Street	Figure 21



SCOTT COUNTY 1814 VIRGINIA · VDOT Virginia Department of Transportation · Kimley»Horn	Moccasin Gap Corridor Study Scott County, VA	School Option #1 – One-way Bus Circulation Access	Figure 22

SCOTT COUNTY 1814 VIRGINIA · VDOT Virginia Department of Transportation · Kimley»Horn	Moccasin Gap Corridor Study Scott County, VA	School Option #2 – Internal Bus Circulation Loop	Figure 23

5.7 Future Conditions Summary

Based on the operational analysis of the future Build conditions, the Moccasin Gap study area corridor and the associated intersections are expected to operate with minor queuing and nominal instances of delay. The identified short- and mid- term recommendations provide quality of life improvements for area residents and help extend the life cycle of the current transportation system with moderate levels of investment.

Theses recommended short- and mid-term improvements are anticipated to result in less delay and minimal queuing under 2030 Build conditions. Although they were not modeled as part of this study, it should be noted that the long-term improvements are not expected to result in significant operational benefits due to the availability of excess capacity and limited operational issues/constraints identified as a part of the future conditions analysis. However, the County and VDOT should continue to monitor conditions and explore opportunities to make strategic infrastructure investments that help further extend the life cycles of these facilities.

Based on a qualitative comparison analysis of the proposed long-term alternatives, a preferred alternative was ultimately selected as the best candidate for implementation. A comparison matrix (Table 36) was created that reviewed different elements for each alternative that included:

- Safety enhancements
- Traffic operations
- Impacts to existing tax base
- Impacts to property owners/Right-of-Way Impacts
- Environmental impacts
- Scope of Construction/Constructability

Each alternative was considered under these factors to determine their relative impacts in order to select a preferred alternative. Based on the anticipated impacts identified in the comparison matrix and conversations with Scott County, a “Hybrid” alternative that combined elements from Alternative #2 and Alternative #4 was ultimately developed into the preferred alternative as illustrated in Figure 24. The preferred long-term alternative provides many of the access management strategies identified in the other alternatives, without the significant impacts (e.g., ROW acquisition, constructability, etc.), along either Jones Street or Bishop Street.

In this Hybrid alternative, Beech Street will be improved to accommodate full-width travel lanes, curb, gutter, and sidewalks between Bishop Street and Jones Street. This alternative includes the realignment of Beech Street to become the fourth leg of the Harry Fry Drive/Jones Street intersection. The Hybrid alternative also includes the proposed enhancements to the middle and high school parking lot and access driveways, with additional pedestrian connectivity/accommodations (i.e., new sidewalks and crosswalks) as well as a direct sidewalk path between Shoemaker Elementary School and the Middle/High Schools site.

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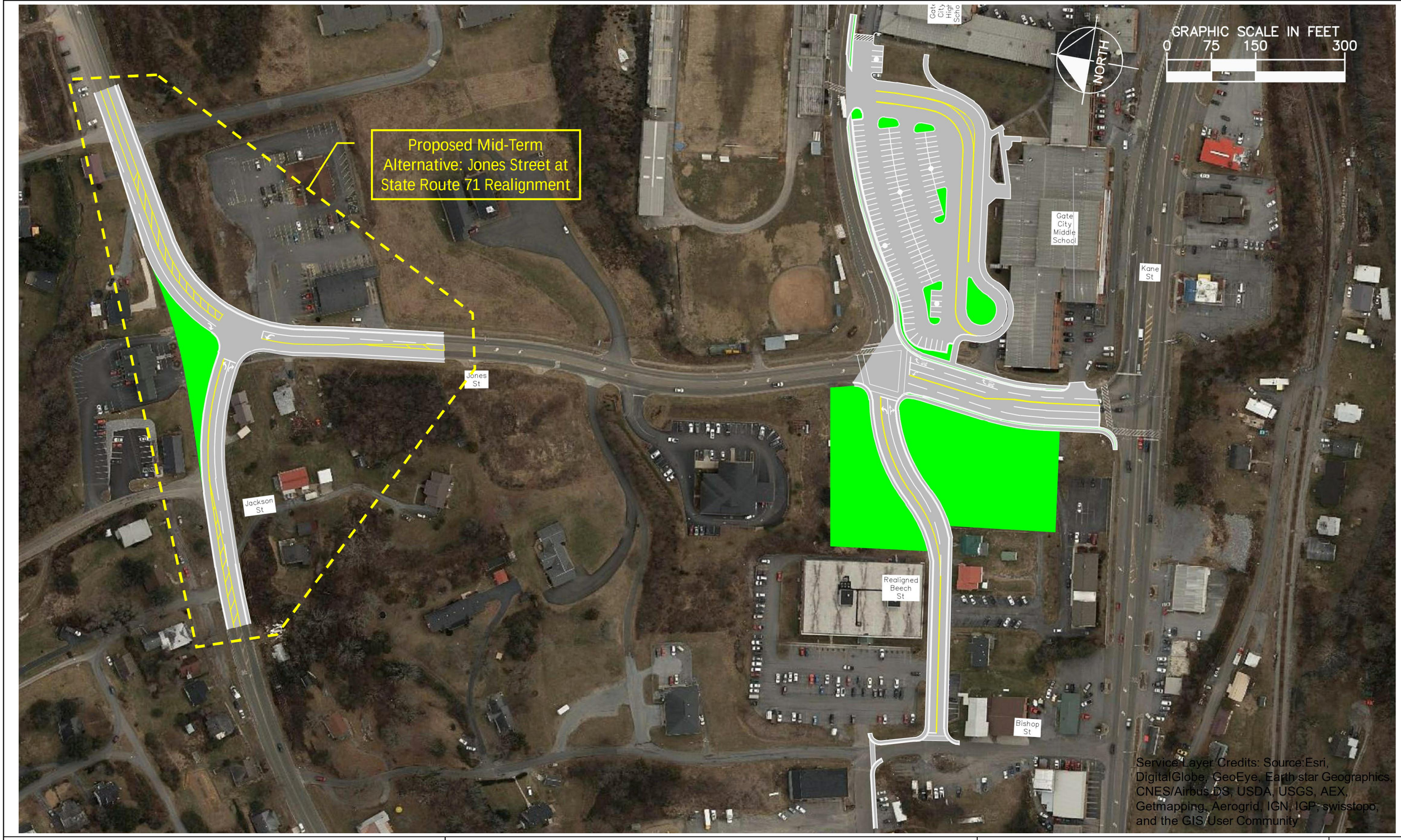
Table 36: Long-term Alternatives Comparative Matrix

Qualitative Factors	No-Build	Alternative #1: Parallel Route to Jones Street	Alternative #2: Parallel Route to Jones Street and Realignment of Beech Street	Alternative #3: Additional Capacity on Jones Street	Alternative #4: Additional Capacity on Jones Street and Realignment of Beech Street
Traffic Operations	1. Moderate delays and queues are anticipated under 2030 No-Build conditions. 2. As future development continues, the delays and queues experienced will be more severe. 3. Limited route choices for vehicles traveling north/south through the Gap	1. Reduced delays and queuing along Jones Street by widening and extending Bishop/Nena Street.	1. Reduced delays and queuing along Jones Street by providing a parallel route. 2. Improved access management on Jones Street by realigning Beech Street.	1. Improved capacity on Jones Street by widening to a four-lane, divided roadway.	1. Improved capacity on Jones Street by widening to a four-lane, divided roadway. 2. Improved access management on Jones Street by realigning Beech Street.
Impacts to Tax Base	1. None	1. Proposed improvements for the realignment of Jones Street and State Route 71 will require the acquisition of the Post Office. 2. Proposed improvements on Bishop Street will require the acquisition of the O'Reilly Auto Parts store or the Campus Drive-In restaurant.	1. Proposed improvements for the realignment of Jones Street and State Route 71 will require the acquisition of the Post Office. 2. Proposed improvements on Bishop Street will require the acquisition of the O'Reilly Auto Parts store or the Campus Drive-In restaurant. 3. Proposed improvements on Beech Street will required the acquisition of the Gate City Funeral Home	1. Proposed improvements for the realignment of Jones Street and State Route 71 will require the acquisition of the Post Office.	1. Proposed improvements for the realignment of Jones Street and State Route 71 will require the acquisition of the Post Office. 2. Proposed improvements on Beech Street will required the acquisition of the Gate City Funeral Home
Right-of-Way Impacts	1. None	1. Proposed realignment of Jones Street and State Route 71 will require the acquisition of the Post Office and at least one residential property located on the southwest corner. ROW and access impacts from the adjacent property owners will include the New People's Bank, the Virginia Department of Motor Vehicles, and at least one residential property. 2. Proposed widening on Bishop Street will require the acquisition of the O'Reilly Auto Parts store or the Campus Drive-In restaurant. 3. Widening Bishop/Nena Street will require ROW from properties located adjacent to the roadway including the Campus Drive-in, O'Reilly Auto Parts, the Gate City Fire Department, Shoemaker Elementary School, Scott County, and at least 6 residential homes.	1. Proposed realignment of Jones Street and State Route 71 will require the acquisition of the Post Office and at least one residential property located on the southwest corner. ROW and access impacts from the adjacent property owners will include the New People's Bank, the Virginia Department of Motor Vehicles, and at least one residential property. 2. Proposed widening on Bishop Street will require the acquisition of the O'Reilly Auto Parts store or the Campus Drive-In restaurant. 3. Widening Bishop/Nena Street will require ROW from properties located adjacent to the roadway including the Campus Drive-in, O'Reilly Auto Parts, the Gate City Fire Department, Shoemaker Elementary School, Scott County, and at least 6 residential homes. 4. Proposed improvements on Beech Street will required the acquisition of the Gate City Funeral Home and ROW from the Scott County, the Gate City Fire Department, the Mountain Region Family Med PC, and at least 5 residential properties	1. Proposed realignment of Jones Street and State Route 71 will require the acquisition of the Post Office and at least one residential property located on the southwest corner. ROW and access impacts from the adjacent property owners will include the New People's Bank, the Virginia Department of Motor Vehicles, and at least one residential property. 2. Proposed widening Jones Street will require ROW from the Gate City Middle/High Schools, Gate City Funeral Home, Eastman Credit Union, First Presbyterian Church, and at least 3 residential properties	1. Proposed realignment of Jones Street and State Route 71 will require the acquisition of the Post Office and at least one residential property located on the southwest corner. ROW and access impacts from the adjacent property owners will include the New People's Bank, the Virginia Department of Motor Vehicles, and at least one residential property. 2. Proposed widening Jones Street will require ROW from the Gate City Middle/High Schools, Gate City Funeral Home, Eastman Credit Union, First Presbyterian Church, and at least 3 residential properties 3. Proposed improvements on Beech Street will required the acquisition of the Gate City Funeral Home and ROW from the Scott County, the Gate City Fire Department, the Mountain Region Family Med PC, and at least 5 residential properties

Table 36: Long-term Alternatives Comparative Matrix

Qualitative Factors	No-Build	Alternative #1: Parallel Route to Jones Street	Alternative #2: Parallel Route to Jones Street and Realignment of Beech Street	Alternative #3: Additional Capacity on Jones Street	Alternative #4: Additional Capacity on Jones Street and Realignment of Beech Street
Environmental Impacts	1. None	1. No significant environment impacts identified at this time.	1. No significant environment impacts identified at this time.	1. No significant environment impacts identified at this time.	1. No significant environment impacts identified at this time.
Safety Enhancements	1. Inadequate pedestrian accommodation along Jones Street near Gate City Middle and High School.	1. Improved pedestrian accommodation by providing a sidewalk along Beech Street and Bishop/Nena Street.	1. Improved pedestrian accommodation by providing a sidewalk along the realigned Beech Street and Bishop/Nena Street. 2. By realigning Beech Street, the total number of conflict points at Beech Street and Harry Fry Drive will be reduced.	1. Improved access for pedestrians by providing a sidewalk along Jones Street.	1. Improved pedestrian accommodation by providing a sidewalk along Jones Street and the realigned Beech Street 2. Providing marked crosswalk for all four approaches at the Jones Street at Realigned Beech Street intersection 3. By realigning Beech Street, the total number of conflict points at Beech Street and Harry Fry Drive will be reduced.
Scope of Construction	1. None	Construction costs include: 1. Realigning State Route 71 and construction a new unsignalized intersection with Jones Street. 2. Retaining walls as part of the realignment of State Route 71 and Jones Street. 3. Pavement resurfacing and markings for approaches of Jones Street and State Route 71. 4. Widening of Bishop Street/Nena Street between State Route 71 and Kane Street to include curb, gutter, and sidewalks 5. Widening of Beech Street between Bishop Street and Jones street to include curb, gutter, and sidewalks	Construction costs include: 1. Realigning State Route 71 and construction a new unsignalized intersection with Jones Street. 2. Retaining walls as part of the realignment of State Route 71 and Jones Street. 3. Pavement resurfacing and markings for approaches of Jones Street and State Route 71. 4. Widening of Bishop Street/Nena Street between State Route 71 and Kane Street to include curb, gutter, and sidewalks 5. Widening of Beech Street between Bishop Street and Jones street to include curb, gutter, and sidewalks 6. Construction of a new intersection at Beech Street and Jones Street 7. Pavement resurfacing and markings for a portion of Jones Street	Construction costs include: 1. Realigning State Route 71 and construction a new unsignalized intersection with Jones Street. 2. Retaining walls as part of the realignment of State Route 71 and Jones Street. 3. Pavement resurfacing and markings for approaches of Jones Street and State Route 71. 4. Widening of Jones Street between State Route 71 and Kane Street to include landscaped median, curb, gutter, and sidewalks 5. Pavement resurfacing and markings for at least 4 side street approaches	Construction costs include: 1. Realigning State Route 71 and construction a new unsignalized intersection with Jones Street. 2. Retaining walls as part of the realignment of State Route 71 and Jones Street. 3. Pavement resurfacing and markings for approaches of Jones Street and State Route 71. 4. Widening of Jones Street between State Route 71 and Kane Street to include landscaped median, curb, gutter, and sidewalks 5. Widening of Beech Street between Bishop Street and Jones street to include curb, gutter, and sidewalks 6. Construction of a new intersection at Beech Street and Jones Street 6. Pavement resurfacing and markings for at least 2 side street approaches



SCOTT COUNTY VIRGINIA 1814 · VDOT Virginia Department of Transportation · Kimley»Horn	Moccasin Gap Corridor Study Scott County, VA	Preferred Long-Term Alternative – "Hybrid" Option	Figure 24

6.0 Recommendations

The character, scale, and function of the recommended improvements are a reflection of the feedback received during this study as well as extensive coordination with the Scott County, Gate City, local schools, Kingsport MPO, and VDOT project team members. This includes consideration of the operational benefits of the proposed improvements, feasibility of construction, and estimated implementation costs. Recommendations for specific improvements to the study area intersections have been split into short-term (zero to five years), mid-term (five to fifteen years), and long-term (fifteen to twenty-five plus years) categories based on their scale as well as the time frame in which they will be needed. This approach allows communities to prioritize and program larger scale projects over time while also being able to implement shorter term projects that mitigate immediate needs at relatively lower costs.

6.1 Opinions of Probable Cost

Planning-level cost estimates, expressed in year 2018 dollars, were determined for all improvement alternatives considered as part of this analysis. These planning-level cost estimates have been based on VDOT's statewide two-year cost averages for 2014, the VDOT Transportation & Mobility Planning Division's "Statewide Planning Level Cost Estimates" worksheet from 2009, and familiarity with similar projects and improvements throughout Virginia. Due to fluctuations in the costs of labor, materials, and equipment, fluctuations in the market, and the outcome of competitive bidding as well as the general planning-level nature of the recommendations, these estimated costs are neither exact nor guaranteed.

The cost breakdown per scenario includes engineering/design costs, roadway/intersection improvement costs (e.g., cost per mile for a particular roadway typical section, turn-lane improvements, roundabout, bridges/box culverts, milling, overlay, sidewalks, multi-use paths, channelization, stormwater collection and conveyance, landscaping (e.g., trees, seeding), etc.), traffic signal equipment improvement costs (e.g., poles, mast arms, signal heads, pedestrian signal head equipment and construction), construction engineering and inspection (CEI) costs, right-of-way (ROW) acquisition, and utility relocation costs as well as miscellaneous costs such as mobilization, erosion and sediment (E&S) control, and traffic control (i.e., maintenance of traffic (MOT) during construction). Furthermore, a 15% contingency was calculated based on construction cost.

6.2 Recommended Improvements

6.2.1 Short-Term Recommendations (0 to 5 years)

The following short-term recommendations were identified for the study area intersections to help address existing and future deficient operational conditions. These recommendations primarily represent improvements to existing signalized intersections and are intended to result in safer and more efficient operational conditions. It was determined that minor modifications to most of the existing study area intersections could be implemented at relatively low costs to help address potentially deficient operational conditions and extend the life-span of the existing intersection configuration and/or traffic control measures. The proposed short-term improvements were identified separately from the mid- and long-term alternatives for the study area intersections. Short-term recommendations consist of the following:

- U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)
  - Add right-turn overlap phasing for the westbound and northbound right-turn movements
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- U.S. Route 23 at Food City (Signalized)
  - Add right-turn overlap phasing for the northbound right-turn movement
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
- Kane Street at Jones Street (Signalized)
  - Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)
  - Install pedestrian accommodations (i.e., ADA Accessible, countdown pedestrian signals)

Table 37: Short-Term Recommendations Cost Estimates

Improvement	Planning Level Costs		
	PE/Design	ROW/Utility Relocations	Construction
U.S. Route 58/U.S. Route 23 at Hilton Road Signal Improvements	$ 13,000	$ 0	$ 4,500
	$ 17,500		
U.S. Route 23 at Food City Signal Improvements	$ 7,500	$ 0	$ 0
	$ 7,500		
U.S. Route 58/U.S. Route 23 at Kane Street Signal Improvements	$ 7,500	$ 0	$ 0
	$ 7,500		
Kane Street at Jones Street Signal Improvements	$ 26,000	$ 0	$ 63,000
	$ 89,000		

6.2.2 Mid-Term Recommendations (5 to 15 years)

The proposed mid-term recommendations are anticipated to have some select implementation challenges that will likely place them outside of the time period otherwise associated with short-term improvements. These challenges consist of but are not limited to: additional coordination requirements with/between existing property owners for right-of-way, funding source considerations, and future developments. Mid-term recommendations include the following proposed improvements:

- U.S. Route 58/U.S. Route 23 at Hilton Road (Signalized)
  - Extend the southbound left-turn lanes
  - Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site
- U.S. Route 58/U.S. Route 23 at Kane Street (Signalized)
  - Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)
- Kane Street at Bishop Street (Unsignalized)
  - Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)
- Jones Street at State Route 71 (Unsignalized)
  - Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to "T" into the new intersection and be served by STOP control.
  - New People's Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road.

Table 38: Mid-Term Recommendations and Cost Estimates

Improvement	Planning Level Costs		
	PE/Design	ROW/Utility Relocations	Construction
U.S. Route 58/U.S. Route 23 at Hilton Road Turn Lane and Access Managements Improvements	$ 110,000	$ 100,000	$ 960,000
	$ 1,170,000		
U.S. Route 58/U.S. Route 23 at Kane Street Turn Lane Improvements	$ 211,000	$ 50,000	$ 1,104,000
	$ 1,365,000		
Kane Street at Bishop Street Westbound Right-Turn Lane	$ 41,000	$ 92,000	$ 208,000
	$ 341,000		
Jones Street at State Route 71 Intersection Realignment	$ 444,000	$ 1,510,000	$ 3,599,000
	$ 5,553,000		

6.2.3 Long-Term Recommendations (15 to 25 years)

Long-term recommendations for the Moccasin Gap Bypass Alternatives study area are intended to address larger and/or more complex transportation infrastructure needs. The proposed long-term improvements will not only result in enhanced operations for vehicular traffic, but also improve pedestrian safety and mobility along Jones Street and between the Middle School/High School site and the Elementary School site. These recommendations will also facilitate improved on-site and off-site school related traffic operations for both buses and passenger vehicles. Due to the scale of the projects and the potential number of involved property owners (e.g., private property owners, VDOT, Scott County Schools, etc.), the long-term recommendations will require more coordination among interested parties and substantially more funding than that associated with proposed short- and mid-term recommendations resulting in a longer lead time before implementation. Based on discussions with County staff, the "Hybrid" alternative which incorporated various elements from the other long-term alternatives was selected as the preferred alternative. The final preferred long-term improvements consisted of the following and are illustrated in Figure 26:

- Realign Beech Street with the Harry Fry Drive approach at Jones Street to create a conventional four-legged intersection
  - Improve Beech Street to accommodate full-width travel lanes, curb and gutter, and sidewalks between Bishop Street and Jones Street
    - 11' to 12' travel lanes
    - 5' sidewalk
  - Construct/install new sidewalks and intersection crosswalks
  - Construct sidewalk path between Shoemaker Elementary School and the Middle/High Schools site.
- Construct additional laneage and close identified access driveways along Jones Street to improve traffic flow/operations and reduce friction/conflict points along Jones Street.
  - Enhance pedestrian mobility and safety at the Jones Street/Kane Street intersection
    - Install pedestrian signals and crosswalks
    - Improve/upgrade existing ADA ramps
    - Improve/upgrade existing traffic signal equipment
  - Construct/install 5' sidewalks along northbound and southbound Jones Street
- Improve Middle and High School parking lot, bus loop, and access driveways
  - Remove/close two (2) of the existing access points to/from Jones Street to create a new internal bus circulation loop for the schools
  - Shift parking area and bus access point/driveway approximately 80 feet to the east of its existing location to align with the proposed bus loop
  - Construct new bus loop
  - Construct new 10' wide sidewalk for bus pick-up/drop-off operations and pedestrian/student mobility

Table 39: Long-Term Recommendations and Cost Estimate

Improvement	Planning Level Costs		
	PE/Design	ROW/Utility Relocations	Construction
Realignment of Beech Street with Harry Fry Drive at Jones Street	$ 622,000	$ 1,119,500	$2,808,900
	$ 4,550,400		
Jones Street Access Management and Pedestrian Mobility/Safety enhancements	$269,000	$443,100	$1,670,600
	$2,382,700		
Improve/Reconfigure Middle School and High School Parking Lot, Bus Loop, and access driveways	$443,000	$652,000	$1,555,400
	$2,650,400		

The short-, mid-, and long-term recommendations are summarized in Figure 25.

Not To Scale

Legend

- Short-Term Recommendation
- Mid-Term Recommendations
- Long-Term Recommendations

Jones Street at State Route 71
Mid-Term:
- Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to "T" into the new intersection and be served by STOP control
- New People's Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road.

Jones Street - Preferred "Hybrid" Alternative
Long-Term:
- Realign Beech Street with the Harry Fry Drive approach at Jones Street
- Improve Beech Street to accommodate full-width travel lanes, curb and gutter, and sidewalks between Bishop Street and Jones Street
- Construct/install new sidewalks and intersection crosswalks
- Construct sidewalk path between Shoemaker Elementary School and Middle/High Schools site
- Improve Middle and High School parking lot, bus loop, and access driveways
- Remove/close two of the existing access points to/from Jones Street
- Shift parking area and bus access point approximately 80 feet to the east
- Construct additional laneage and close identified access driveways along Jones Street to improve traffic flow/operations and reduce friction/conflict points along Jones Street.

Kane Street at Bishop Street
Mid-Term:
- Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)

U.S. Route 58/U.S. Route 23 at Hilton Road
Short-Term:
- Add right-turn overlap phasing for the westbound and northbound right-turn movements
- Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)

Mid-Term:
- Extend the southbound left-turn lanes
- Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site

U.S. Route 58/U.S. Route 23 at Kane Street
Short-Term:
- Implement coordinated, time of day plans
- Install pedestrian accommodations (i.e., ADA Accessible, countdown pedestrian signals)

U.S. Route 58/U.S. Route 23 at Kane Street
Short-Term:
- Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)

Mid-Term:
- Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)

U.S. Route 58/U.S. Route 23 at Food City
Short-Term:
- Add right-turn overlap phasing for the northbound right-turn movements
- Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)

72 71 23 58 58 23

Moccasin Gap Corridor Study
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Short-, Mid-, and Long-Term Recommendations

Figure 25

6.3 Implementation

The next key step in the planning process is to determine how the recommended improvements will be implemented. Both Scott County and VDOT officials will need to determine implementation strategies as well as establish project priorities. Implementation strategies to consider include seeking and identifying funding streams, both public and private, to construct the proposed improvements. There are several potential public programs that could assist with funding the identified projects. At the federal level there are earmarks, National Highway System funds, bridge funds, Regional Surface Transportation Program (RSTP) funds, Highway Safety Improvement Program (HSIP) funds, and Transportation Alternatives (TA) funds, to name a few. At the state level there is the VDOT SMART Scale program that evaluates different projects based on a quantitative review that results in a prioritization process for making funding decisions for capacity enhancing projects within the six-year improvement program (SYIP). The SYIP can also help define which alternative funding sources the project may qualify for such as; the Recreational Access Program, the Economic Development Access Program, or the Revenue Sharing Program. It is recommended that proposed improvements be prioritized into projects with Town, County, PDC, MPO, and VDOT input. Each project should be thoroughly evaluated then identified for priority order, time frame from implementation, and potential funding sources.

The following sections describe some of potential sources of funding for the recommended improvements identified for the study area.

6.3.1 Federal Funding Sources Alternatives

Highway Safety Improvement Program (HSIP)
Safety throughout all transportation programs remains VDOT's number one priority. Federal legislation, "Fixing America's Surface Transportation Act'' (FAST Act), authorizes the Federal surface transportation programs for highways, highway safety, and transit. The Highway Safety Improvement Program (HSIP) is a core program administered at the federal level by the U.S. Department of Transportation's (USDOT) FHWA Office of Safety. HSIP's purpose is to make significant progress in reducing highway fatalities and serious injuries on all public roadways. The Federal FAST Act continues the successful HSIP, with an estimated 2018 annual funding amount of $2.318 billion, including $235 million per year for the Rail-Highway Crossings program. Annually, Virginia expects to receive approximately $66M for roadway safety improvements.

The HSIP emphasizes a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. The foundation for this approach is a safety data system, which each state is required to have to identify key safety problems, establish their relative severity, and then adopt strategic and performance based goals to maximize safety. Every state is required to develop a Strategic Highway Safety Plan (SHSP) that lays out strategies to address these key safety problems. Every state now has an SHSP in place, and the FAST Act ensures ongoing progress toward achieving safety targets by requiring regular plan updates and defining a clear linkage between behavioral (NHTSA funded) state safety programs and the SHSP.

Virginia's 2017-2021 SHSP identified eight (8) emphasis areas for the updated plan including impaired driving, intersections, speeding, young drivers, occupant protection, bicycles, roadway departure, and pedestrians. The updated SHSP also initiates a comprehensive evaluation plan to track progress and effectiveness towards the plan's goal of reducing deaths and severe injuries by half by 2030.

The federal share for HSIP projects is 90%, with the remaining 10% typically being covered by VDOT. Where VDOT funding is limited, however, the locality could be required to cover this 10%.

Surface Transportation Block Grant Program
The Surface Transportation Block Grant Program provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. Federal-aid highways are defined as those highways on the Federal-aid highway systems and all other public roads not classified as local roads or rural minor collectors. The Federal-aid highway systems consist of the National Highway System (NHS) and the Dwight D. Eisenhower National System of Interstate and Defense Highways (the "Interstate System"). U.S. Route 58/U.S. Route 23 is located on the NHS as a principal arterial.

The typical split for STP projects between federal funding and the project sponsor is 80% federal and 20% state and/or local match.

Transportation Alternatives (TA)
The Transportation Alternatives (TA) redefines the former Transportation Alternatives Program (TAP) and consolidates these eligibilities with the Safe Routes to School (SRTS) and Recreational Trails program eligibilities. The program is intended to help local sponsors fund community based projects that expand travel choices and enhance the transportation experience by improving the cultural, historical and environmental aspects of the transportation infrastructure. TA is part of the Federal-aid Highway program. It is not a traditional grant program and funds are only available on a reimbursement basis. This means the project sponsor must first incur project expenses and then request reimbursement.

The program does not fund traditional roadway projects or provide maintenance for these facilities. Instead it focuses on providing for pedestrian and bicycle facilities, community improvements and mitigating the negative impacts of the highway system. Additional projects eligible for funding include infrastructure projects for improving non-driver access to public transportation and enhanced mobility. Due to the presence of three schools within the study area, this project is eligible to receive funding from TA programs

The split for TA projects allows for a maximum federal reimbursement of 80% of the eligible project costs and requires a minimum 20% local match. The 2018 estimated annual funding is $850 million.

6.3.2 State Funding Sources Alternatives

SMART Scale

Virginia uses the SMART Scale funding program to review and score which transportation projects should be funded into the Six-Year Improvement Plan (SYIP). The program is intended to improve the transparency and accountability of project selection, as well as provide improved stability in the SYIP by ensuring that all projects are fully funded through all phases. The process scores projects based on an objective and fair analysis process that is applied statewide. This process is intended to help the Commonwealth Transportation Board (CTB) members select projects that provide the maximum benefit for per the tax dollars invested.

The prioritization process will evaluate projects in the following factor areas: congestion mitigation, economic development, accessibility, safety, environmental quality and land use coordination. Factor areas are weighted in each highway construction district, and may be weighted differently within each highway construction district

Within the SMART Scale process, there are several types of projects that are eligible for funding. Highway, transit, rail, road, operational improvements and transportation demand management projects and strategies will be considered. However, projects must meet a need identified in VTrans 2040 for a Corridor of Statewide Significance (CoSS), Regional Network or Urban Development Area (UDA). Projects seeking funding from most state and Federal discretionary fund categories are required to go through the SMART Scale program. However, the following funding categories are exempt from the SMART Scale program: Congestion Mitigation and Air Quality, Highway Safety Improvement Program, Transportation Alternatives, Revenue Sharing program, and secondary/urban formula funds.

The SMART Scale will consist of a two-year cycle where projects applications are submitted, reviewed, and selected. Candidate projects will be solicited from eligible entities (i.e., Scott County). From there VDOT will screen, review, and evaluate the projects to determine the preliminary list of projects and scores for the CTB to consider. A draft SYIP will be released by the CTB, followed by public hearings to gather input. A final SYIP will be released and considered for adoption by the CTB.

Revenue Sharing

The “Revenue Sharing Program” provides additional funding for use by a county, city, or town to construct, reconstruct, or improve the highway systems within such county, city, or town. Locality funds are matched on a dollar-for-dollar basis with state funds, with statutory limitations on the amount of state funds authorized per locality. A locality may apply for up to a maximum of $10 million in matching allocations per fiscal year, with up to $5 million of these requested funds being utilized for maintenance projects. There is no limit to the amount of additional funds the locality may contribute. Priority will be given first to allocations that accelerate construction projects in the Commonwealth Six-Year Improvement Program or the locality’s capital plan. Locality requests up to a total of $1 million will be evaluated first and funded first.

The Revenue Sharing Program is administered by the Virginia Department of Transportation, in cooperation with the participating localities, under the authority of Section 33.1-23.05 of the Code of Virginia and the Commonwealth Transportation Board’s (CTB) Revenue Sharing Program Policy. Application for program funding must be made by resolution of the governing body of the jurisdiction requesting the funds. Applications for program funding are typically due by November for funding under the next fiscal year. Localities are typically notified by June prior to the effective fiscal year of application approvals.

The Revenue Sharing Program may be used to finance eligible work on highway systems within a locality. The Revenue Sharing Program is intended to provide funding for immediately needed improvements or to supplement funding for existing projects. Larger new projects may also be considered, provided the locality identifies any additional funding needed to implement the project. Revenue Sharing Program funds are generally expected to be used to finance project costs in the same fiscal year and projects should be in active development that is leading to their completion within the near term.

The total funds available each fiscal year will be determined by the Commonwealth Transportation Board. The maximum allocation the CTB may make to the Revenue Sharing Program is $200 million annually. The minimum allocation the CTB may make to the Revenue Sharing Program is $15 million annually.

Economic Development Access Program

The Economic Development Access Program is a state-funded incentive designed to assist Virginia localities in attracting sustainable businesses that create jobs and generate tax revenues within the locality. The program makes funds available to localities for road improvements needed to provide adequate access for new or substantially expanding qualifying establishments. These qualifying investments represent the cost of land, building and any manufacturing/processing equipment by an incoming establishment, including manufacturing, processing, research and development, distribution centers, regional service centers and corporate headquarters. Economic Development Access funds are allocated by the CTB. These funds may be used for financing the construction or improvement of secondary or local system roads within all counties and cities, and certain towns that are part of the Urban System. Ancillary improvements, such as turn lanes or intersection modifications may also be warranted as part of the access project, but are not to be considered as the primary objective of the project. The program is administered by VDOT, Local Assistance Division. Subject to available funding, the maximum unmatched allocation to a locality within any one fiscal year is $500,000, which may be used for one or more projects. The maximum allocation to any one project is limited to the lesser of either the access road construction cost or 20% of the qualifying investment.

Recreational Access Program

The Recreational Access Program is a state-funded program intended to assist in providing adequate access to or within public recreational areas and historic sites operated by the Commonwealth of Virginia, or by a local government or authority. Federal sites are not eligible. Recreational Access funds, with the appropriate designation and concurrence of the Department of Conservation and Recreation (DCR) or the Department of Historic Resources (DHR), are allocated by the Commonwealth Transportation Board (CTB) in accordance with its policy revised February 20, 2008. While projects may qualify under either recreational or historic categories, the area may have both recreational and historic qualities.

It is recommended that localities consult with both DCR and DHR to ensure the access project design takes all values into account when requesting funding under this program. These funds may be used for financing the construction or improvement of secondary or local system roads within all counties and cities and certain towns that are part of the Urban System. The Recreational Access Program is funding through an annual appropriation, with up to $3 million available for the program. Applications are considered on a first come, first served basis. Limitations to this funding specify that not more than $400,000 may be allocated for an access road or $75,000 for a bikeway project for any facility operated by a state agency. Additionally, not more than $250,000 may be allocated for an access road or $60,000 for a bikeway project to any facility operated by a locality, with an additional $100,000 available for the access road or $15,000 for the bikeway if matched dollar-for-dollar by the locality.

6.3.3 Other Funding Sources

At the local level, Scott County is part of the Scott County Planning Commission. Additionally, Scott County is part of the Bristol Planning Commission. These Planning Commission can assist with local planning efforts by providing services and guidance on funding strategies/coordination with VDOT.

Private funds can also be realized through rezoning action and proffer contributions, as well as dedication of right-of-way. All the referenced funding programs and strategies require some portion of commitment and/or match at the local level but serve as a means for communities to increase the effectiveness of their budgetary dollars toward priority projects. One source of local match funding could be the inclusion of specific transportation-match funds in Scott County's Capital Improvement Program (CIP), or another dedicated local fund.

Local fund matches or the use of additional local funds for some components may be necessary if it is determined their inclusion in the roadway project is cost prohibitive, a significant addition to anticipated costs, or inconsistent with the intent of the project. The vision for the corridor is to provide an efficient transportation system that is multi-modal in nature, safe for all users, and aesthetically acceptable to the community.

To achieve some of these objectives and based on the proposed typical section of the roadway it is anticipated that additional improvement and roadway attribute costs may include; the relocation of overhead utilities to underground, a multi-use path and the associated bicycle and pedestrian safety features (e.g., signage, pavement markings, pedestrian push buttons/ped displays at signalized intersections, pedestrian scale lighting, and flashing beacons), and landscaping (raised grass medians, trees, and/or shrubs). These features may require Scott County to identify and dedicate additional local funds to supplement traditional and alternative funding sources.

6.4 Resiliency

In addition to the transportation improvement recommendations identified in this study, Scott County, as well as the Town of Gate City and the Town of Weber City should work together with the Commonwealth to develop an emergency response standard operating procedures (SOP) document in the event of a catastrophic incident, such as a train derailment that could impact the operations and accessibility along U.S. Route 58/U.S. Route 23.

7.0 Conclusions

The Moccasin Gap Bypass Alternatives Study can serve as a planning level document that conducted a technical review and analysis of the traffic characteristics and operations along many of the key roadway through the Moccasin Gap in southwest Virginia. This document will help serve Scott County and it neighbors in understanding the challenges the area currently faces and provide strategies for the future. The primary intent for this study was to provide a plan that verifies the operational constraints and safety issues along the described study area corridor/route and develop, identify, and prioritize a list of improvements that mitigate existing constraints.

Based on a review of these operational characteristics, safety conditions, and access management, recommendations were developed that help plan for the future growth and maintain efficient traffic flows through the study area. The recommendations were developed based on the guiding principles established for this study:

- Develop recommended transportation improvements that have the support of the local jurisdictions
- Identify cost-effective transportation improvements that can receive future funding for implementation
- Provide justification for future transportation improvements and enhancements
- Enhance safety for all users
- Implement access management strategies
- Respond to projected future traffic volumes and vehicle mix
- Minimize impacts to natural and built environments

Recommendations developed for the corridor also reflect the feedback received during the study process and coordination with the County and VDOT. Recommendations for specific improvements to the Moccasin Gap study area corridor were split into short-term (zero to five years), mid-term (five to fifteen years), and long-term (fifteen to twenty-five plus years) categories based primarily on their scale as well as the time frame in which they will be needed. This allows communities to prioritize larger scale projects over time while also being able to implement shorter term projects that mitigate immediate needs at relatively lower costs. The recommended for the study corridor are summarized in Table 40 through Table 42. It is also recommended that the proposed improvements should be prioritized into projects with both County and VDOT input. Each project should be thoroughly evaluated then identified for priority order, time frame from implementation, and potential funding sources. Preliminary recommendations regarding the prioritization of project implementation are provided in Appendix G of this report.

Table 40: Summary of Short-Term Moccasin Gap Bypass Alternatives Study Recommendations

Improvement	Description	Planning Level Costs
Short-Term Recommendations (0 to 5 years)		
U.S. Route 58/U.S. Route 23 at Hilton Road Signal Improvements	o Add right-turn overlap phasing for the westbound and northbound right-turn movements o Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)	$ 17,500
U.S. Route 23 at Food City Signal Improvements	o Add right-turn overlap phasing for the northbound right-turn movements o Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)	$ 7,500
U.S. Route 58/U.S. Route 23 at Kane Street Signal Improvements	o Implement coordinated, time of day traffic signal timing plans (i.e., AM Peak, PM Peak, School Peak, and Weekend/Off-Peaks)	$ 7,500
Kane Street at Jones Street Signal Improvements	o Implement coordinated, time of day plans o Install pedestrian accommodations (i.e., ADA Accessible, countdown pedestrian signals)	$ 89,000

Table 41: Summary of Mid-Term Moccasin Gap Bypass Alternatives Study Recommendations

Improvement	Description	Planning Level Costs
Mid-Term Recommendations (5 to 15 years)		
U.S. Route 58/U.S. Route 23 at Hilton Road Turn Lane and Access Management Improvements	o Extend the southbound left-turn lanes o Implement access management strategies to improve traffic operations and enhance the safety of vehicles traveling to/from the Exxon gas station site	$ 1,170,000
U.S. Route 58/U.S. Route 23 at Kane Street Turn Lane Improvements	o Extend the existing exclusive left and right-turn lanes on U.S. Route 58/23 to meet current VDOT standards (i.e., minimum 200 feet storage and 200 feet taper)	$ 1,365,000
Kane Street at Bishop Street Westbound Right-Turn Lane	o Add/construct an exclusive westbound right-turn lane (i.e., drop lane for outside travel lane)	$ 341,000
Jones Street at State Route 71 Intersection Realignment	o Realign the east leg of State Route 71 with Jones Street to serve the dominant westbound to southbound and northbound to eastbound turning movements. The west leg of the existing intersection will be realigned to “T” into the new intersection and be served by STOP control o New People’s Bank access to/from State Route 71 at Jones Street will be removed. Access to/from the bank will be provided via Red Hill Road	$ 5,553,000

Table 42: Summary of Long-Term Moccasin Gap Bypass Alternatives Study Recommendations

Improvement	Description	Planning Level Costs
Long-Term Recommendation (15 to 25+ years)		
Realign Beech Street with Harry Fry Drive at Jones Street	• Realign Beech Street with the Harry Fry Drive approach at Jones Street • Improve Beech Street to accommodate full-width travel lanes, curb and gutter, and sidewalks between Bishop Street and Jones Street • Construct/install new sidewalks and intersection crosswalks • Construct sidewalk path between Shoemaker Elementary School and Middle/High Schools site	$ 4,550,400

Jones Street Access Management and Pedestrian Mobility/Safety enhancements	• Construct additional laneage and close identified access driveways along Jones Street to improve traffic flow/operations and reduce friction/conflict points along Jones Street
	• Enhance pedestrian mobility and safety at the Jones Street/Kane Street intersection
	  o Install pedestrian signals and crosswalks
	  o Improve/upgrade existing ADA ramps
	  o Improve/upgrade existing traffic signal equipment
	  o Construct/install 5’ sidewalks along northbound and southbound Jones Street
		$ 2,382,700

Improve/Reconfigure Middle School and High School Parking Lot, Bus Loop, and access driveways	• Remove/close two (2) of the existing access points to/from Jones Street to create a new internal bus circulation loop for the schools • Shift parking area and bus access point/driveway approximately 80 feet to the east of its existing location to align with the proposed bus loop • Construct new bus loop • Construct new 10’ wide sidewalk for bus pick-up/drop-off operations and pedestrian/student mobility	$ 2,650,400

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