VDOT

Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

MARCH 2020

Air Quality Technical Report

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

Prepared in Coordination With:

U.S. Department of Transportation
Federal Highway Administration

AIR QUALITY TECHNICAL REPORT

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EXECUTIVE SUMMARY

This report describes the details of an air quality assessment performed for the Martinsville Southern Connector Study in Henry County, Virginia. Information in this report is intended to support the Draft Environmental Impact Statement (EIS) that has been prepared by the Virginia Department of Transportation (VDOT), in conjunction with the Federal Highway Administration (FHWA) as the lead federal agency. The Draft EIS has been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), codified in 42 USC §4321-4347, as amended, and in accordance with FHWA regulations, found in 23 CFR §771.

The alternatives retained for evaluation in the Draft EIS have been assessed for potential air quality impacts and conformity consistent with all applicable air quality regulations and requirements. All models, methods and assumptions applied in modeling and analyses were made consistent with those provided or specified in the VDOT Resource Document and associated online data repository[1] (VDOT, 2018). The assessment indicates that the project would meet all applicable federal air quality requirements. As such, the project would not cause or contribute to a violation of the national ambient air quality standards (NAAQS) established by the U.S. Environmental Protection Agency (EPA).

Additional detail on the analyses conducted for this project is provided below.

Carbon Monoxide: As the project is located in a region that is attainment of the NAAQS for carbon monoxide (CO), only NEPA applies; EPA project-level (hot-spot) transportation conformity requirements do not apply. The conformity rule applies to projects located in, "non-attainment or maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan" (40 CFR 93.102(b)).

Analyses for potential impacts for CO were conducted for the nearby intersections that might be impacted by the project. Worst-case modeling assumptions, which were made consistent with the VDOT Resource Document as noted above, included:

- The studied signalized intersections for the Build Alternatives were ranked and summarized based on peak volumes and level of service (LOS). The intersections were then screened for modeling using the 2016 FHWA-VDOT "Programmatic Agreement (PA) for Project-Level Air Quality Analyses for Carbon Monoxide" (hereinafter "2016 Agreement"), which references screening criteria (primarily Design-Year average daily traffic [ADT] and intersection skew angle) that were previously established based on worst-case modeling for typical intersections (FHWA and VDOT, 2016). The worst case intersections are skewed and were found to meet the criteria for screening for skewed intersections for all Build Alternatives that were referenced in the 2016 Agreement for 2025 and 2040 conditions, so it can be safely concluded that they would all meet the NAAQS.

For freeways, interchanges are typically the focus for CO analyses. The studied interchanges for the Build Alternatives were ranked and summarized based on peak volumes. For the interchanges that were identified as the worst-case locations, CO concentrations were estimated using EPA

[1] The Resource Document was created by VDOT to facilitate and streamline the preparation of project-level air quality analyses. It serves as a resource for modelers to help ensure that not only regulatory requirements and guidance, as appropriate, are met in all analyses but also high-quality standards for modeling and documentation are consistently achieved. In a comprehensive fashion, it addresses the models, methods, and assumptions (including data and data sources) needed for the preparation of air quality analyses for transportation projects by, or on behalf of, the Department. It includes an associated online data repository to support project-level modeling. It was subjected to inter-agency consultation with FHWA and other agencies before being finalized in 2016. It was last updated in December 2018.

models (Motor Vehicle Emissions Simulator (MOVES) 2014b and CAL3QHC). A worst-case grade separation configuration was assumed that has receptors located in close proximity to the cross-over point (i.e., inside the right of way) where the highest modeled concentrations would be observed, i.e., representing worst-case placement of receptors. The results of the modeling for each of the short-listed (worst-case) interchanges indicate that, despite worst-case assumptions for traffic volumes, roadway configuration and receptor placement, the modeled worst-case CO concentrations remain well below the CO NAAQS at all receptor locations for each interchange. For purposes of NEPA, worst-case emission and dispersion modeling for CO was conducted for the project for the worst-case interchanges for each Build Alternative. The worst-case modeling assumptions were made consistent with EPA and FHWA guidance as well as the VDOT Resource Document and included:

For emission factor modeling:

- Regional registration (age) distributions were applied that were not adjusted (as a limitation of the EPA MOVES model) for mileage accumulation rates that generally decline with age. This assumption effectively weights emission factors for older higher-emitting vehicles the same as newer lower-emitting vehicles, resulting in higher estimates for fleet-average emission factors.
- Worst-case emission factor selected as that for the maximum (or higher) road grade for each link.

For dispersion modeling:

- Traffic volumes representing LOS E conditions, which typically exceeds actual opening and design year ADT forecasts for build scenarios by substantial margins. Depending on the project, volumes may also be increased with the worst-case assumption of additional through lane(s) to account for auxiliary lanes or ramps.
- Worst-case receptor locations on the edge of the roadway right of way, i.e., at the closest possible point to roadway.
- Worst-case geometric assumptions that serve to concentrate traffic, emissions and concentrations to the greatest extent possible:
    - Zero vertical separation for the grade separation (interchange)
    - Zero median widths for arterial streets and minimum distance for freeways
    - Lane widths of 11 ft, compared to the standard 12 ft
- Other federal default data for most model inputs (e.g., low wind speeds, surface roughness, and stability class), which result in higher modeled estimates of ambient concentrations than are expected to occur in practice.

Overall, the results indicate that, even with assuming worst-case traffic volumes and other modeling inputs, ambient levels of CO in the vicinity of the project are expected to decline significantly over time and to remain below both the one-hour and the eight-hour NAAQS. In general, emissions and ambient concentrations drop significantly over time (through the opening and design years) due to continued fleet turnover to vehicles constructed to more stringent emission standards. The project therefore is not expected to cause or contribute to a violation of the CO standards.

Mobile Source Air Toxics: Federal Highway Administration (FHWA) guidance specifies Mobile Source Air Toxics (MSATs) to include *1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter* (VDOT, 2016a). Following FHWA guidance, which specifies three possible tiers of analysis

and associated criteria depending on specific project circumstances, this project may be categorized as one with low potential MSAT effects based on the criteria specified in FHWA guidance and the forecast traffic volumes for this project. A qualitative assessment was therefore conducted for the project, following FHWA guidance for projects with low potential impacts.

Overall, best available information indicates that, nationwide, regional levels of MSATs are expected to decrease in the future due to ongoing fleet turnover and the continued implementation of increasingly more stringent emission and fuel quality regulations. Nonetheless, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects effectively limit meaningful or reliable estimates of MSAT emissions and effects of this project at this time. While it is possible that localized increases in MSAT emissions may occur as a result of this project, emissions would likely be lower than present levels in the design year of this project as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent between 2010 and 2050. Although local conditions may differ from these national projections in terms of fleet mix and turnover, vehicle-miles-travelled (VMT) growth rates, and local control measures, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Greenhouse Gases: With the recent withdrawal of federal guidance addressing greenhouse gas analyses and climate change[2] (CEQ, 2017), the Department protocol (*VDOT Resource Document*, *Section 4.7*) for greenhouse gas (GHG) analyses was reviewed for applicability to this project. Based on the Department protocol, a GHG analysis is warranted for this project as it involves an Environmental Impact Statement. A qualitative analysis for climate change and GHGs was therefore conducted. GHG emissions from vehicles using roadways are a function of distance travelled (expressed as vehicle miles travelled, or VMT), vehicle speed, and road grade. GHG emissions are also generated during roadway construction and maintenance activities (VDOT, 2018).

Under the No-Build Alternative, daily VMT would gradually increase between 2018 and 2040 as employment and population in the area increase. Similarly, under the Build Alternatives, daily VMT is expected to increase relative to the No-Build Alternative for all Build Alternatives where additional alignments would be constructed. More specific, under the No-Build Alternative, daily VMT increases approximately 32 percent between 2018 and 2040 while under the Build Alternatives, daily VMT would increase on average by approximately 44% compared to 2018 levels (the increases range from 31% to 50% depending on Alternative). Nationally, the Energy Information Administration (EIA) estimates that light-duty vehicles VMT would increase by approximately 38 percent between 2012 and 2040[3] (EIA, 2015), so the VMT increase under the majority of Build Alternatives is still slightly above the projected national rate.

A major factor in mitigating this increase in VMT is EPA's GHG emissions standards, implemented in concert with national fuel economy standards. EIA projects that vehicle energy efficiency (and thus, GHG emissions) on a per-mile basis would improve by 30% between 2012 and 2040[4] (EIA, 2014). For example, the fuel economy of new light-duty vehicles (LDVs), measured in terms of their compliance values in Corporate Average Fuel Economy (CAFÉ) testing, rises from 32.7 miles per gallon (mpg) in 2012 to 48.2 mpg in 2040, as new fuel-saving technologies are adopted.

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[2] See: https://www.federalregister.gov/documents/2017/04/05/2017-06770/withdrawal-of-final-guidance-for-federal-departments-and-agencies-on-consideration-of-greenhouse-gas

[3] https://www.hsdl.org/?view&did=767364. Calculated from Annual Energy Outlook 2015, Table A7. The increase in VMT is calculated from 2012 because AEO2015 does not include data for 2010

[4] https://www.eia.gov/outlooks/aeo/pdf/0383(2014).pdf

Similarly, in 2040, passenger car fuel economy averages 55.6 mpg, and light-duty truck fuel economy averages 40.9 mpg[5]. This improvement in vehicle emissions rates would help offset the increase in VMT. Other factors related to the project would also help reduce GHG emissions relative to the No-Build Alternative. The project would improve vehicle speeds by reducing the number of curves and increasing the typical curve radius and design speed. The average travel speed across the entire study area would increase from 51.3 miles per hour under the No-Build Alternative to 51.5 to 54.1 miles per hour under the Build Alternatives. GHG emission rates decrease with speed over the range of average speeds encountered in this corridor, although they do increase at very high speeds. For example, 2040 MOVES2014b GHG emission rates at 45 mph are estimated at 1,218 grams per mile, while emission rates at 55 mph for 2040 are lower at 1,133 grams per mile. Reduction of the roadway grade also reduces energy consumption and GHG emissions; the maximum design grade for the new Route 220 roadway alternatives is 4 percent. The existing Route 220 roadway has a maximum grade of 7 percent, which is used on the southbound roadway in Segment A. The existing approaches to the Marrowbone Creek bridge in Segment C are constructed with 6 percent grades. In addition, all other roadways and interchange ramps that are within the limits of work would have maximum design grades of 5 percent. Soapstone Road currently has grades of 9.5 percent near the locations of a potential interchange with Alternatives B and C, and this segment of roadway would be rebuilt at a maximum grade of 5 percent. EPA estimates that each 1 percent decrease in grade reduces energy consumption and GHG emissions by 7 percent, although the effect is not linear[6].

Other factors related to the project would also help reduce GHG emissions relative to the No-Build Alternative. For example, the roadway improvements and access controls proposed with the build alternatives, coupled with the reduced volumes on the existing Route 220 roadway, are anticipated to produce emissions benefits by reducing vehicle delay and idling.

The addition of new roadway miles to the study area roadway network would also increase the energy and GHG emissions associated with maintaining those new roadway miles in the future. However, the increase in construction and maintenance GHG emissions would be less compared to the operational GHG emissions associated with the new roadway. Depending on Alternative, the total roadway miles in the study area that need to be maintained on an ongoing basis would increase on average 11 percent relative to the No-Build Alternative. The increase in maintenance needs due to the addition of new roadway infrastructure would be partially offset by the reduced need for maintenance on existing routes (because of lower total traffic and truck volumes on those routes). Any increase in GHG emissions from construction activities are short term and temporary.

Indirect Effects and Cumulative Impacts: A qualitative assessment of the potential for indirect effects and cumulative impacts attributable to this project concluded that the potential effects or impacts are not expected to be significant given available information from the analyses conducted for CO & MSATs. The CO and MSAT qualitative assessments conducted for this project are considered indirect effects analyses because they address air quality impacts attributable to the project that occur at a later time in the future. Those assessments demonstrate that in the future: (1) air quality impacts from CO would not cause or contribute to violations of the CO NAAQS; and (2) MSAT emissions from the affected network would be significantly lower than they are today.

Regarding the potential for cumulative impacts, EPA's air quality designations for the region reflect, in part, the accumulated mobile source emissions from past and present actions. Since EPA has designated the region to be in attainment for all of the NAAQS, the potential for

[5] https://www.eia.gov/outlooks/aeo/pdf/0383(2014).pdf (page MT-14)

[6] EPA MOVES2010b model

cumulative impacts associated with the project may reasonably be expected to not be significant. In addition, the GHG qualitative assessment conducted for the project address GHG impacts attributed to the project in the future. Such a discussion satisfies NEPA's requirement that agencies analyze the cumulative effects of a proposed action because the potential effects of GHG emissions are inherently a global cumulative effect. Therefore, a separate cumulative effects analysis is not required.[7]

Construction and Mitigation: Emissions may be produced in the construction of this project from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT Road and Bridge Specifications (VDOT, 2016).

The Virginia Department of Environmental Quality (VDEQ) provides general comments for projects by jurisdiction. Their comments in part address mitigation *"…all reasonable precautions should be taken to limit the emissions of VOC and NOx. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions[8]; and 9 VAC 5-50, Article 1, Fugitive Dust precautions[9]."*

Project Status in the Regional Transportation Plan and Program: The study area is located in Henry County. At the time of preparation of this technical report, the United States EPA's Green Book shows Henry County to be designated as an attainment area for all criteria pollutants (EPA, 2019).

As of the date of preparation of this analysis, the project is included in the Virginia Fiscal Year (FY) 2018-2021 Statewide Transportation Improvement Program (STIP)[10] (VDOT 2019a) UPC 110916 and for projects recommended in Henry County in the 2035 Long Range Transportation Plan (LRTP)[11] (VDOT, 2011).

[7] https://www.energy.gov/sites/prod/files/2019/06/f64/CEQ-Draft-GHG-Guidance-2019-06-26.pdf (p.30098, 84 CFR 30097, 6/26/2019)

[8] See: http://law.lis.virginia.gov/admincode/title9/agency5/chapter130/

[9] See: http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC5-50-60

[10] See: http://www.virginiadot.org/about/resources/STIP_External.pdf

[11] See http://www.wppdc.org/content/wppdc/uploads/PDF/transportation/west_piedmont_2035_rlrp_final.pdf

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LIST OF ACRONYMS

AADT	Annual Average Daily Traffic
ADT	Average Daily Traffic
CAA	Clean Air Act
CAFÉ	Corporate Average Fuel Economy
CEQ	Council of Environmental Quality
CH4	Methane
CO	Carbon Monoxide
CO2	Carbon Dioxide
CTB	Commonwealth Transportation Board
EA	Environmental Assessment
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EO	Executive Order
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration

FTA	Federal Transit Administration
FY	Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information System
HAP	Hazardous Air Pollutant
HEI	Health Effects Institute
HFC	Hydrofluorocarbons
IRIS	Integrated Risk Information System
LDV	Light-duty vehicle
LOS	Level of Service
LRTP	Long-range Transportation Plan
MOVES	Motor Vehicle Emissions Simulator
MPH	Miles per hour
MSATs	Mobile Source Air Toxics
N2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NO2	Nitrogen Dioxide
NOx	Nitrogen Oxide
O3	Ozone
PA	Programmatic Agreement
Pb	Lead
PM	Particulate Matter
PM2.5	Fine Particulate Matter
PM10	Coarse Particulate Matter
POM	Polycyclic Organic Matter
PPM	Parts per Million
SO2	Sulfur Dioxide
STIP	Statewide Transportation Improvement Plan
TSD	Technical support documentation
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VDEQ	Virginia Department of Environmental Quality
VDOT	Virginia Department of Transportation
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound
VPHPL	Vehicles per Hour per Lane

1. INTRODUCTION

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

The Draft EIS and supporting technical documentation have been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), codified in 42 United States Code §4321-4347, as amended, and in accordance with FHWA regulations, found in 23 Code of Federal Regulations (CFR) §771. As part of the Draft EIS, the environmental review process has been carried out following the conditions and understanding of the *NEPA and Clean Water Act (Section 404) Merged Process for Highway Projects in Virginia* (merged process)[12]. The Martinsville Southern Connector Study also follows the One Federal Decision (OFD) process, which was enacted by Executive Order (EO) 13807: *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects* (82 FR 163)[13].

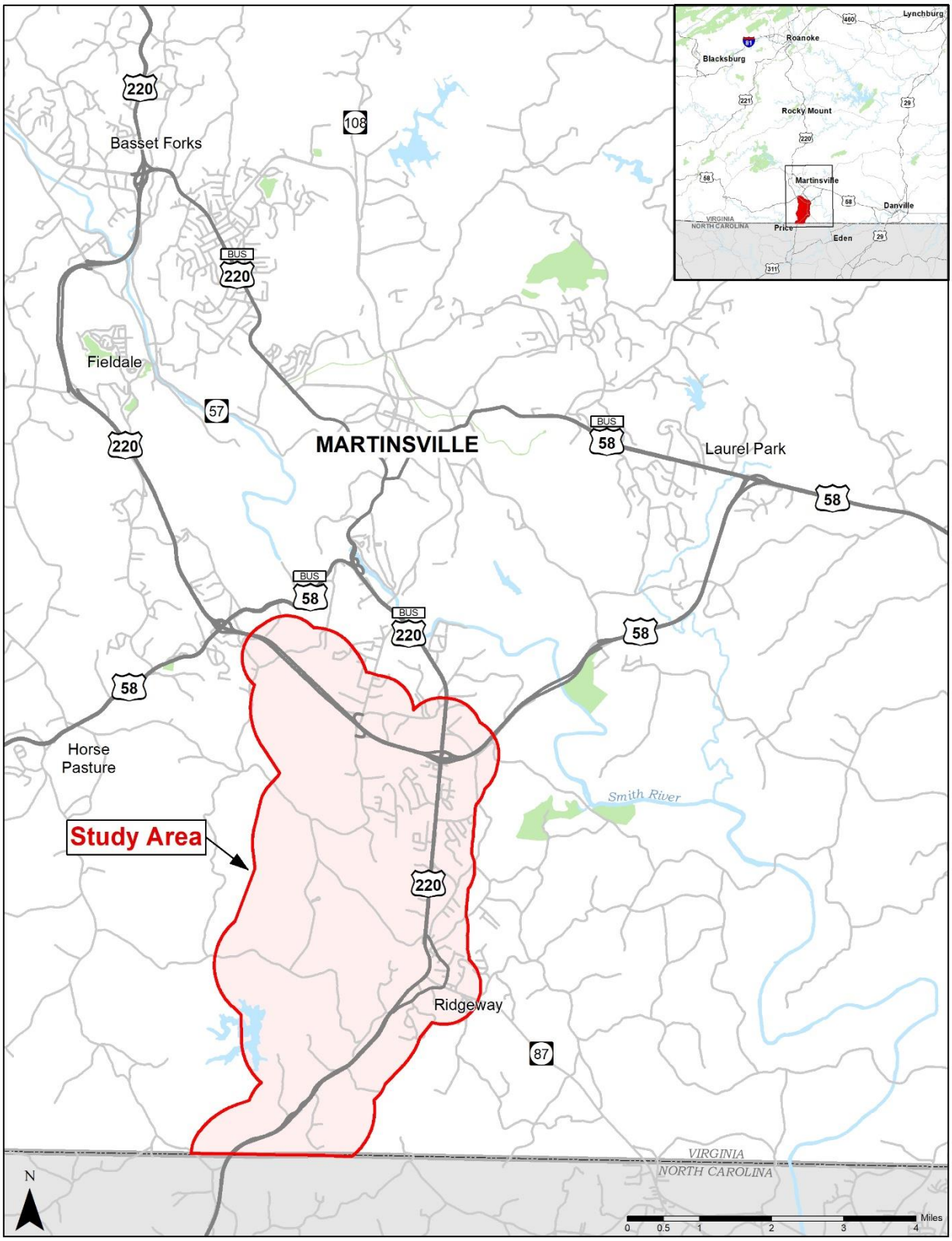
The study area for the Martinsville Southern Connector Study is located south of Martinsville in Henry County, Virginia (see **Figure 1-1**). Positioned on the southern border of Virginia, the study area is located approximately 60 miles southeast of the City of Roanoke (Roanoke) via Route 220, 30 miles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

The study area encompasses approximately seven miles of the Route 220 corridor, between the interchange of Route 220 with the William F. Stone Highway and the North Carolina state line. Within the study area, existing Route 220 consists of a four-lane roadway, with two travel lanes in each direction. The William F. Stone Highway is signed as Route 58 to the east of its interchange with Route 220; west of the interchange, Route 220 is collocated with Route 58, as both bypass Martinsville. For the purposes of consistency in this study, portions of the William F. Stone Highway east and west of the Route 220 interchange are herein referred to as Route 58. The study area also includes the interchange of Route 58 at Route 641 (Joseph Martin Highway), approximately 1.25 miles west of Route 220. Additionally, the study area encompasses the Town of Ridgeway (Ridgeway), where Route 220 connects with Route 87 (Morehead Avenue), approximately three miles south of Route 58.

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

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

Figure 1-1: Study Area



The study area boundary for the Martinsville Southern Connector Study has been developed to assist with data collection efforts and the evaluation of alternatives retained for evaluation. The study area covers 12,873 acres and generally encompasses a one-half-mile buffer around the portion of existing Route 220, between the North Carolina state line and Route 58, and each alternative carried forward for evaluation. The study area was used in various instances during preliminary research and to establish an understanding of the potentially affected natural, cultural, and social resources that may be impacted by the improvements evaluated in the Draft EIS.

The purpose of this ***Air Quality Technical Report*** is to assess the study alternatives for potential air quality impacts and conformity consistent with all applicable air quality regulations and requirements. Information in this report, described below, supports the discussion presented in the Draft EIS. NEPA requires consideration of whether the proposed action would have an adverse effect on air quality in the study area. Accordingly, qualitative carbon monoxide (CO) and Mobile Source Air Toxics (MSATs) analyses have been prepared. Additionally, qualitative analyses are provided for indirect effects and cumulative impacts.

1.1 PURPOSE AND NEED

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

The Martinsville Southern Connector Study addresses the following needs:

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

1.2 ALTERNATIVES CARRIED FORWARD FOR EVALUATION

1.2.1 Alternatives Retained

VDOT, in coordination with FHWA, the Cooperating and Participating Agencies, and the general public, initially considered a broad range of alignment options to address the established Purpose and Need of the Martinsville Southern Connector Study. A number of these alignment options were not carried forward based on their inability to meet the Purpose and Need. Other alignment options were developed into alternatives for evaluation, but were not retained based on anticipated impacts to private property. As part of the public involvement process during the development of the Draft EIS, additional alternatives were suggested for evaluation. These options were similar to the alignment options initially considered and were not carried forward for evaluation based on their inability to address the identified Purpose and Need for the study.

The alternatives carried forward for evaluation and retained for detailed study in the Draft EIS are listed below:

- No-Build Alternative;
- Alternative A – New access-controlled alignment west of existing Route 220 with a new interchange with Route 58 to the west of Route 641 (Joseph Martin Highway) and reconstruction of the existing Route 220 alignment for approximately 0.5 miles from the North Carolina state line;
- Alternative B – New access-controlled alignment west of existing Route 220 and west of Magna Vista High School with reconstruction of the Joseph Martin Highway interchange at Route 58 and reconstruction of the existing Route 220 alignment for approximately 0.5 miles from the North Carolina state line; and
- Alternative C – New access-controlled alignment west of existing Route 220 and east of Magna Vista High School with reconstruction of the Joseph Martin Highway interchange at Route 58 and reconstruction of the existing Route 220 alignment for approximately 0.5 miles from the North Carolina state line.

These alternatives are described in the sections that follow. Additional information is included in the Draft EIS and supporting ***Alternatives Analysis Technical Report*** (VDOT, 2020a), including the process used to identify and screen alignment options, alternatives carried forward, and alternatives retained for detailed study.

Based on the detailed study of the alternatives retained for evaluation, Alternative C has been identified in the Draft EIS as the Preferred Alternative.

1.2.1.1 No-Build Alternative

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

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

1.2.1.2 Alternative A

Alternative A would consist of a new roadway alignment that is primarily to the west of existing Route 220. Under Alternative A, access would be controlled and provided at three new interchanges. It is assumed that interchanges would be provided at both ends of the facility and one would be located along the corridor. For the purposes of the analyses in the Draft EIS and supporting documentation, it is assumed this third interchange would occur at Route 687 (Soapstone Road). The reconstructed portion of Route 220, along with the new alignment, would incorporate full access control.

Beginning at the North Carolina state line, Alternative A would reconstruct Route 220 for approximately one mile, where it would shift eastward on a new alignment before turning to the north to cross over the Norfolk Southern railroad. The wide curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed and minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Route 689

(Reservoir Road) and Route 971 (J.B. Dalton Road). After crossing the railroad, the new alignment would parallel White House Road along its south side and then shift to the northwest crossing Patterson Branch. The alignment would then shift to the north, following a small ridge between Patterson Branch and a tributary to Marrowbone Creek, before crossing Marrowbone Creek east of Marrowbone Dam. The alignment would continue north and to the west of a large farm/open field, crossing tributaries of Marrowbone Creek. The alignment would shift eastward and cross over Route 688 (Lee Ford Camp Road), Stillhouse Run, and a floodplain. After crossing Stillhouse Run, the alignment would shift northward and continue for approximately one mile. The alignment would then continue north reaching Soapstone Road, where a new interchange would be provided, west of the intersection with Joseph Martin Highway. An interchange with Alternative A is proposed at Soapstone Road. The alignment would then turn to the northeast to cross three minor tributaries to Marrowbone Creek. The alignment continues in a northerly direction with a new interchange at Route 58, west of the interchange at Joseph Martin Highway.

1.2.1.3 Alternative B

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

Beginning at the North Carolina state line, Alternative B would reconstruct Route 220 for approximately one mile, where it would shift eastward before turning to the north to cross over the Norfolk Southern railroad. The wide horizontal curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed, as well as minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. After crossing the railroad, the new alignment would parallel White House Road along its south side and then shift to the northwest prior to crossing Patterson Branch. The alignment would then gradually shift from the northwest to the northeast and cross three tributaries to Marrowbone Creek. The alignment would continue in a northeasterly direction over Lee Ford Camp Road, where it would pass to the east of the Marrowbone Plantation, shifting northwest to cross Marrowbone Creek. After crossing Marrowbone Creek, Alternative B would continue to the northwest, crossing Magna Vista School Road south of Magna Vista High School, then paralleling Magna Vista School Road west of the high school up to a new interchange with Soapstone Road. The new interchange at Soapstone Road would require the relocation of a portion of Magna Vista School Road. From the Soapstone Road interchange, the alignment would continue to the northeast and cross two minor tributaries before shifting to the north. The alignment would then shift to the northeast to cross Little Marrowbone Creek and tie in with Joseph Martin Highway at its interchange with Route 58, requiring modifications to the existing interchange configuration to provide a more direct connection between Route 58 and the new roadway. The reconstructed portion of Route 220 at the southern end, along with the new alignment, would be an access-controlled facility

1.2.1.4 Alternative C (Preferred Alternative)

Alternative C would consist of a new roadway alignment that is primarily to the west of existing Route 220. Alternative C was developed as a modification of the initially considered Alignment Option 4C based on agency comments, with the primary changes occurring north of Soapstone

Road. Alignment Option 4C originally included an interchange between Joseph Martin Highway and Route 220; however, adequate spacing could not be provided to accommodate all movements. Therefore, the alignment was shifted to tie in at the location of the existing Joseph Martin Highway interchange. Under Alternative C, access would be controlled and provided at two new interchanges and a modified interchange at Route 220/Route 58 and Joseph Martin Highway. For the purposes of the analyses in the Draft EIS, it is assumed that new interchanges would be provided at the southern end of the facility and at Soapstone Road. If this alternative were to advance to a phase of more detailed design, the final interchange locations and configuration would be refined. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

Beginning at the North Carolina state line, Alternative C would reconstruct Route 220 for approximately one mile, where it would shift eastward on a new alignment before turning to the north to cross over the Norfolk Southern railroad. The wide curve in this location would allow for an adequate turning radius to meet design standards for the arterial facility with a 60 mph design speed, and minimize potential impacts to residents in the vicinity of J.B. Dalton Road. A new interchange to access a realigned existing Route 220 would be constructed near Reservoir Road and J.B. Dalton Road. After crossing the railroad, the new alignment would continue northward for approximately 1.5 miles, crossing White House Road and a tributary to Marrowbone Creek. The alignment would then shift to the northeast to cross Lee Ford Camp Road. Alternative C would then shift northward and continue east of Magna Vista High School and Marrowbone Creek and parallel the Pace Airport to the east. After passing Pace airport, the alignment would shift to the northeast and cross Soapstone Road to the east of Marrowbone Creek. A new interchange with Alternative C would be constructed at Soapstone Road. North of Soapstone Road, the alignment would shift west and cross Joseph Martin Highway. The alignment would continue to the northwest and cross two tributaries before shifting to the north. The alignment would then shift to the northeast to cross Little Marrowbone Creek and tie in with Joseph Martin Highway at the existing interchange location with Route 58. This would require modifications to the existing interchange to provide a more direct connection between Route 58 and the new roadway.

1.2.2 Alternatives Not Retained

As part of the alternatives development process for the Draft EIS, the following alternatives were carried forward for evaluation, but have not been retained for detailed study in the Draft EIS, based on their anticipated impacts to private properties. However, these alternatives were evaluated to a sufficient level of detail to eliminate them from further consideration and detailed study in the Draft EIS. While this Technical Report does not include the analysis of Alternatives D and E, other technical reports, such as the ***Natural Resources Technical Report*** (VDOT, 2020d), were prepared prior to the elimination of alternatives and thus include the following two alternatives, which are summarized in the sections that follow.

- Alternative D – Reconstruct Route 220 as an access-controlled roadway, with a spur on new alignment north of Ridgeway and reconstruct the Joseph Martin interchange at Route 58; and
- Alternative E – Reconstruct Route 220 as an access-controlled roadway, consolidating access to interchanges at select locations.

These alternatives, as well as those previously described that have been retained for detailed analysis in the Draft EIS, are illustrated on **Figure 1-2**.

1.2.2.1 Alternative D

Alternative D would consist of reconstructing existing Route 220 as an access-controlled roadway for approximately 5.6 miles from the North Carolina state line where it would then divert to the west on a new access-controlled roadway just north of Water Plant Road. Under Alternative D,

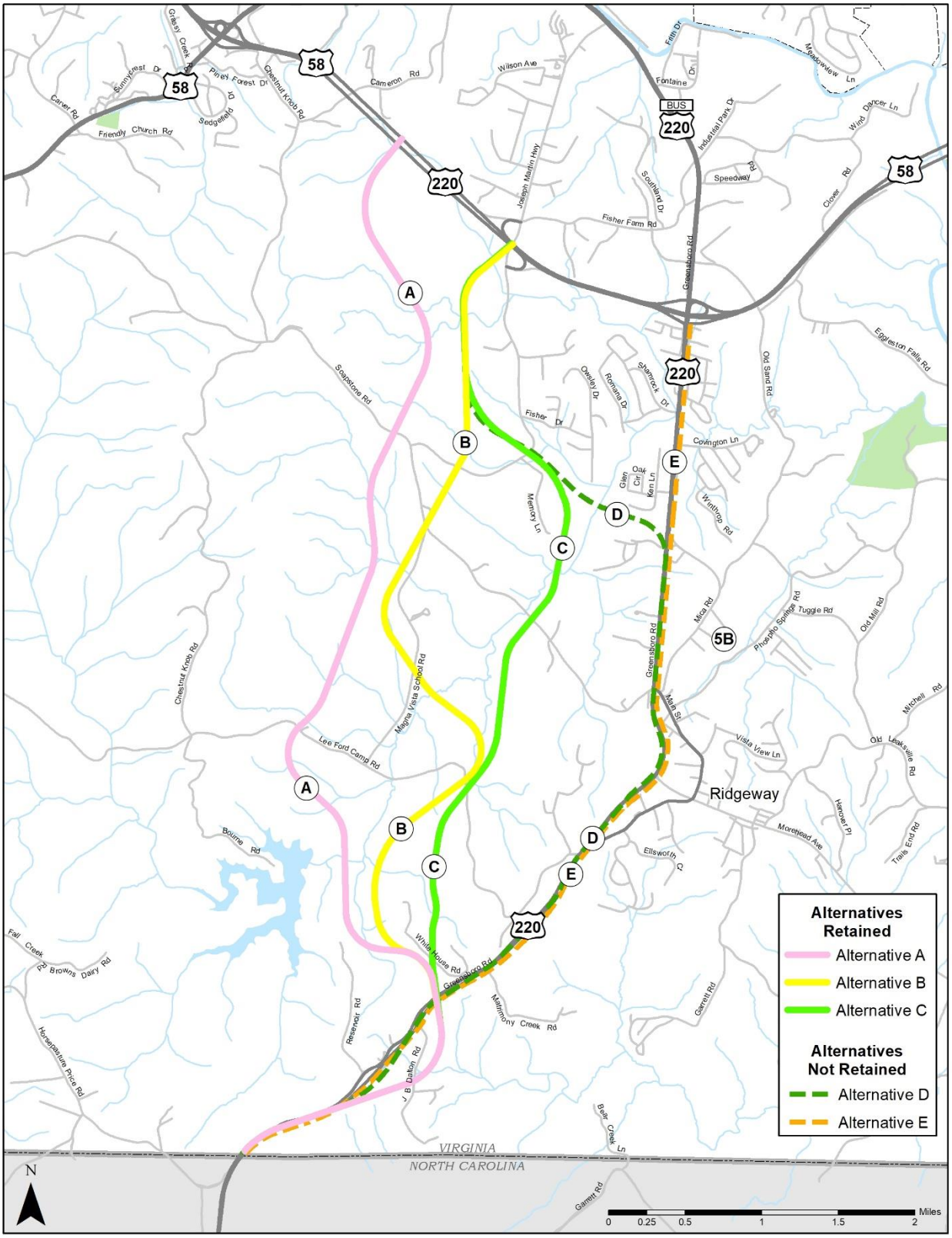
access would be controlled and provided at three new interchanges and a modified interchange at Route 58 and the Joseph Martin Highway. South of Water Plant Road, access to the new roadway would be made via frontage roads and new interchanges near Reservoir Road and at Morehead Avenue. A new structure providing access to Route 220 would be located at Lee Ford Camp Road/Church Street. At Water Plant Road an interchange is suggested where the new roadway branches from Route 220 to provide direct access between the new roadway and Route 220 to the north. From this interchange, the new alignment would proceed northwest, crossing Marrowbone Creek and then parallels a tributary of Marrowbone Creek to beyond Joseph Martin Highway. The alignment then shifts northward and follows the same alignments as Alternatives B and C just north of the Radial warehouse site to the tie-in location with Route 58. Modifications to the existing interchange at Route 58 and Joseph Martin Highway would be required with this alternative. The reconstructed portion of Route 220, along with the new alignment, would incorporate access control.

1.2.2.2 Alternative E

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

Under Alternative E, access would be controlled and provided only at interchanges at various locations in the corridor. Existing residential and commercial driveways would be directed to frontage roads that parallel the roadway, ultimately connecting to Route 220 at interchanges. New interchanges to provide frontage road access to Route 220 are located at Reservoir Road and at Morehead Avenue. Structures over or under the new Route 220 roadway are included at Lee Ford Camp Road/Church Street and Soapstone Road/Main Street to provide east-west connectivity. The Route 220 interchange at Route 58 would be modified to provide direct access between the new roadway, Route 58, and Business Route 220 to the north.

Figure 1-2: Route 220 Alternative Alignment Map



1.3 SUMMARY OF TRAFFIC DATA AND FORECASTS

For the purposes of this air quality analysis, the study was based on those intersections and interchanges that would be directly affected by the project alternatives. **Section 4.2.5** presents a summary of base (2018), opening (2024) and design year (2040) average daily traffic (ADT) forecasts for the project. As shown in **Section 4.2.5**, the peak ADT forecast for the design year is 22,000 for Alternative A, Alternative B, and Alternative C. The corresponding No-Build design year forecast is 31,900 (or 45 percent higher than the worst case Build Alternative). The decrease in ADT from the No-Build to the Build Alternatives is primarily due to redistributed ADT to the new roadway configuration which would reduce ADT along portions of existing Route 220 and increase overall vehicle miles traveled (VMT) for the project for all Build Alternatives due to additional roadway segments which result in additional roadway lengths. For example, total daily VMT for the Design Year No-Build is forecast at 171,394 while overall worst case daily VMT for the Build Alternatives is expected at 193,824 for Alternative A, which is about 13 percent higher than the No-Build. Trucks comprise on average between 9 and 28 percent of the total traffic throughout the Study Corridor depending on the Build Alternative and Study Year (i.e., Opening or Design Year). The detailed traffic forecast is provided as **Appendix A** to this report.

2. REGULATORY REQUIREMENTS

This section provides an overview of regulations and guidance applicable to the project-level air quality analysis.

2.1 NATIONAL ENVIRONMENTAL POLICY ACT

NEPA applies to all federally-funded transportation projects. Air quality is an environmental concern within the broad purview of NEPA. The requirements of NEPA have been defined in the Council of Environmental Quality's (CEQ) NEPA regulations that apply to all federal agencies and the FHWA / Federal Transit Administration (FTA) joint NEPA procedures. However, the NEPA statute, the CEQ NEPA regulations (40 CFR §1500), and FHWA's NEPA regulations (23 CFR §771) do not contain specific requirements for air quality analyses. For air quality, FHWA has issued guidance for MSAT and CO analyses.

2.2 MOBILE SOURCE AIR TOXICS

On October 18, 2016, FHWA issued updated interim guidance regarding MSATs in a NEPA analysis to include the EPA's recent Motor Vehicle Emissions Simulator (MOVES), Version 2014a emission model along with updated research on air toxic emissions from mobile sources[14] (VDOT, 2016a).

The EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer drivers from their 1999 National Air Toxics Assessment. The nine compounds identified were: acetaldehyde; acrolein; benzene; 1, 3-butadiene; diesel particulate matter (PM) plus diesel exhaust organic gases; ethylbenzene; formaldehyde; naphthalene; and polycyclic organic matter (POM). While FHWA considers these the priority MSATs, the list is subject to change and may be adjusted in consideration of future EPA rules.

The FHWA guidance of October 18, 2016, presents a tiered approach for assessing MSATs in NEPA documents. The three levels are for projects with: (1) no meaningful MSAT effects; (2) low potential MSAT effects; and (3) high potential MSAT effects, respectively. The FHWA guidance defines the levels of analysis for each type of MSAT effect as:

- No analysis for projects with no potential for meaningful MSAT effects;
- A qualitative analysis for projects with low potential MSAT effects; and
- A quantitative analysis for projects with high potential MSAT effects.

The Build Alternative was evaluated against each threshold criteria in order to determine the type of MSAT analysis required to satisfy NEPA.

2.3 CARBON MONOXIDE

In 1987, FHWA issued a Technical Advisory providing guidance for preparing and processing of environmental impacts for Environmental Assessments (EAs) and EISs under NEPA[15] (FHWA, 1987). Section V(G)(8) pertains to air quality, including a summary of the project-related CO analysis. VDOT and FHWA have developed programmatic agreements to streamline the analysis requirements for projects using worst-case modeling results, consistent with the EPA and FHWA guidance. **Section 2.6** presents a summary of the latest Programmatic Agreement (PA), which

[14] See: https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/policy_and_guidance/msat/index.cfm

[15] See: https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp#aq

sets the procedures and thresholds recommended for a CO air quality study for projects in Virginia.

2.4 PARTICULATE MATTER

The project is in an attainment area for fine particulate matter ($PM_{2.5}$), therefore, transportation conformity requirements pertaining to PM do not apply for this Project.

2.5 EPA MOVES

On October 7, 2014, the EPA published a Federal Register Notice of Availability that approved the MOVES2014 as the latest EPA tool for estimating emissions of volatile organic compounds (VOCs), nitrogen oxide (NOx), CO, PM10, PM2.5 and other pollutants from motor vehicles. With this release, EPA started a two-year grace period to phase in the requirement of using MOVES2014 for transportation conformity analyses. In July 2014, EPA issued guidance on the use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes. This guidance specifies that the same grace period be applied to project-level emissions analyses. At the end of the grace period, i.e., beginning October 7, 2016, project sponsors are required to use MOVES2014 to conduct emissions analysis. In March 2015, EPA published a new guidance document for completing project-level carbon monoxide analyses using MOVES2014. CO vehicle emission rates were estimated for this study using the latest official version of the EPA MOVES model (MOVES 2014b) (EPA, 2014).

2.6 PROGRAMMATIC AGREEMENTS

Programmatic agreements are legal documents between the United States Department of Transportation and a state Department of Transportation that are designed to help streamline the environmental clearance process for transportation projects. Programmatic agreements can help focus limited resources on assessing larger projects with greater potential for air quality impacts.

On May 16, 2016, FHWA and VDOT implemented a *"Programmatic Agreement for Project-Level Air Quality Analyses for Carbon Monoxide"*[16] (hereinafter "2016 Agreement") that was developed based on a national template that was created in a recently completed National Cooperative Highway Research Program (NCHRP) study (ICF International et al., 2015). The NCHRP template was designed to be applied using state-specific background concentrations and persistence factors, without the need to update the detailed worst-case CO modeling as presented in its Technical Support Document (TSD). The 2016 Agreement uses the number of lanes and other criteria to screen projects involving highway links, unskewed intersections, and interchanges with adjacent unskewed intersections.

As the new NCHRP template agreement does not include skewed intersections, the 2016 FHWA-VDOT Agreement incorporates, by reference, criteria for skewed intersections from the previously existing 2009 FHWA-VDOT *"Project-Level Carbon Monoxide Air Quality Studies Agreement"* (hereinafter "2009 Agreement"). Under the terms of the 2009 Agreement, project-level air quality (hot-spot) analyses are typically only conducted for CO for projects that exceed specified ADT thresholds. Different ADT thresholds are specified for different intersection skew angles. Worst-case ranked intersections and interchanges that cannot be screened using the 2016 Agreement (including the referenced 2009 Agreement criteria) are quantitatively assessed using worst-case modelling assumptions for CO consistent with the VDOT Resource Document.

[16] http://www.virginiadot.org/projects/resources/air/2016_FHWA-VDOT_PA_for_CO_from_NCHRP25-2578_Attachment2_FINAL.pdf

Projects that meet the criteria specified in the 2016 Agreement (or by reference, the thresholds from the 2009 Agreement) do not require project-specific modelling for CO. For those projects, the air quality analysis can simply reference the 2016 Agreement, as appropriate, and the worst-case modelling for CO on which its thresholds/criteria are based.

2.7 CLEAN AIR ACT

2.7.1 National Ambient Air Quality Standards (NAAQS)

Pursuant to the Federal Clean Air Act (CAA) of 1970, the EPA established NAAQS for major pollutants known as "criteria pollutants." Currently, the EPA regulates six criteria pollutants: ozone (O_3), CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM, and lead (Pb). PM is divided into two particle size categories: particles with a diameter less than 10 micrometers (PM_{10}) and those with a diameter of less than 2.5 micrometers ($PM_{2.5}$). **Table 2-1** shows the primary and secondary NAAQS for the criteria pollutants. The NAAQS are two-tiered: the first tier (primary) is intended to protect public health; the second tier (secondary) is intended to protect public welfare and prevent degradation of the environment.

Section 176(c) of the CAA requires federal agencies to ensure that all of their actions conform to applicable implementation plans for achieving and maintaining the NAAQS. Federal actions must not cause or contribute to any new violation of any standard, increase the frequency or severity of any existing violation, or delay timely attainment of any standard in nonattainment and maintenance areas.

The NAAQS apply to the concentration of a pollutant in outdoor ambient air. If the air quality in a geographic area is equal to, or is better than the national standard, the EPA will designate the region as an attainment area. Areas where air quality does not meet the national standards are designated as non-attainment areas. Once the air quality in a non-attainment area improves to the point where it meets the standards and the additional redesignation requirements in the CAA (Section 107(d)(3)(E)), the EPA may redesignate the area as an attainment/maintenance area, which are typically referred to as "maintenance areas."

The CAA requires the EPA to designate the status of all areas as being in or out of compliance with the NAAQS. The CAA further defines non-attainment areas for ozone based on the severity of the violation as marginal, moderate, serious, severe, and extreme.

Table 2-1: National Ambient Air Quality Standards[17]

Pollutant [links to historical tables of NAAQS reviews]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Notes:

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 µg/m3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which an implementation plan providing for attainment of the current (2010) standard has not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the required NAAQS.

[17] See: https://www.epa.gov/criteria-air-pollutants/naaqs-table (accessed November 1, 2018).

2.8 DESCRIPTION OF PROJECT LEVEL POLLUTANTS

CO is a toxic colorless and odorless gas that results from the incomplete combustion of gasoline and other fossil fuels. Because CO disperses quickly, the concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO may occur near congested intersections, along heavily used roadways conveying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions.

2.9 TRANSPORTATION CONFORMITY

The EPA promulgated the transportation conformity rule (40 CFR Parts 51 and 93) pursuant to requirements of the CAA. The rule **only** applies in EPA-designated non-attainment or maintenance areas (40 CFR 93.102(b)). As noted in the next section (**Section 3.1**), the study area is located in Henry County where the EPA Green Book shows Henry County to be designated as an attainment area for all criteria pollutants. Therefore, project-level transportation conformity rule requirements, including project-level analysis requirements for CO and $PM_{2.5}$, do not apply for this region.

2.10 CLIMATE CHANGE AND GREENHOUSE GAS IMPACTS

Carbon dioxide (CO2) is the largest component of human produced greenhouse gas emissions; other prominent emissions include methane (CH4), nitrous oxide (N2O) and hydrofluorocarbons (HFCs).[18] These emissions are different from criteria air pollutants since their effects in the atmosphere are global rather than localized, and also since they remain in the atmosphere for decades to centuries, depending on the species (CEQ, 2019).

Greenhouse Gas (GHG) emissions from vehicles using roadways are a function of distance travelled (expressed as VMT), vehicle speed, and road grade. GHG emissions are also generated during roadway construction and maintenance activities. In an effort to better understand and coordinate all of the environmental issues and policies, the Commonwealth Transportation Board (CTB) has established an Environmental Task Force that has been tasked with, among other environmental concerns, collecting information regarding GHG and climate change and providing recommendations to the CTB.

[18] It should be noted, a complete list specified in the draft CEQ GHG guidance *defines GHGs as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6) and nitrogen trifluoride (NF3)*.", 84 CFR 30097, 6/26/2019, footnote (84 CFR 30097, 6/26/2019, footnote 2)

3. EXISTING CONDITIONS

With the recent withdrawal of federal guidance addressing greenhouse gas analyses and climate change19, the Department protocol (*VDOT Resource Document, Section 4.7*) for GHG analyses was reviewed for applicability to this project. Based on the Department protocol that limits GHG analyses to projects involving an EIS, a GHG analysis is warranted for this project as it involves an EIS. Therefore, a qualitative GHG analysis was conducted for this project.

3.1 AIR QUALITY ATTAINMENT STATUS OF THE PROJECT AREA

The EPA Green Book,[20] which lists non-attainment, maintenance, and attainment areas was reviewed to determine the designations for Henry County in which the project is located. The EPA Green Book shows that Henry County is designated as attainment area for all NAAQS.

3.2 CLIMATE AND METEOROLOGY

The climate of the area in which the project is located is comprised of four distinct seasons. Winters are mild with limited snowfall and summers are hot and humid. Based on data provided by the National Weather Service, the average annual temperature for nearby Danville area is 51.61 degrees Fahrenheit. The area typically receives 40.89 inches of rainfall annually and up to 41.3 inches of snow in 2019[21] (NWS, 2019).

3.3 AMBIENT AIR QUALITY DATA AND TRENDS

The Virginia Department of Environmental Quality's (VDEQ's) annual air quality monitoring report[22] shows that measured pollutant concentrations from all stations representative of the study area. While there are no VDEQ monitors located in the immediate vicinity of the project, the Piedmont monitor locations were the closest VDEQ monitors to the project and therefore considered the best available for the project area for evaluating air quality and data trends.

As presented in **Figure 3-1** through **Figure 3-4**, VDEQ's ten-year monitoring data indicates that criteria pollutants concentrations have been decreasing in the Piedmont Region (VDEQ, 2016). The reduction in CO, SO_2, NOx, and ozone emissions is due to a variety of control measures that have been implemented over the last two decades, including motor vehicle engine controls and reductions in evaporative emissions from gasoline stations and consumer products, as well as reductions from power plants, businesses, and residential combustion sources.

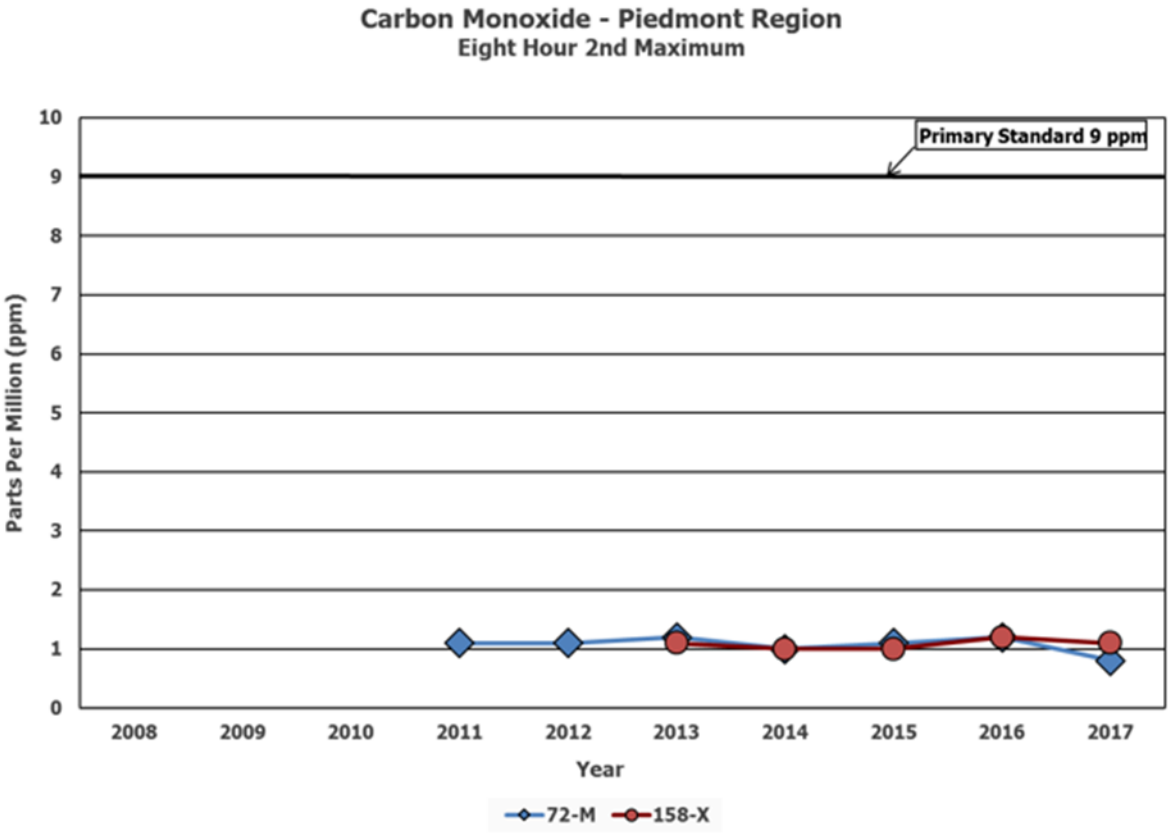
[19] See: https://www.federalregister.gov/documents/2017/04/05/2017-06770/withdrawal-of-final-guidance-for-federal-departments-and-agencies-on-consideration-of-greenhouse-gas

[20] EPA Green Book: https://www3.epa.gov/airquality/greenbook/anayo_va.html (accessed on April 15, 2019)

[21] National Weather Service https://w2.weather.gov/climate/getclimate.php?wfo=rnk (accessed on April 15, 2019)

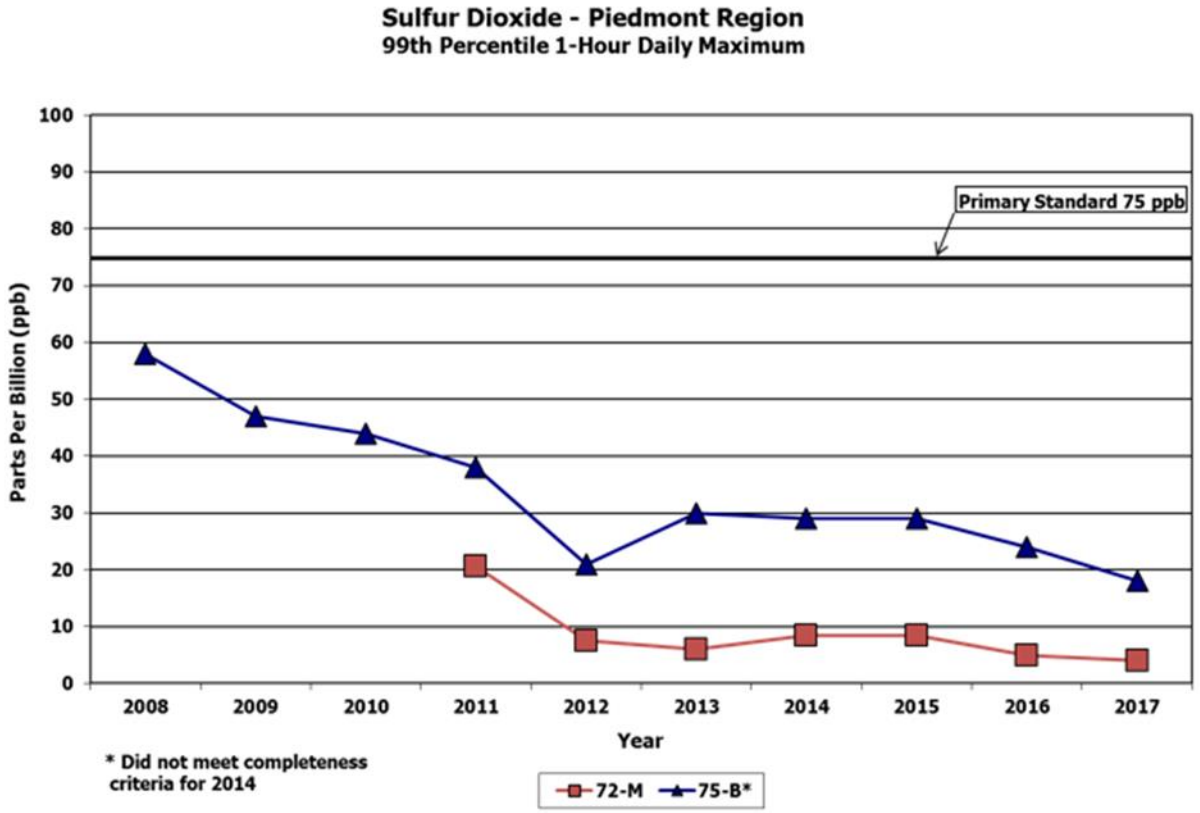
[22] See: https://www.deq.virginia.gov/Portals/0/DEQ/Air/AirMonitoring/Annual_Report_2016.pdf?ver=2017-10-03-144129-973

Figure 3-1: VDEQ 10-Year Trend for 8-hour Carbon Monoxide (PPM) – Piedmont Region



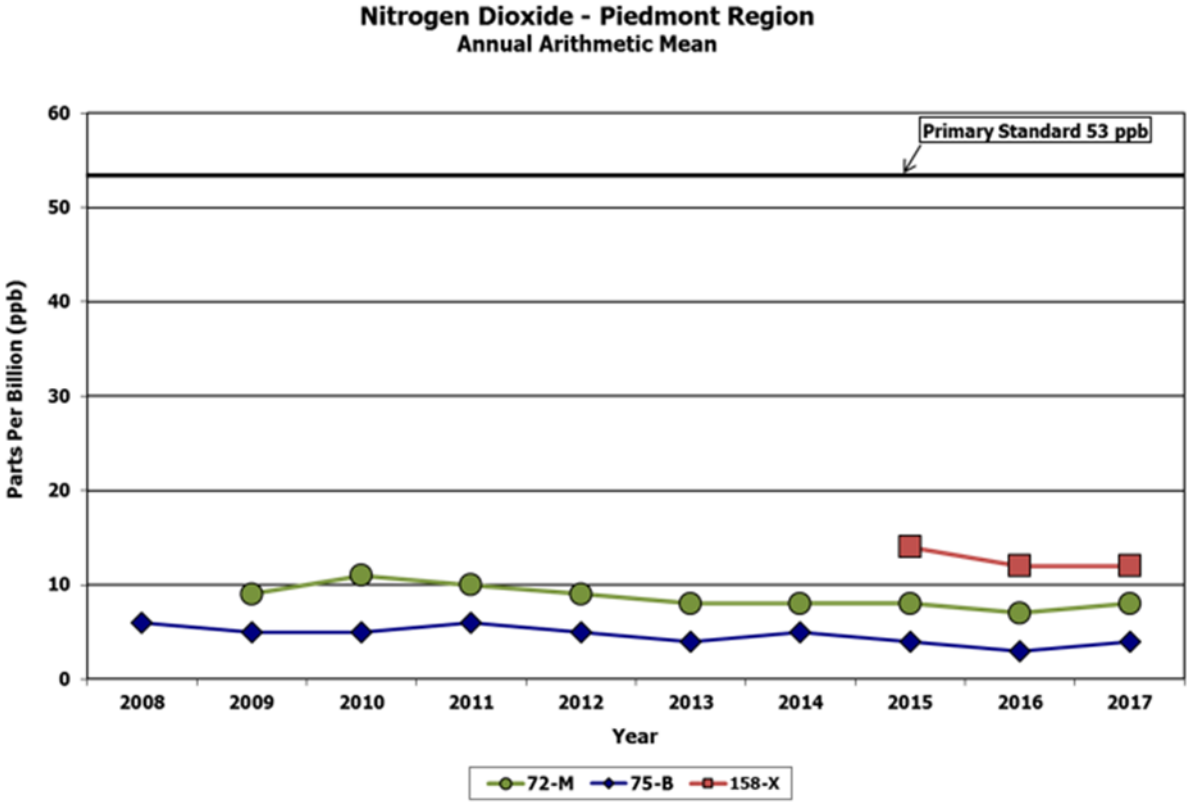
Source: VDEQ Virginia Ambient Air Monitoring 2016 Data Report.

Figure 3-2: VDEQ 10-Year Trend for 1-hour Sulfur Dioxide (PPM) – Piedmont Region



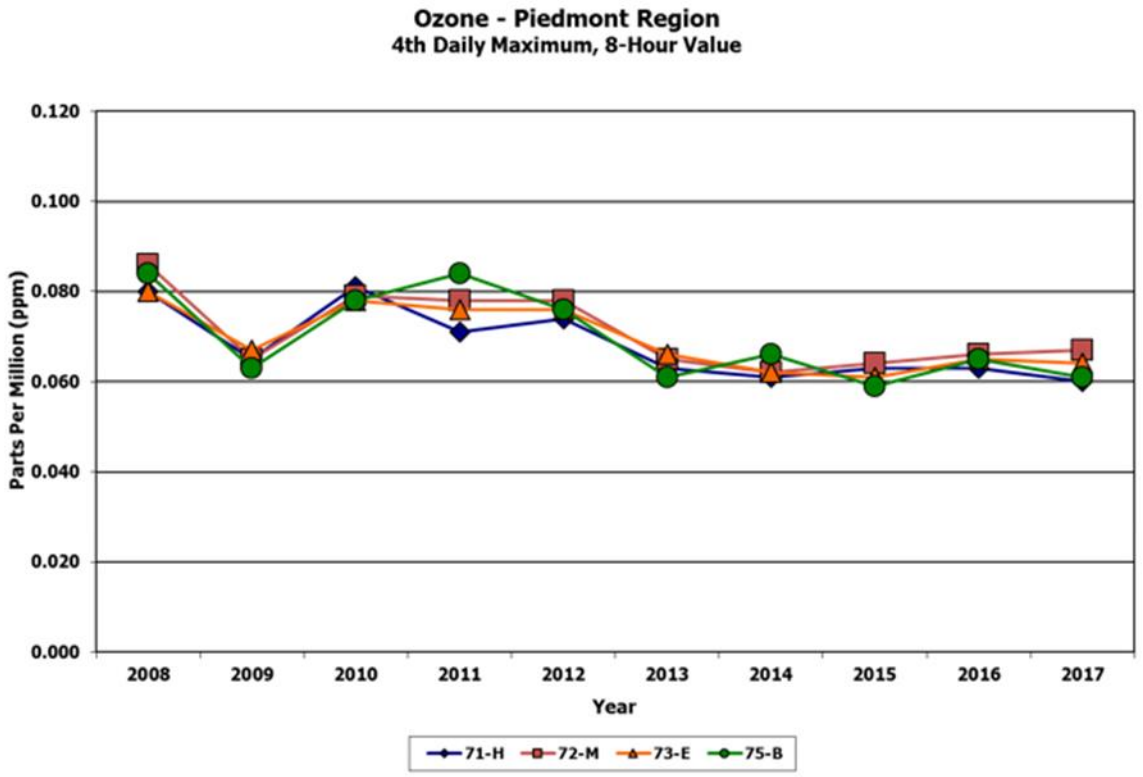
Source: VDEQ Virginia Ambient Air Monitoring 2016 Data Report

Figure 3-3: VDEQ 10-Year Trend for Annual Nitrogen Dioxide (PPM) – Piedmont Region



Source: VDEQ Virginia Ambient Air Monitoring 2016 Data Report

Figure 3-4: VDEQ 10-Year Trend for 8-hour Ozone (PPM) – Piedmont Region



Source: VDEQ Virginia Ambient Air Monitoring 2016 Data Report.

4. PROJECT ASSESSMENT

The methodologies and assumptions applied for the analysis are consistent with FHWA and EPA guidance as well as the VDOT *Project Level Air Quality Analysis Resource Document*,[23] including its associated on-line data repository.

Traffic forecasts for the Study Alternatives were developed for the Existing (2018), Opening-Year (2025) and Design-Year (2040) conditions including the Build Alternatives and No-Build Alternative.

4.1 CARBON MONOXIDE (CO) ANALYSIS

4.1.1 Methodology

The CO analysis included a review of intersections and interchanges in the project area to identify the worst-case locations for assessment for each Build Alternative. The EPA's detailed guidance[24] for CO analyses was applied (though not required as the project area is in attainment for CO and therefore not subject to conformity requirements for CO) to identify the worst-case intersections to consider for the analysis based on forecasts of peak volumes and intersection LOS (EPA, 1992). Intersections were then screened using the previously-referenced 2016 Agreement. The 2016 Agreement establishes the type of projects and conditions that would not require project-specific modeling or a quantitative air quality analysis for compliance with the NAAQS. These project types require qualitative statements that reference the Agreement and its technical support document (TSD).

The 2016 Agreement includes thresholds for non-skewed intersection and, to address skewed intersections, incorporates by reference the criteria specified in the previously existing 2009 Agreement for skewed intersections. Under the terms of the 2009 Agreement, project-level air quality (hot-spot) analyses are typically only conducted for CO projects that exceed specified ADT and level of service (LOS) thresholds or for any project for which an EIS is being prepared. The thresholds in the 2009 Agreement were originally established based on worst-case modeling for typical arterial intersections, with different thresholds applying for different intersection skew angles. The projected traffic volumes and intersection skew angles applied for the CO hot-spot analysis (i.e., for comparison to the applicable thresholds) are presented in the following tables.

4.1.2 Intersections Studied

An analysis of the LOS and peak hourly volumes were evaluated for the Build Alternatives to confirm the worst-case intersection locations for consideration under the 2016 Agreement. The intersections were summarized by worst-case peak AM or PM volumes and LOS for each Build Alternative for years 2025 and 2040. Traffic volumes used in the ranking of the signalized intersections are included in **Appendix A**. The intersection and interchange locations studied are shown in **Figure 4-1** through **Figure 4-3** for each Build Alternative. A summary of the intersections including LOS, peak AM and PM hourly volumes and delay are presented in **Table 4-1** through **Table 4-3**. The signalized intersections were ranked by LOS and the higher of the AM or PM peak hourly-ranked volumes were summarized for the Build Alternative. **Table 4-4** and **Table 4-5** show the top three worst-case intersections ranked by LOS and higher of the peak AM or PM volumes for all Build Alternatives for 2025 and 2040, respectively.

[23] VDOT Project–Level Air Quality Analysis Resource Document, April 2016.

[24] U.S. Environmental Protection Agency, *Guideline for Modeling Carbon Monoxide from Roadway Intersections*, EPA-454/R-92-005, Office of Air Quality Planning and Standards, November 1992.

Figure 4-1: Alternative A Study Area Intersections and Interchanges

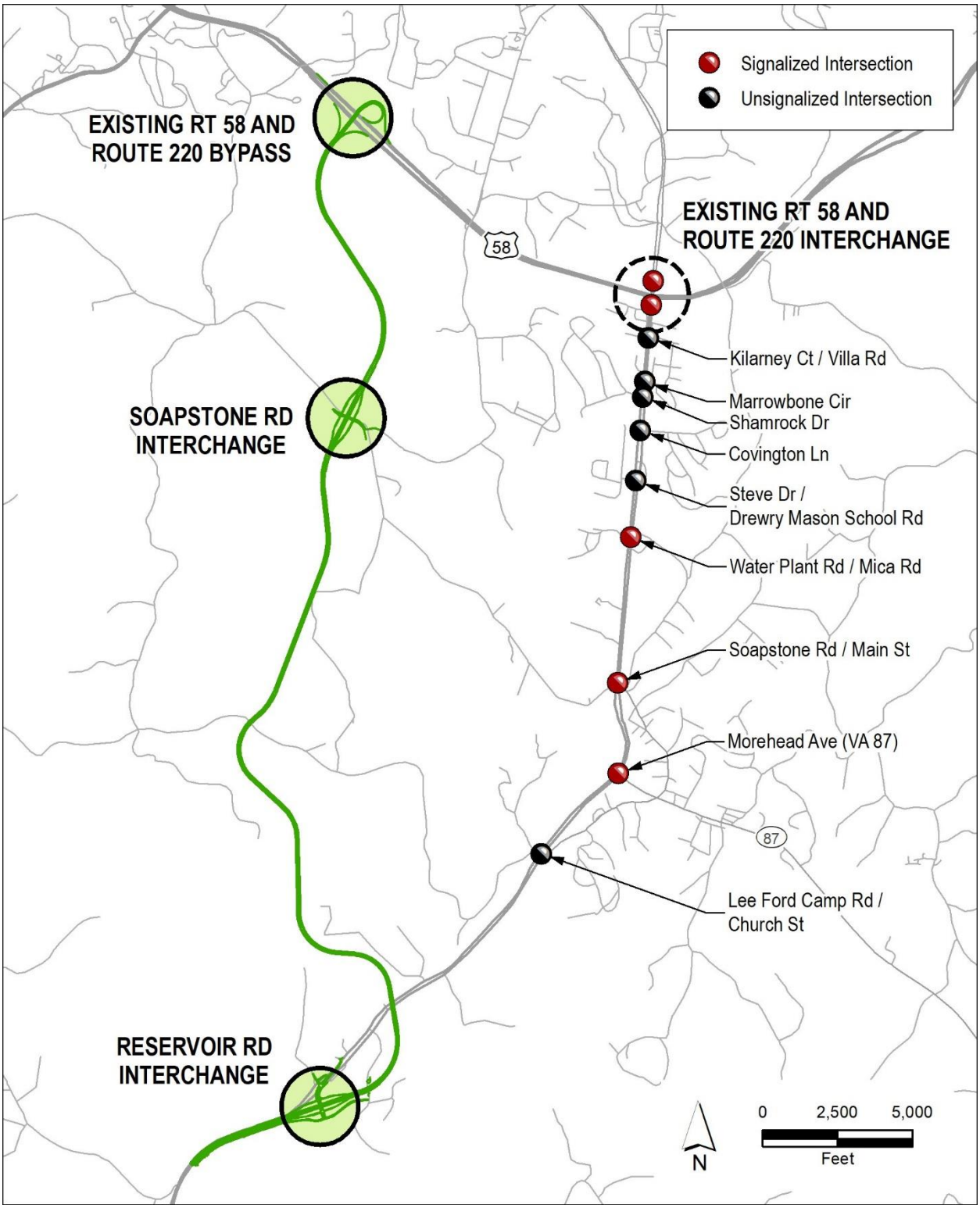


Figure 4-2: Alternative B Study Area Intersections and Interchanges

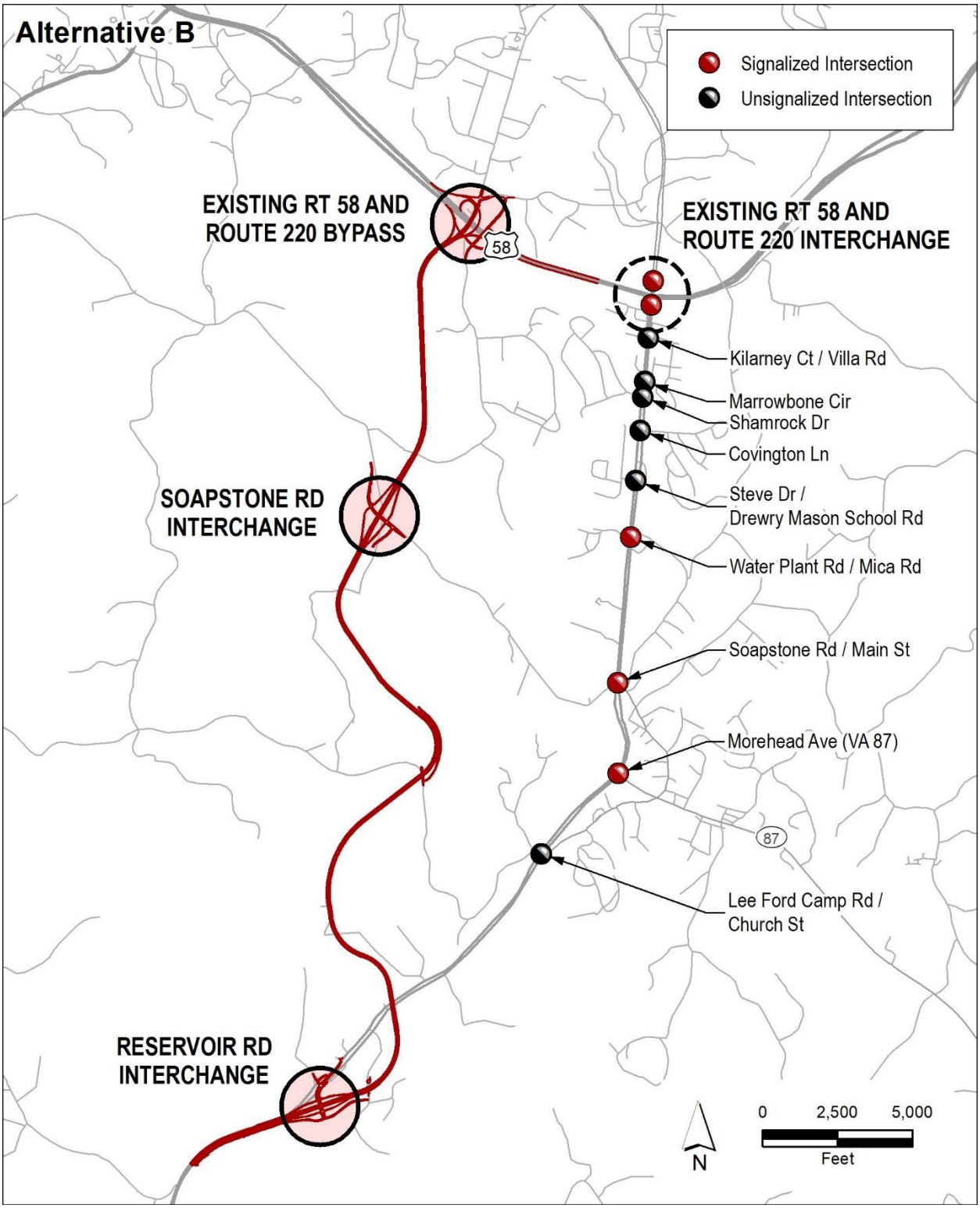


Figure 4-3: Alternative C Study Area Intersections and Interchanges

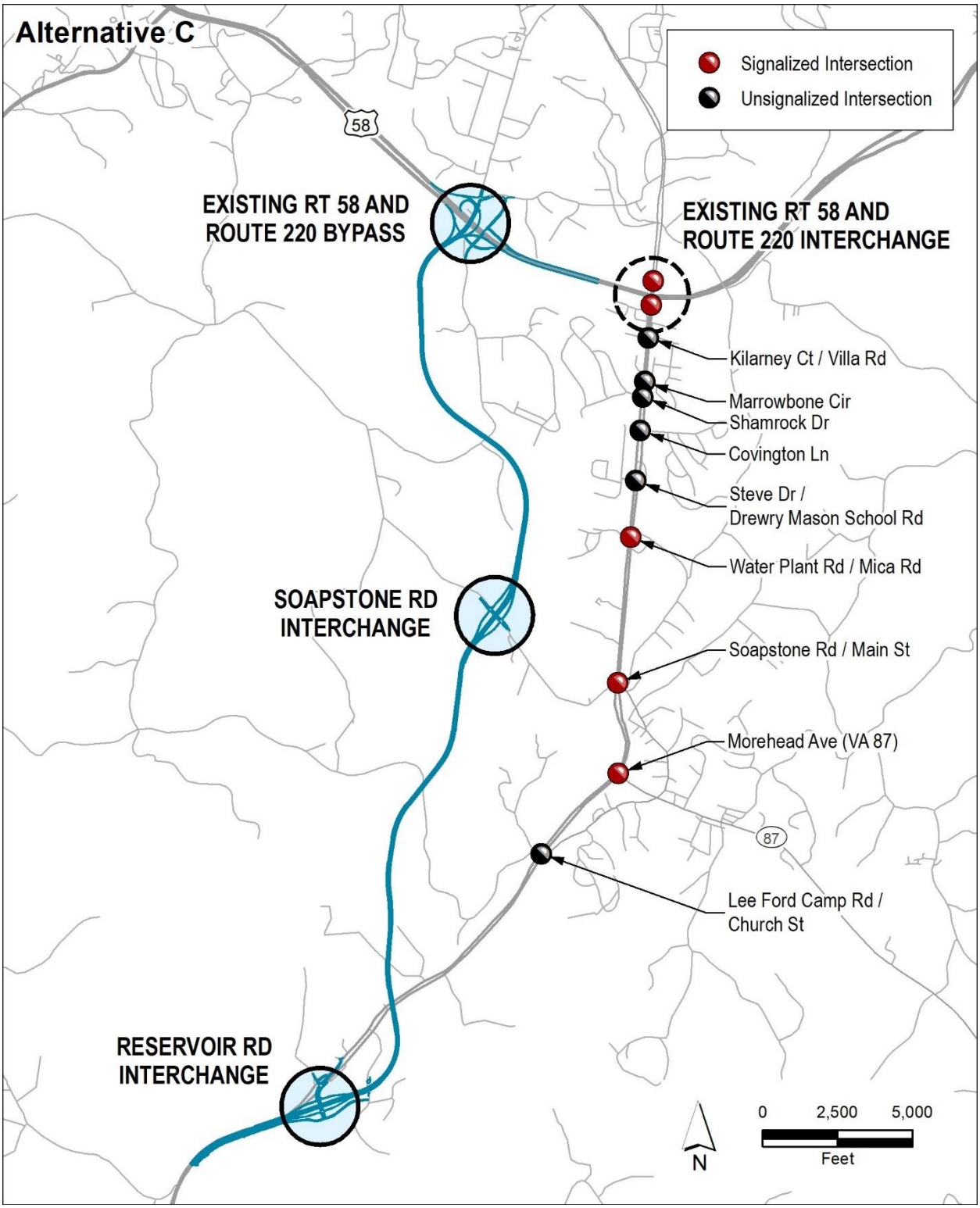


Table 4-1: Alternative A Summary of Intersections including LOS, Peak AM and PM Hourly Volumes, and Delay

	AM	Type of Signalization	2025 Build			2040 Build		
	Segment		AM	LOS	Delay	AM	LOS	Delay
1	Route 58 WB Ramp	signalized	1832	A	9.1	2104	B	11.3
2	Route 58 EB Ramp	signalized	2250	B	16.1	2527	C	21.6
3	Kilarney Court/ Villa Road	unsignalized	2109	F	70.0	2362	F	134.6
4	Marrowbone Circle	unsignalized	2099	F	66.7	2351	F	109.4
5	Shamrock Drive	unsignalized	2079	F	421.7	2312	F	102.1
6	Covington Lane	unsignalized	1956	E	35.2	2304	F	82.5
7	Steve Drive/ Drewry Mason School Road	unsignalized	1990	A	0.0	2342	A	0.0
8	Water Plant Road	signalized	1932	B	14.5	2306	B	16.7
9	Soapstone Road/ Main Street	signalized	1765	B	13.9	2156	C	29.0
10	Morehead Avenue (VA 87)	signalized	1643	F	123.3	1785	D	48.3
11	Lee Ford Camp Road/ Church Street	unsignalized	1035	C	21.0	1256	D	27.9
12.1	Reservoir Interchange WB Ramp	unsignalized	955.0	B	11.7	631	B	14.5
12.2	Reservoir Interchange EB Ramp	unsignalized	487.0	B	14.5	598	C	18.9
13.1	Soapstone Interchange WB Ramp	unsignalized	270.0	A	9.5	284	A	9.6
13.2	Soapstone Interchange EB Ramp	unsignalized	231.0	A	7.5	212	A	4.2

	PM	Type of Signalization	2025 Build			2040 Build		
	Segment		PM	LOS	Delay	PM	LOS	Delay
1	Route 58 WB Ramp	signalized	2101	B	13.0	2201	B	16.6
2	Route 58 EB Ramp	signalized	2585	C	34.5	2789	D	51.8
3	Kilarney Court/ Villa Road	unsignalized	2363	F	297.4	2551	F	491.0
4	Marrowbone Circle	unsignalized	2311	F	63.1	2482	F	56.7
5	Shamrock Drive	unsignalized	2287	F	873.2	2486	F	1253.4
6	Covington Lane	unsignalized	2140	C	21.9	2334	D	26.7
7	Steve Drive/ Drewry Mason School Road	unsignalized	2110	F	102.4	2282	F	150.3
8	Water Plant Road	signalized	2095	C	21.2	2285	C	20.7
9	Soapstone Road/ Main Street	signalized	1921	C	33.0	2098	C	33.4
10	Morehead Avenue (VA 87)	signalized	1523	E	56.8	1677	C	34.2
11	Lee Ford Camp Road/ Church Street	unsignalized	914	C	21.5	1079	D	26.8
12.1	Reservoir Interchange WB Ramp	unsignalized	837	B	10.2	1003	B	11.3
12.2	Reservoir Interchange EB Ramp	unsignalized	363	B	12.1	516	C	21.0
13.1	Soapstone Interchange WB Ramp	unsignalized	274	A	9.9	650	B	13.1
13.2	Soapstone Interchange EB Ramp	unsignalized	286	A	7.7	624	A	6.3

Table 4-2: Alternative B Summary Intersections including LOS, Peak AM and PM Hourly Volumes, and Delay

	AM	Type of Signalization	2025 Build			2040 Build		
	Segment		AM	LOS	Delay	AM	LOS	Delay
1	Route 58 WB Ramp	signalized	1832	A	9.1	2104	B	15.9
2	Route 58 EB Ramp	signalized	2250	B	16.1	2527	D	47.7
3	Kilarney Court/ Villa Road	unsignalized	2109	F	70.0	2362	F	134.6
4	Marrowbone Circle	unsignalized	2099	F	66.7	2351	F	109.4
5	Shamrock Drive	unsignalized	2079	F	421.7	2312	F	102.1
6	Covington Lane	unsignalized	1956	E	35.2	2304	F	82.5
7	Steve Drive/ Drewry Mason School Road	unsignalized	1990	B	13.0	2342	A	0.0
8	Water Plant Road	signalized	1932	B	14.4	2306	B	16.6
9	Soapstone Road/ Main Street	signalized	1792	B	14.0	2156	C	28.7
10	Morehead Avenue (VA 87)	signalized	1643	F	123.0	1785	D	42.6
11	Lee Ford Camp Road/ Church Street	unsignalized	1358	C	21.0	1256	D	27.9
12.1	Reservoir Interchange WB Ramp	unsignalized	955	B	11.7	1193	B	14.5
12.2	Reservoir Interchange EB Ramp	unsignalized	487	B	14.3	598	C	17.1
13.1	Soapstone Interchange WB Ramp	unsignalized	270	A	9.5	284	A	9.6
13.2	Soapstone Interchange EB Ramp	unsignalized	231	E	4.1	242	A	7.5
14.1	Route 58 Interchange Southern	unsignalized	742	B	11.0	892	B	11.4
14.2	Fisher Farm Road/Fisher Farm Road	unsignalized	238	B	13.1	168	B	13.7
14.3	Fisher Farm Road/Route 58 WB Ramp	unsignalized	520	B	10.0	564	B	10.1
14.4	Fisher Farm Road/Route 58 EB Ramp	unsignalized	465	B	11.7	495	B	12.2

	PM	Type of Signalization	2025 Build			2040 Build		
	Segment		PM	LOS	Delay	PM	LOS	Delay
1	Route 58 WB Ramp	signalized	2101	B	13.7	2201	B	10.7
2	Route 58 EB Ramp	signalized	2585	D	35.7	2789	D	47.7
3	Kilarney Court/ Villa Road	unsignalized	2365	F	297.4	2551	F	491.0
4	Marrowbone Circle	unsignalized	2311	F	63.1	2482	F	56.7
5	Shamrock Drive	unsignalized	2287	F	873.2	2486	F	1253.4
6	Covington Lane	unsignalized	2140	C	21.9	2334	D	26.7
7	Steve Drive/ Drewry Mason School Road	unsignalized	2082	A	10.1	2282	F	150.3
8	Water Plant Road	signalized	2091	B	13.4	2285	B	20.0
9	Soapstone Road/ Main Street	signalized	1930	C	30.9	2116	C	32.8
10	Morehead Avenue (VA 87)	signalized	1523	C	25.0	1677	C	28.1
11	Lee Ford Camp Road/ Church Street	unsignalized	1548	C	21.3	1269	F	419.6
12.1	Reservoir Interchange WB Ramp	unsignalized	812	B	10.3	1058	B	11.4
12.2	Reservoir Interchange EB Ramp	unsignalized	436	C	16.1	524	C	21.1
13.1	Soapstone Interchange WB Ramp	unsignalized	270	A	9.9	295	B	10.1
13.2	Soapstone Interchange EB Ramp	unsignalized	286	A	4.2	327	A	7.8
14.1	Route 58 Interchange Southern	unsignalized	678	B	12.1	856	B	12.6
14.2	Fisher Farm Road/Fisher Farm Road	unsignalized	401	B	11.7	344	B	12.4
14.3	Fisher Farm Road/Route 58 WB Ramp	unsignalized	517	B	10.4	560	B	10.7
14.4	Fisher Farm Road/Route 58 EB Ramp	unsignalized	446	B	10.8	490	B	11.1

Table 4-3: Alternative C Summary of Intersections including LOS, Peak AM and PM Hourly Volumes, and Delay

	AM	Type of Signalization	2025 Build			2040 Build		
	Segment		AM	LOS	Delay	AM	LOS	Delay
1	Route 58 WB Ramp	signalized	1832	A	9.1	2104	B	11.3
2	Route 58 EB Ramp	signalized	2250	B	16.1	2527	C	21.6
3	Kilarney Court/ Villa Road	unsignalized	2109	F	70.0	2362	F	134.6
4	Marrowbone Circle	unsignalized	2099	F	66.7	2351	F	109.4
5	Shamrock Drive	unsignalized	2079	F	421.7	2312	F	102.1
6	Covington Lane	unsignalized	1956	E	35.2	2304	F	82.5
7	Steve Drive/ Drewry Mason School Road	unsignalized	1990	B	13.0	2342	A	0.0
8	Water Plant Road	signalized	1932	B	14.4	2306	B	16.6
9	Soapstone Road/ Main Street	signalized	1792	B	14.0	2156	C	29.1
10	Morehead Avenue (VA 87)	signalized	1643	F	123.0	1785	D	42.9
11	Lee Ford Camp Road/ Church Street	unsignalized	1035	C	21.0	1256	D	27.9
12.1	Reservoir Interchange WB Ramp	unsignalized	955	B	11.7	1143	B	14.5
12.2	Reservoir Interchange EB Ramp	unsignalized	487	B	14.3	596	C	18.4
13.1	Soapstone Interchange WB Ramp	unsignalized	270	A	9.5	284	A	9.6
13.2	Soapstone Interchange EB Ramp	unsignalized	231	A	7.5	242	A	7.5
14.1	Route 58 Interchange Southern	unsignalized	742	B	11.0	892	B	11.4
14.2	Fisher Farm Road/Fisher Farm Road	unsignalized	238	B	13.1	168	B	13.7
14.3	Fisher Farm Road/Route 58 WB Ramp	unsignalized	520	B	10.0	564	B	10.1
14.4	Fisher Farm Road/Route 58 EB Ramp	unsignalized	465	B	1.1	495	B	12.7

	PM	Type of Signalization	2025 Build			2040 Build		
	Segment		PM	LOS	Delay	PM	LOS	Delay
1	Route 58 WB Ramp	signalized	2101	B	13.7	2201	B	16.6
2	Route 58 EB Ramp	signalized	2585	D	35.7	2789	D	51.8
3	Kilarney Court/ Villa Road	unsignalized	2365	F	297.4	2551	F	491.0
4	Marrowbone Circle	unsignalized	2311	F	63.1	2482	F	56.7
5	Shamrock Drive	unsignalized	2287	F	873.2	2486	F	1253.4
6	Covington Lane	unsignalized	2140	C	21.9	2334	D	26.7
7	Steve Drive/ Drewry Mason School Road	unsignalized	2082	B	10.1	2282	F	150.3
8	Water Plant Road	signalized	2091	B	13.4	2285	C	20.7
9	Soapstone Road/ Main Street	signalized	1930	C	31.6	1434	C	33.6
10	Morehead Avenue (VA 87)	signalized	1523	C	25.0	1667	C	28.3
11	Lee Ford Camp Road/ Church Street	unsignalized	929	C	21.3	1269	F	419.6
12.1	Reservoir Interchange WB Ramp	unsignalized	812	B	10.3	1143	B	11.4
12.2	Reservoir Interchange EB Ramp	unsignalized	436	C	16.1	596	C	23.0
13.1	Soapstone Interchange WB Ramp	unsignalized	270	A	9.9	284	B	10.1
13.2	Soapstone Interchange EB Ramp	unsignalized	286	A	7.7	242	A	7.8
14.1	Route 58 Interchange Southern	unsignalized	678	B	12.1	856	B	12.6
14.2	Fisher Farm Road/Fisher Farm Road	unsignalized	401	B	11.8	344	B	12.4
14.3	Fisher Farm Road/Route 58 WB Ramp	unsignalized	517	B	1.4	560	B	10.7
14.4	Fisher Farm Road/Route 58 EB Ramp	unsignalized	446	B	11.1	490	B	11.4

Table 4-4: 2025 Worst-Case Intersection LOS and Peak Hour Ranking for All Build Alternatives

Alternative A LOS

Rank	Int #	Segment	Type of Signalization	2025 Build Peak Hour	2025 Build LOS	2025 Build Delay
1	10	Morehead Avenue (VA 87)	signalized	1643	F	123.3
3	2	Route 58 EB Ramp	signalized	2585	C	34.5
4	8	Water Plant Road	signalized	2095	C	21.2

Alternative B LOS

Rank	Int #	AM Segment	Type of Signalization	2025 Build Peak Hour	2025 Build LOS	2025 Build Delay
1	10	Morehead Avenue (VA 87)	signalized	1643	F	123.0
2	2	Route 58 EB Ramp	signalized	2585	D	35.7
3	9	Soapstone Road/ Main Street	signalized	1930	C	30.9

Alternative A Peak Hour

Rank	Int #	Segment	Type of Signalization	2025 Build Peak Hour	2025 Build LOS	2025 Build Delay
1	2	Route 58 EB Ramp	signalized	2585	C	34.5
3	1	Route 58 WB Ramp	signalized	2101	B	13.0
4	8	Water Plant Road	signalized	2095	C	21.2

Alternative B Peak Hour

Rank	Int #	AM Segment	Type of Signalization	2025 Build Peak Hour	2025 Build LOS	2025 Build Delay
1	2	Route 58 EB Ramp	signalized	2585	D	35.7
3	1	Route 58 WB Ramp	signalized	2101	B	13.7
4	8	Water Plant Road	signalized	2091	B	13.4

Alternative C LOS

Rank	Int #	Segment	Type of Signalization	2025 Build Peak Hour	2025 Build LOS	2025 Build Delay
1	10	Morehead Avenue (VA 87)	signalized	1643	F	123.0
2	2	Route 58 EB Ramp	signalized	2585	D	35.7
3	9	Soapstone Road/ Main Stre	signalized	1930	C	31.6

Alternative C Peak Hour

Rank	Int #	Segment	Type of Signalization	2025 Build Peak Hour	2025 Build LOS	2025 Build Delay
1	2	Route 58 EB Ramp	signalized	2585	D	35.7
3	1	Route 58 WB Ramp	signalized	2101	B	13.7
4	8	Water Plant Road	signalized	2091	B	13.4

Table 4-5: 2040 Worst-Case Intersection LOS and Peak Hour Ranking for All Build Alternatives

Alternative A LOS

Rank	Int #	Segment	Type of Signalization	2040 Build Peak Hour	2040 Build LOS	2040 Build Delay
1	10	Morehead Avenue (VA 87)	signalized	1785	D	48.3
2	2	Route 58 EB Ramp	signalized	2789	D	51.8
4	8	Water Plant Road	signalized	2285	C	20.7

Alternative B LOS

Rank	Int #	AM Segment	Type of Signalization	2040 Build Peak Hour	2040 Build LOS	2040 Build Delay
1	10	Morehead Avenue (VA 87)	signalized	1785	D	42.6
2	2	Route 58 EB Ramp	signalized	2789	D	47.7
4	9	Soapstone Road/ Main Street	signalized	2116	C	32.8

Alternative A Peak Hour

Rank	Int #	Segment	Type of Signalization	2040 Build Peak Hour	2040 Build LOS	2040 Build Delay
1	2	Route 58 EB Ramp	signalized	2789	D	51.8
3	8	Water Plant Road	signalized	2306	B	16.7
5	1	Route 58 WB Ramp	signalized	2201	B	16.6

Alternative B Peak Hour

Rank	Int #	AM Segment	Type of Signalization	2040 Build Peak Hour	2040 Build LOS	2040 Build Delay
1	2	Route 58 EB Ramp	signalized	2789	D	47.7
3	8	Water Plant Road	signalized	2306	B	16.6
5	1	Route 58 WB Ramp	signalized	2201	B	10.7

Alternative C LOS

Rank	Int #	Segment	Type of Signalization	2040 Build Peak Hour	2040 Build LOS	2040 Build Delay
1	10	Morehead Avenue (VA 87)	signalized	1785	D	42.9
2	2	Route 58 EB Ramp	signalized	2789	D	51.8
3	9	Soapstone Road/ Main Street	signalized	1434	C	33.6

Alternative C Peak Hour

Rank	Int #	Segment	Type of Signalization	2040 Build Peak Hour	2040 Build LOS	2040 Build Delay
1	2	Route 58 EB Ramp	signalized	2789	D	51.8
3	8	Water Plant Road	signalized	2306	B	16.6
5	1	Route 58 WB Ramp	signalized	2201	B	16.6

The 2016 Agreement, and by reference, the criteria for skewed intersections from the 2009 Agreement, were then applied to screen the intersections for the Build Alternatives as shown in **Table 4-6** thru **Table 4-17.** All of the intersections are expected to operate at LOS D or better for the Opening Year and Design Year, except the intersection of Morehead Avenue and Existing Route 220 which is expected to operate at LOS F in the 2025 Build Condition for Alternative A, Alternative B, and Alternative C. As shown in **Tables 4-6** thru **Table 4-17**, the skew angles for the worst case intersections range from 57 degrees (Soapstone Road/Main Street) to 90 degrees (Route 58 EB Ramp) while the ADT ranges from 8,500 (at Morehead Avenue) to 22,000 (at Route 58 EB ramp). For all intersections that operate at LOS E or better, these intersections meet (i.e. below) the design year ADT and corresponding intersection skew angle thresholds established in the 2009 PA (denoted in the tables under 2009 Programmatic Agreement). In addition, the worst-case vehicle per hour per lane (vphpl) value of 287 in the Opening Year for this LOS F intersection is well below the FHWA-default value of 1,037 vphpl that was applied in the 2009 PA for skewed intersections. Therefore, while this intersection would operate at LOS F in the Opening year, the project is below the design year ADT and corresponding intersection skew angle thresholds criteria as established in the 2009 PA and associated technical support document for all intersections. In addition, the 2009 PA used emission factors in the worst-case modeling for an opening-year of 2009. Based on this project's Opening-Year of 2025, the emission factors would be much lower for CO given the continued fleet turnover to newer vehicles, which are designed to meet more stringent emission standards set by the EPA. As shown in **Table 4-6** thru **Table 4-17**, all worst case intersections meet the criteria included in the 2009 Agreement ADT thresholds for skewed intersections, which is referenced in the 2016 Agreement for 2025 and 2040 and would not require project-specific modeling or a quantitative air quality analysis for compliance with the NAAQS.

In sum, the signalized intersections were summarized and ranked based on worst-case LOS and peak hourly volumes for the 2025 Opening Year and 2040 Design Year. The top three worst-case intersections were screened out (i.e. below the ADT and corresponding intersection skew angle thresholds and worst case vphpl) using the 2016 PA (and by reference the 2009 PA). These results demonstrate that these intersections would not cause or contribute to a violation of the CO NAAQS within the Study Area. It can also be concluded that if the worst-case intersections would not cause or contribute to a violation of the CO NAAQS, all other locations in the Study Area also would be expected to meet the CO NAAQS.

4.1.3 Interchanges

Interchanges were ranked by worst-case volumes for the mainline traveling through each interchange for each Build Alternative. Traffic volumes used in the ranking of the interchanges are included in **Appendix A**. The interchange locations studied for each Alternative are shown above in **Figures 4-1** thru **Figure 4-3**. The top two interchanges by volume for each Build Alternative were chosen for dispersion modeling (CO Hot Spot Analysis). **Table 4-18** and **Table 4-19** presents the interchanges ranked by volume for each Alternative for the 2025 and 2040 condition, respectively. A review of the worst-case interchanges shows the top two interchanges for each Alternative clearly have the highest traffic volumes. The two highest ranked interchanges are common to Alternative A, Alternative B, and Alternative C are 1) Existing Route 58 and Route 220 Bypass (Existing Route 58 and Joseph Martin Highway) and 2) Existing Route 58 and Existing Route 220. An additional interchange associated with a previously considered alternative was included in the analysis: Modified Route 220 and Morehead Avenue.

Table 4-6: 2025 Worst-Case Intersection LOS Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative A

			Intersection Data							2025 Build					2025 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Morehead Avenue (VA 87)	Signalized	87	6	4	3	3.25	35	274	8,900	2,350	1643	F	123.3	89.1
2	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	431	17,500	7,271	2585	C	34.5	1857.7
3	Water Plant Road	Signalized	88	8	4	0.75	4	25	262	11,100	2,803	2095	C	21.2	20.2

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Morehead Avenue (VA 87)	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Route 58 EB Ramp	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Water Plant Road	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-7: 2025 Worst-Case Intersection Peak Hour Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative A

			Intersection Data							2025 Build				2025 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2025 Build Vehicle per Hour per Lane (vphpl)	ADT	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	431	17,500	2585	C	34.5	1857.7
2	Route 58 WB Ramp	Signalized	87	5	4	1	2	35	420	17,500	2101	B	13	38.7
3	Water Plant Road	Signalized	88	8	4	0.75	4	25	262	11,100	2095	C	21.2	20.2

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]				
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?
1	Route 58 EB Ramp	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes
2	Route 58 WB Ramp	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes
3	Water Plant Road	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.

Table 4-8: 2040 Worst-Case Intersection LOS Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative A

			Intersection Data							2040 Build					2040 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Morehead Avenue (VA 87)	Signalized	87	6	4	3	3.25	35	298	12,000	3,443	1785	D	48.3	55.1
2	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	465	22,000	9,861	2789	D	51.8	75.7
3	Water Plant Road	Signalized	88	8	4	0.75	4	25	286	15,400	4,242	2285	C	20.7	24.1

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Morehead Avenue (VA 87)	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Route 58 EB Ramp	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Water Plant Road	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-9: 2040 Worst-Case Intersection Peak Hour Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative A

			Intersection Data							2040 Build					2040 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	465	22,000	9,861	2789	D	51.8	75.7
2	Water Plant Road	Signalized	88	8	4	0.75	4	25	288	15,400	4,281	2306	B	16.7	10.9
3	Route 58 WB Ramp	Signalized	87	5	4	1	2	35	440	22,000	9,339	2201	B	16.6	15.5

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Route 58 EB Ramp	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Water Plant Road	Signalized[5]	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Route 58 WB Ramp	Signalized	Yes	Yes	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-10: 2025 Worst-Case Intersection LOS Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative B

			Intersection Data							2025 Build					2025 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2025 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Morehead Avenue (VA 87)	Signalized	87	6	4	3	3.25	35	274	8,500	2,245	1643	F	123	89.1
2	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	431	17,600	7,312	2585	D	35.7	1857
3	Soapstone Road/ Main Street	Signalized	57	8	4	1.25	2.66	35	241	9,700	2,257	1930	C	30.9	58.3

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Morehead Avenue (VA 87)	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Soapstone Road/ Main Street	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-11: 2025 Worst-Case Intersection Peak Hour Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative B

			Intersection Data							2025 Build				2025 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2025 Build Vehicle per Hour per Lane (vphpl)	ADT	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	431	17,600	2585	D	35.7	1857.7
2	Route 58 WB Ramp	Signalized	87	5	4	1	2	35	420	17,600	2101	B	13.7	38.7
3	Water Plant Road	Signalized	88	8	4	0.75	4	25	261	11,000	2091	B	13.4	20.2

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]				
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?
1	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes
2	Route 58 WB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes
3	Water Plant Road	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.

Table 4-12: 2040 Worst-Case Intersection LOS Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative B

			Intersection Data							2040 Build					2040 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Morehead Avenue (VA 87)	Signalized	87	6	4	3	3.25	35	298	11,800	3,385	1785	D	42.6	55.1
2	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	465	22,000	9,861	2789	D	47.7	75.7
3	Soapstone Road/ Main Street	Signalized	57	8	4	1.25	2.66	35	265	14,000	3,571	2116	C	32.8	48.3

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Morehead Avenue (VA 87)	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Soapstone Road/ Main Street	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-13: 2040 Worst-Case Intersection Peak Hour Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative B

			Intersection Data							2040 Build					2040 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	465	22,000	9,861	2789	D	47.7	75.7
2	Water Plant Road	Signalized	88	8	4	0.75	4	25	288	15,300	4,253	2306	B	16.6	10.9
3	Route 58 WB Ramp	Signalized	87	5	4	1	2	35	440	22,000	9,339	2201	B	10.7	15.5

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Water Plant Road	Signalized[5]	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Route 58 WB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-14: 2025 Worst-Case Intersection LOS Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative C

			Intersection Data							2025 Build					2025 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2025 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Morehead Avenue (VA 87)	Signalized	87	6	4	3	3.25	35	35	8,500	287	1643	F	123	89.1
2	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	431	17,600	7,312	2585	D	35.7	1857.7
3	Soapstone Road/ Main Street	Signalized	57	8	4	1.25	2.66	35	241	9,700	2,257	1930	C	31.6	58.3

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Morehead Avenue (VA 87)	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Soapstone Road/ Main Street	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-15: 2025 Worst-Case Intersection Peak Hour Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative C

			Intersection Data							2025 Build				2025 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2025 Build Vehicle per Hour per Lane (vphpl)	ADT	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	431	17,600	2585	D	35.7	1857.7
2	Route 58 WB Ramp	Signalized	87	5	4	1	2	35	420	17,600	2101	B	13.7	38.7
3	Water Plant Road	Signalized	88	8	4	0.75	4	25	261	11,000	2091	B	13.4	20.2

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]				
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?
1	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes
2	Route 58 WB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes
3	Water Plant Road	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.

Table 4-16: 2040 Worst-Case Intersection LOS Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative C

			Intersection Data							2040 Build					2040 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Morehead Avenue (VA 87)	Signalized	87	6	4	3	3.25	35	298	11,800	3,385	1785	D	42.9	55.1
2	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	465	22,000	9,861	2789	D	51.8	75.7
3	Soapstone Road/ Main Street	Signalized	57	8	4	1.25	2.66	35	179	14,000	2,420	1434	C	33.6	48.3

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Morehead Avenue (VA 87)	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Soapstone Road/ Main Street	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-17: 2040 Worst-Case Intersection Peak Hour Ranking and Comparison to 2016 Agreement and ADT Thresholds Alternative C

			Intersection Data							2040 Build					2040 No-Build
Rank	Intersection Name	Signalized	Skew Angle	Approach Lanes	Departure Lanes	Largest Mainline Grade (%)	Largest Cross Street Grade (%)	Lowest Posted Speed Limit (mph)	2040 Build Vehicle per Hour per Lane (vphpl)	ADT	Effective ADT[5]	Peak AM/PM Volume	LOS	Delay(s)	Delay(s)
1	Route 58 EB Ramp	Signalized	90	6	5	3	2.3	35	465	22,000	9,861	2789	D	51.8	75.7
2	Water Plant Road	Signalized	88	8	4	0.75	4	25	288	15,300	4,253	2306	B	16.6	10.9
3	Route 58 WB Ramp	Signalized	87	5	4	1	2	35	440	22,000	9,339	2201	B	16.6	15.5

			2016 Programmatic Agreement[1,2]					2009 Programmatic Agreement[1]					
Rank	Intersection Name	Signalized	Skewed Intersection (Yes/No)	Grade - Mainline 2% or Less and Cross Street at 0%	Approach Speed Greater than 15 mph (Yes/No)	Maximum Lanes at the Intersection < 6 (Yes/No)	Screen Out with 2016 PA?	Vehicles per Hour per Lane < 1037?	ADT Less than 59,000 (Skew Angle > 60 deg.)?	ADT Less than 49,000 (45 ≤ Skew Angle < 60 deg.)?	ADT Less than 39,000 (30 ≤ Skew Angle < 45 deg.)?	Screen Out with 2009 PA?	Screen Out with Weight of Evidence ?
1	Route 58 EB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
2	Water Plant Road	Signalized[5]	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A
3	Route 58 WB Ramp	Signalized	Yes	N/A	Yes	N/A	N/A	Yes	Yes			Yes	N/A

1. 2016 VDOT Programmatic Agreement with FHWA which references screening criteria (primarily Design-Year average daily traffic and intersection skew angle) that were previously established in the 2009 PA based on worst-case modeling of 1,037 vehicles per lane.
2. The 2016 PA also contains Intersection screening criteria of for 90 degree intersections, 6 approach lanes, 4 lanes on each departure, and a roadway grade of 2 percent (mainline) and 0 percent (cross-street), and vehicle speeds greater than 15 mph.
3. Worst of either AM or PM peak volumes was chosen.
4. N/A denotes 2016 PA not applicable to skewed intersections.
5. Effective ADT based on the Build Vehicle Hour per Lane divided by worst case modeling of 1,037 vehicles per lane in the 2009 PA and multiplied by ADT.

Table 4-18: 2025 Interchange Rankings for All Build Alternatives

Alternative A

Rank	Interchange	2025 ADT Totals
1	Existing Route 58 and Route 220 Bypass	40,900
2	Existing Route 58 and Route 220	26,100
3	New Route 220 and Soapstone	22,100
4	New Route 220 and Reservoir Road	12,000

Alternative B

Rank	Interchange	2025 ADT Totals
1	Existing Route 58 and Route 220 Bypass	41,700
2	New Route220 and Existing 58	26,400
3	New Route 220 and Soapstone	22,600
4	New Route 220 and Reservoir Road	12,000

Alternative C

Rank	Interchange	2025 ADT Totals
1	Existing Route 58 and Route 220 Bypass	41,700
2	Existing Route 58 and Route 220	26,400
3	New Route 220 and Soapstone	22,600
4	New Route 220 and Reservoir Road	12,000

Notes:
Yellow denotes the top two ranked interchanges for each Alternative.

Table 4-19: 2040 Interchange Rankings for All Build Alternatives

Alternative A

Rank	Interchange	2040 ADT Totals
1	Existing Route 58 and Route 220 Bypass	46,100
2	Existing Route 58 and Route 220	30,300
3	New Route 220 and Soapstone	23,600
4	New Route 220 and Reservoir Road	14,000

Alternative B

Rank	Interchange	2040 ADT Totals
1	Existing Route 58 and Route 220 Bypass	47,300
2	Existing Route 58 and Route 220	30,900
3	New Route 220 and Soapstone	24,100
4	New Route 220 and Reservoir Road	14,200

Alternative C

Rank	Interchange	2040 ADT Totals
1	Existing Route 58 and Route 220 Bypass	47,300
2	Existing Route 58 and Route 220	30,900
3	New Route 220 and Soapstone	24,100
4	New Route 220 and Reservoir Road	14,200

Notes:
Yellow denotes the top two ranked interchanges for each Alternative.

The traffic analysis, as summarized above, demonstrates that the three interchanges selected for evaluation in the CO hot-spot analysis have the highest traffic volumes for all Build Alternatives, and therefore are representative of the locations where peak CO concentrations would be expected to occur throughout the corridor.

It is assumed that if these interchanges show peak ground level CO concentrations below the CO NAAQS, then all other locations in the study area would also be below the CO NAAQS.

For the highway interchanges, a worst-case analysis approach was taken using MOVES2014b and CAL3QHC (invoked via the latest version of the FHWA CAL3i interface software) to develop conservative estimates for CO concentrations. This approach is designed to overestimate the project impacts on CO emissions and produce worst-case results from the air quality/dispersion modeling. CAL3i provides a user-friendly interface for the EPA CAL3QHC model that serves to facilitate and streamline the modeling process, particularly for worst-case analyses. Details on the assumptions used for the worst-case modeling analyses are provided later in this report.

4.1.4 MOVES Emission Rates

Vehicle emission rates for CO were estimated using the latest version of the EPA Motor Vehicle Emissions Simulator model (MOVES2014b). The methodologies and assumptions used for the MOVES modeling were consistent with FHWA guidance as previously referenced as well as EPA guidance and the VDOT Resource Document. All modeling inputs were from or otherwise consistent with the VDOT Resource Document. Specifically:

- Vehicle and fuels data required for input into the MOVES model was provided by VDOT (on-line data repository) for 2018, 2025 and 2040 conditions, consistent with the latest planning assumptions for the Study Corridor.
- Fuel data and age distribution data were provided by VDOT (on-line data repository) to populate the MOVES project data manager database for the areas where the worst-case interchanges are located (i.e. Martinsville).
- Source type hour fractions for each link were derived using the link-source-type-hour calculation tool provided with the VDOT Resource Document (i.e., available in the on-line data repository). Project-specific data for cars and trucks volumes were applied along with the most recent VDOT DVMT 1236 report (2017) and source type population data for each source type.
- MOVES link files were developed for each worst-case interchange studied for each analysis year. The link file includes road type, peak-hour volumes, link lengths, roadway speed, and roadway grade.
- The roadway grades for the interchanges were derived from plans where available, or from profile data based on U.S. Geological Survey (USGS) elevation data from Geographic Information Survey (GIS) files or Google Earth data.
- Worst-case meteorological data consistent with the VDOT Resource Document for the Study Corridor for the areas where the worst-case interchanges are located were also assumed in the project data manager database.

A summary of the MOVES inputs is presented in **Table 4-19**.

Table 4-19: Summary of MOVES Inputs

Parameter	Assumption
Scale Menu	"Project" Domain
	Calculation Type "Inventory"
Temperature	29.2°F[1]
Relative Humidity	Relative Humidity=73.4%[1]
Evaluation Month	January
Time Span	Year= (2018, 2025, 2040), AM Hour= 7AM to 8AM, Days=Weekdays
Geographic Bounds	City of Martinsville[2]
Vehicles Equipment[3]	All Vehicle Types for diesel and gasoline and CNG transit buses
Link Files	Roadway Specific developed by HMMH
Roadway Grade/Link Speeds	Roadway Specific developed by Wallace and Montgomery and HMMH
Fuel and I/M Inputs	Fuels Data Provided by VDOT[1], No I/M program in study corridor[1,2]
Age Distribution	Provided by VDOT[2]
Pollutants and Process Panel	CO Running and CO Crankcase
Output Panel	Grams and Miles Selected as Units, Population and Distance traveled

Notes:

1. **Data provided in the VDOT Project-Level Air Quality Analysis Resource Document, On-line repository.**
2. **Data for MOVES runs collected based on the location of the worst-case interchanges which are located in the Cities of Martinsville. The MOVES Project database was populated for each interchange using city specific values relative to their locations.**
3. **Includes electric and ethanol E-85 light commercial trucks, passenger car and passenger trucks.**

4.1.5 Emission Factors

Mobile source emission factors are calculated based on posted speeds at which vehicles travel through the interchanges. The MOVES runs were used to generate CO emission rates for input into the CAL3QHC dispersion model for the base (2018), opening (2025), and design (2040) years. For estimating CO emission rates for the interchange analysis, the following assumptions were made:

- Vehicle speed of either 55 or 65 mph was assumed for each mainline link at each interchange based on posted speed limits
- Roadway ramp speeds of 35 mph based on the traffic study results.
- The modeling assumed freeway links in an urban area type;
- Zero median width;
- At grade interchanges assuming no vertical separation;
- Receptor locations on the edge of the right of way assuming EPA guidance.

Emission rates were developed for freeway links with grades of +1 percent. A maximum climbing grade of 3 percent was assumed on ramps that showed an incline. If this was the case, the entire approach leg was modeled as a 3 percent grade. If a ramp did not have an incline, a conservative 1 percent grade was used for the approach leg. The speeds, roadway grades, and emission

factors for each of the legs are summarized in **Table 4-20**. As an example of the CO emission rates, **Table 4-20** summarizes the emission factors generated by MOVES for each year and vehicle speed for the three interchanges modeled using MOVES2014b. A sample MOVES input and output file is provided in **Appendix B**. A complete set of MOVES input/output files can be made available upon request.

Table 4-20: Summary of MOVES CO Emission Factors

	Approach	Vehicle Speed (mph)	Roadway Grade (%)	2018 (g/mile)	2025 (g/mile)	2040 (g/mile)
Existing Route 58 and Route 220 Bypass	East Leg Approach/Depart	65/65	3/1	3.33/2.82	1.64/1.42	0.36/0.35
	West Leg Approach/Depart	65/65	1/3	2.82/3.33	1.42/1.64	0.35/0.36
	North Leg Approach/Depart	55/55	2/1	3.40/2.96	1.69/1.50	0.40/0.40
	South Leg Approach/Depart	55/55	1/2	2.96/3.40	1.50/1.69	0.40/0.40
Existing Route 58 and Route 220	East Leg Approach/Depart	65/65	2/1	3.10/2.82	1.54/1.42	0.35/0.35
	West Leg Approach/Depart	65/65	1/2	2.82/3.10	1.42/1.54	0.35/0.35
	North Leg Approach/Depart	45/45	1/1	3.29/3.29	1.67/1.67	0.44/0.44
	South Leg Approach/Depart	45/45	1/1	3.29/3.29	1.67/1.67	0.44/0.44
Modified Route 220 and Morehead Avenue	North Leg Approach/Depart	55/55	1/2	2.96/3.40	1.50/1.69	0.40/0.40
	South Leg Approach/Depart	55/55	2/1	3.40/2.96	1.69/1.50	0.40/0.40
	East Leg Approach/Depart	35/35	1/3	3.68/4.55	1.86/1.26	0.48/0.52

Notes:
1. **MOVES2014b emission rates based on posted vehicle speeds and roadway grades.**

4.1.6 Dispersion Modeling Scenarios

A worst-case modeling approach was taken for the analysis. The worst-case assumptions applied together serve to overestimate the project CO emissions and concentrations. Worst-case traffic volumes (set at the theoretical per lane maximum for LOS E) were assumed for the CO analyses at the interchanges.

As the same worst-case volumes were applied for 2018, 2025 and 2040, and CO emission factors decline over time due to improved fuel quality and continued fleet turnover to vehicles constructed to more stringent exhaust emission standards for CO, the worst-case analysis for 2018 would have higher concentrations than those for 2025 and 2040. That is, as 2018 would have the same worst-case traffic but higher emission factors (as shown above in **Table 4-27**), it would have higher worst-case emissions than would later years. The screening analysis for 2018 therefore effectively covers both the 2025 and 2040 Build scenarios; however, all three years were modeled for comparison. For comparison, No-Build conditions were also analyzed for 2025 and 2040 using forecasted No-Build traffic volumes for each worst-case interchange.

4.1.7 Traffic Volumes for Interchange Scenarios

As part of the approach for worst-case screening modeling, default worst-case volumes were applied as specified in the VDOT Resource Document. For freeway links, the default worst-case volumes are 2,400 vphpl[25]. The worst-case volumes are intended to reflect over-capacity operating conditions, which is taken as LOS E. As discussed, as part of the worst-case modeling approach designed to overestimate concentrations, ramps were modeled as through lanes physically located adjacent to the mainline lanes.

Typically, the assumed worst-case traffic volumes tend to be significantly higher than the design (and opening) year modeled volumes. **Table 4-21** below summarizes the refined Build and No-Build traffic estimates developed by the project team along the three worst case interchanges. It shows the per lane volume to be substantively lower in both the opening year (2025) and design year (2040) scenarios compared to the worst-case default. In addition, ramp lanes tend to accommodate fewer vehicles per hour, but this conservative approach assumes full utilization at a capacity of a mainline travel lane (2,400 vphpl). Overall, the traffic volumes assumed are well over two to three times higher than those forecasted for the corridor.

[25] VDOT Project-Level Air Quality Analysis Resource Document, Appendix G1.

Table 4-21: Comparison of Forecasted Traffic Volumes and Assumed Worst Case Volumes for Screening Modeling

Interchange	Direction	2018	2025						2040						Worst-Case Volumes	Roadway Speeds	Lanes
		Existing	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E			
Existing Route 58 and Route 220 Bypass	East	1580	1640	1709	1709	1709	1709	1664	1835	1927	1927	1927	1927	1864	7,200	65	3
	West	1660	1770	1800	1805	1805	1804	1806	2040	2101	2110	2110	2110	2115	7,200	65	3
	North			968	1210	1210	803			1477	1596	1596	1074		4,800	45	2
	South			846	836	836	980			1075	1065	1065	1200		7,200	45	3
	Total	3200	3410	5323	5560	5560	5296	3470	3875	6580	6698	6698	6311	3979	26,400		
Existing Route 58 and Route 220	East	1130	1120	1236	1236	1236	1237	1241	1630	1673	1673	1673	1674	1684	7,200	65	3
	West	1470	1510	1510	1510	1510	1510	1510	1700	1700	1700	1700	1700	1700	7,200	65	3
	North	1570	1670	1680	1683	1683	1684	1694	1820	1840	1844	1844	1847	1864	4,800	55	2
	South	1650	1700	1700	1700	1700	1700	1747	1850	1850	1850	1850	1850	1948	7,200	55	3
	Total	5820	6000	6126	6129	6129	6131	6192	7000	7063	7067	7067	7071	7196	26,400		
Modified Route 220 and Morehead Avenue	East	372	391					897	432					1000	4,800	35	2
	West	541	531					679	365					857	4,800	35	2
	North	2531	2689	2157	1885	1885	2038	2403	3005	2383	2234	2234	2476	3017	7,200	55	3
	South	2631	2731	2478	2223	2223	2081	2571	2913	2460	2422	2422	2245	2943	7,200	55	3
	Total	6075	6342	4635	4108	4108	4119	6550	6715	4843	4656	4656	4721	7817	24,000		

Notes:
Default values based on number of lanes times 2,400 vehicles per hour per lane.

4.1.8 CAL3QHC

The latest version of the CAL3QHC model (04244)[26] (EPA, 1995) was used to predict worst-case 1-hour CO concentrations from free-flow links using the latest version of the FHWA CAL3i[27] (FHWA, 2016b). CAL3i is a software package that incorporates the EPA CAL3QHC dispersion model and various worst-case default parameters per EPA guidance. The peak 1-hour concentrations from CAL3QHC were scaled by a persistence factor of 0.77[28] (as specified in the VDOT Resource Document) to estimate 8-hour concentrations. Travel speeds were estimated based on field observations and the traffic analysis. A summary of inputs used in the CAL3Interface model are shown in **Table 4-22**.

Worst-case modeled concentrations from CAL3QHC were added to appropriate background CO concentrations for comparison to the NAAQS. The default background CO levels specified in the VDOT Resource Document were 1.8 ppm (one-hour CO concentration) and 1.4 ppm (eight-hour concentration). This is conservative as parts of the study area are urban and parts are rural, and the default urban concentration of 1.8 ppm and 1.4 ppm are higher than the default rural concentrations of 1.5 ppm and 1.1 ppm for 1-hour and 8-hour, respectively.

Table 4-22: Summary of CAL3QHC Inputs

Description	Value[1]
Surface Roughness Coefficient	175 Centimeters
CO Background Concentrations	1.8 ppm 1-hour, 1.4 ppm 8-hour (default urban)
Persistence Factor	0.77 (overall average default Value for Worst Case Scenario Modeling)
Wind Speed	1.0 meter per second
Stability Class	Urban D
Mixing Height	1,000 meters
Wind Direction	5 degree increments (1 thru 36)
Receptor Height	5.9 feet
Note: CAL3QHC inputs were derived from the VDOT Project-Level Air Quality Analysis Resource Document, Appendix G1 and G2.	

In keeping with the worst-case analysis approach, each interchange is modeled at grade separation. This approach effectively concentrates the travel lanes, traffic and emissions in one location, i.e., at the center of the grade separation, versus being widely distributed or dispersed across the actual freeway ramps. Additionally, default receptor locations, which are summarized below, are close to the roadway edge and well inside the footprint or right of way for the actual interchange, which results in higher modeled estimates for ambient concentrations of CO than would occur for the actual interchange. The combination of the default worst-case configuration (grade separation for an interchange) and receptor locations (near the road way edge instead of being located much further away, at the actual right of way edge) together result in much more conservatively high modeled estimates for ambient concentrations than would be expected to occur in practice. CAL3QHC input and output files are provided in **Appendix C**.

[26] "User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections", EPA-454/R-92-006 (Revised), EPA, September 1995.

[27] See CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models", Michael Claggett, Ph.D., FHWA Resource Center, 2016.

[28] CO Persistence Factor Calculations and represents the overall average (default Value for Worst Case Scenario Modeling) derived from Appendix G2 of the VDOT Resource Document and was used for estimating 8-hour concentrations from 1-hour concentrations.

4.1.9 Receptors

Receptor locations are placed in the vicinity of each interchange at worst-case locations such as sidewalks, property lines, and parking lots where the public generally has access. For worst-case analyses for freeways, receptors are placed twenty feet from the roadway edge; for arterial streets (including intersections), the receptors are placed ten feet from the roadway edge (i.e., at the nearest possible location for the model, which assumes a ten-foot mixing zone next to the roadway).

Receptor locations for each worst-case interchange were generated in CAL3i consistent with EPA modeling guidelines where the receptors were located a minimum of 3 meters from the edge of the roadway and positioned at a height of 1.8 meters above the ground (5.9 feet). **Figures 4-4** through **4-6** shows the receptor locations at the three interchanges as displayed in the CAL3i interface. The modeled conditions are conservative as the theoretical worst-case traffic volumes along with other simplified assumptions were applied which together would serve to overestimate impacts and yield conservative results. If the peak CO concentrations at the worst-case areas selected in the analysis are below the NAAQS for CO, it is assumed that all other locations in the corridor would also remain below the thresholds.

Figure 4-4: CAL3i Generated CAL3QHC Receptor Locations for Existing Route 58 and Route 220 Bypass Interchange

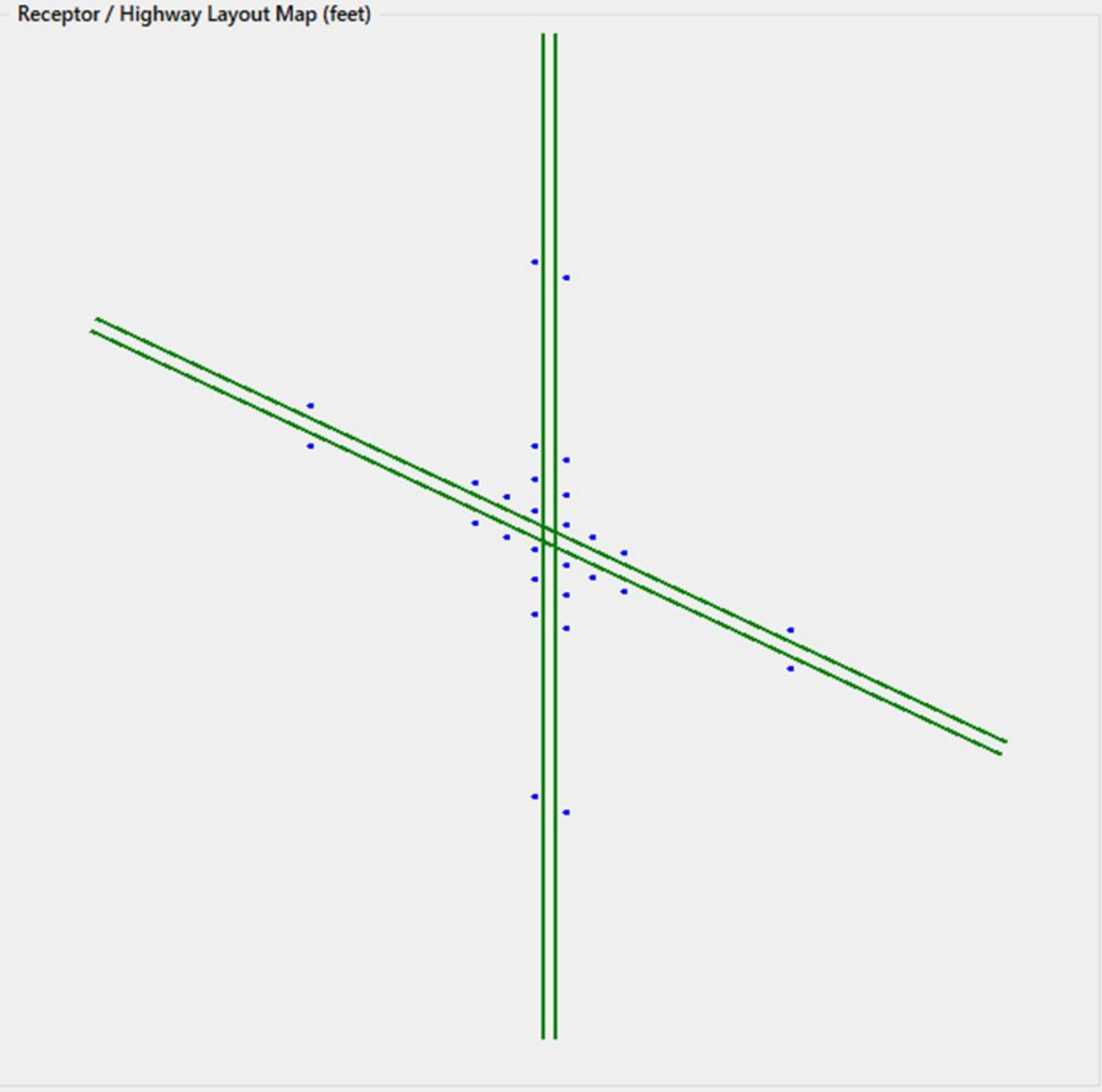


Figure 4-5: CAL3i Generated CAL3QHC Receptor Locations for Existing Route 58 and Route 220 Interchange

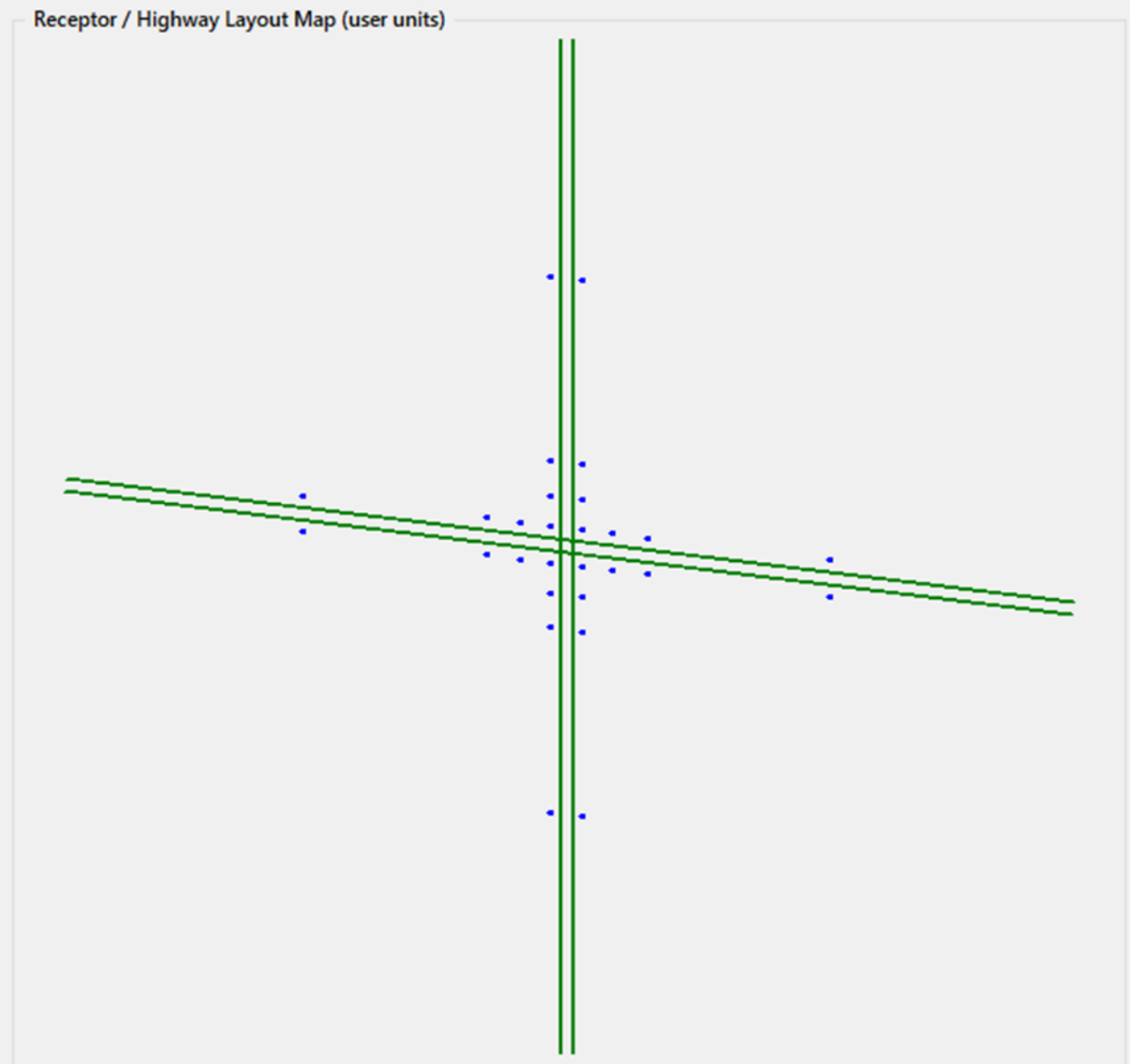
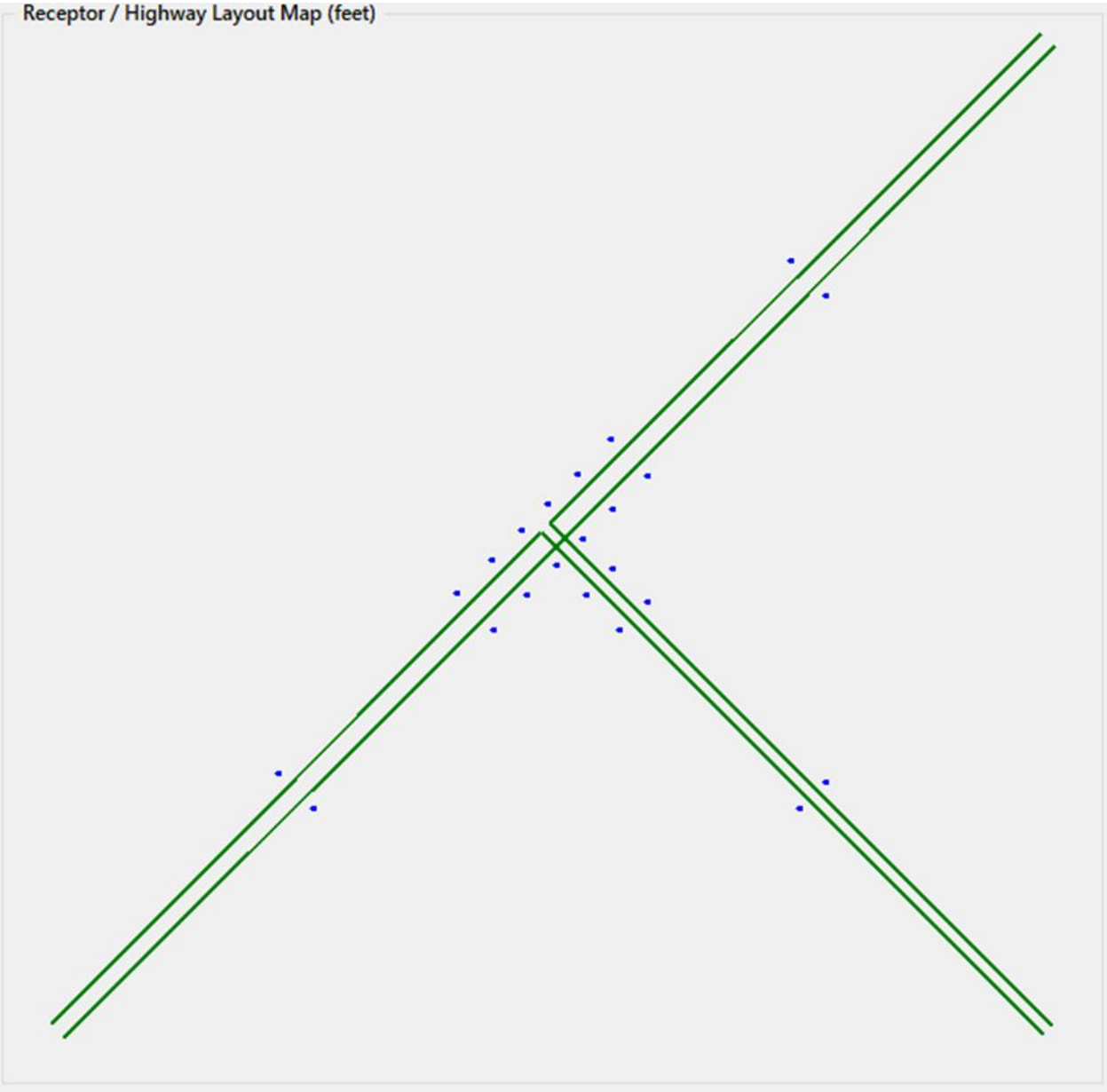


Figure 4-6: CAL3i Generated CAL3QHC Receptor Locations for Modified Route 220 and Morehead Avenue Interchange



4.1.10 CAL3QCHC Modeling Results

The results of the 1-hour and 8-hour CO hot-spot analysis for the worst-case interchange locations is presented in **Table 4-23** for the existing, opening and design year build and No-Build conditions. The table includes the overall worst-case modeled concentrations for the AM and PM peak periods, and includes the modeled receptor number in parenthesis. The concentrations in **Table 4-22** also include the appropriate 1-hour and 8-hour background concentrations of 1.8 ppm and 1.4 ppm[29], respectively, for comparison to the CO NAAQS. The highest 1-hour predicted concentrations for the existing, opening and design year build conditions were 2.6 ppm, 3.5 ppm and 2.3 ppm, respectively. The maximum 1-hour concentration for all future Build and No-Build conditions was predicted to occur at the Existing Route 58 and 220 Bypass interchange and the Modified Route 220 and Morehead Avenue Interchange, respectively. However, all predicted peak 1-hour CO concentrations are well below the 1-hour CO NAAQS of 35 ppm.

The peak 1-hour values generated by CAL3QHC were scaled by a persistence factor of 0.77 to generate peak 8-hour CO concentrations, and these values were then added to the appropriate background concentration for comparison to the CO NAAQS. The highest 8-hour concentrations for the existing, opening and design year build and No-Build conditions were 1.94 ppm, 2.7 ppm and 1.79 ppm, respectively. Similar to the peak 1-hour concentrations, the maximum 8-hour CO concentration was also predicted to occur at the same two interchanges for the existing, future build and No-Build conditions. However, all predicted peak 8-hour CO concentrations are also below the 8-hour CO NAAQS standard of 9 ppm.

These results demonstrate that the worst-case interchanges for each existing, build and No-Build alternative using very conservative assumptions would not cause or contribute to a violation of the CO NAAQS within the study corridor, and thereby satisfies all NEPA and CAA requirements pertaining to CO.

Table 4-23: CAL3QHC CO Modeling Results for the Worst-Case Interchanges

Intersection / Interchange	Averaging Period	Existing Peak (ppm)	2025[1, 2]		2040[1, 2]		NAAQS (ppm)
			No-Build Alternative	Build Alternative	No-Build Alternative	Build Alternative	
			Peak (ppm)	Peak (ppm)	Peak (ppm)	Peak (ppm)	
Existing Route 58 and 220 Bypass Interchange	1-Hour	2.40 (21)	2.10 (1)	**3.50 (5)**	1.85(1)	**2.30 (5)**	35
	8-Hour	1.86 (21)	1.63 (1)	**2.70 (5)**	1.44 (1)	**1.79 (5)**	9
Existing Route 58 and Route 220 Interchange	1-Hour	2.50 (1)	2.20 (1)	3.40 (1)	1.90 (1)	2.30 (13)	35
	8-Hour	1.94 (1)	1.71 (1)	2.63 (1)	1.48 (1)	1.79 (13)	9
Modified Route 220 and Morehead Avenue Interchange	1-Hour	**2.60 (8)**	**2.3 (13)**	3.30 (4)	**1.90 (1)**	2.30 (4)	35
	8-Hour	**2.02 (8)**	**1.79 (13)**	2.55 (4)	**1.48 (1)**	1.79 (4)	9

Notes:
1. Number in parenthesis represents the modeled receptor number of maximum modeled concentration from CAL3QHC. Please refer to Figures 4-4 through 4-6.
2. Modeled concentrations includes 1-hour Background Value of 1.8 ppm and 8-hour background value of 1.4 ppm

[29] Project Level Air Quality Analysis Resource Document, December 2018, Appendix H2.

4.2 MOBILE SOURCE AIR TOXICS ANALYSIS

4.2.1 Methodology

On October 18, 2016, FHWA issued updated interim guidance[30] regarding MSATs in a NEPA analysis. The guidance recommended including the EPA's recent MOVES2014a emission model along with updated research on air toxic emissions from mobile sources, including the addition of two compounds identified as significant contributors from mobile sources: Acetaldehyde and Ethylbenzene. The guidance includes three categories and criteria for analyzing MSATs in NEPA documents:

1. No meaningful MSAT effects;
2. Low potential MSAT effects; and
3. High potential MSAT effects.

A qualitative analysis is required for projects which meet the low potential MSAT effects criteria, while a quantitative analysis is required for projects meeting the high potential MSAT effects criteria.

Projects with low potential MSAT effects are described as:

- Those that serve to improve operations of highway, transit, and freight without adding substantial new capacity or without creating a facility that is likely to significantly increase emissions. This category covers a broad range of project types, including minor widening projects and new interchanges, such as those that replace a signalized intersection on a surface street or where Design-Year traffic is not projected to meet the 140,000 to 150,000 Annual Average Daily Traffic (AADT) criteria.

Projects with high potential MSAT effects must:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel particulate matter in a single location;
- Create new or add significant capacity to urban highways such as interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000 or greater by the Design-Year; and
- Proposed to be located in proximity to populated areas.

In accordance with the MSAT guidance, the study area is best characterized as a project with "low potential MSAT effects" since projected Design-Year traffic is expected to be well below the 140,000 to 150,000 AADT criteria. Specifically, the Design year Build Alternatives A, Alternative B, and Alternative C are expected to have the highest ADT volumes of 22,000 ADT on US 220 between Kilarney Court and Route 58 Interchange segment. It should be noted that the Design Year No-Build Alternative ADT of 31,900 along the same roadway segment is higher than some of the Build Alternatives and is primarily due to traffic be redistributed from the existing roadway alignment to the new roadway alignments. Tables summarizing the ADT throughout the project corridor for the Alternatives is presented in **Section 4.2.5** below.

The results demonstrate that the forecast ADT volumes would be much less than the 140,000 to 150,000 AADT MSAT criteria. As a result, a qualitative assessment of MSAT emissions projections was conducted for the affected network consistent with FHWA guidance.

[30] See: https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/policy_and_guidance/msat/index.cfm

4.2.2 MSAT Background

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendment of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants (HAPs). The EPA assessed this expansive list in its rule on the Control of HAPs from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of the EPA's Integrated Risk Information System (IRIS) 2011 National Air Toxics Assessment.[31] In addition, the EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers, or contributors, and that are non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA, 2011). These compounds are: 1,3-butadiene; acetaldehyde; acrolein; benzene; diesel particulate matter (diesel PM); ethylbenzene; formaldehyde; naphthalene; and polycyclic organic matter. While FHWA considers these the priority MSATs, the list is subject to change and may be adjusted in consideration of future EPA rules.

4.2.3 Motor Vehicles Emissions Simulator (MOVES)

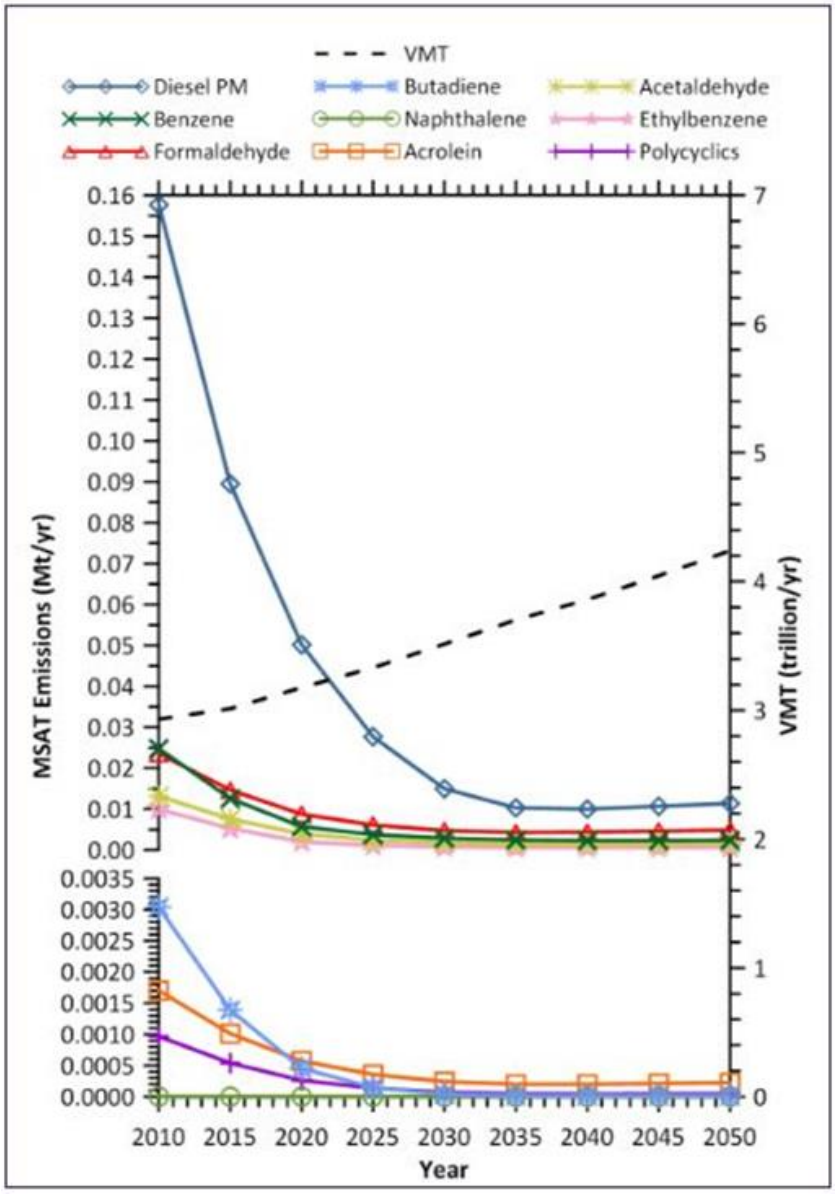
According to the EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy-duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and VMT data. MOVES2014 incorporates the effects of three new federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty GHG regulations that phase-in during model years 2014-2018 (79 FR 60344), and the second phase of light-duty GHG regulations that phase-in during model years 2017-2025 (79 FR 60344). Since the release of MOVES2014, the EPA released MOVES2014a in November 2015. In the MOVES2014a *Questions and Answers Guide*,[32] the EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain the same as MOVES2014.

Using the EPA's MOVES2014a model, as shown in **Figure 4-7**, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecasted, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

[31] See: https://www.epa.gov/national-air-toxics-assessment/2011-nata-assessment-results

[32] See: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100NNR0.txt

Figure 4-7: National MSAT Emission Trends 2010 – 2050 for Vehicles Operating on Roadways



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Source: EPA MOVES2014a model runs conducted by FHWA, September 2016.

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on the calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b and also reflects the latest federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

4.2.4 MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to be raised on highway projects during the NEPA process. Even as the science emerges, we are duly expected by the public and other agencies to address MSAT impacts in our environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

4.2.5 Project-Qualitative MSAT Analysis

For each alternative, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. As shown in **Tables 4-24** through **Tables 4-26**, the VMT estimated for the Build Alternatives is expected to be higher than the No-Build Alternative. In addition, because estimated VMT under each of the Build Alternatives are nearly the same, which is slightly lower; it is expected there would be no appreciable difference in the overall MSAT emissions among the various Build Alternatives. Also, regardless of the Alternative chosen, emissions would likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent from 2010 to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Under each alternative there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur. The localized increases in MSAT emissions would likely be most pronounced along the new roadway sections that would be built along the proposed US 220 alignment under the Build Alternatives. However, even if these increases do occur, they too would be substantially reduced in the future due to implementation of EPA's vehicle and fuel regulations.

In sum, under all Build Alternatives in the design year, it is expected there would be reduced MSAT emissions in the immediate area of the project (i.e. Existing Alignment), relative to the No-Build, due to the reduced VMT associated with more direct routing and rerouting of traffic from the existing segments, and due to the EPA's MSAT reduction programs.

Table 4-24: Alternative A and No-Build ADTs

	Alternative A Proposed Alignment	Length (mi)	Speed Limit (mph)	Opening Year 2025		Design Year 2040	
	Segment			ADT	VMT	ADT	VMT
1	Route 58 between Fisher Farm Road and Cameron Road	1.4	65	17,300	24,220	20,000	28,000
3	US 220 between US 58 Interchange and Soapstone Road Interchange	1.79	55	11,400	20,406	12,200	21,838
4	US 220 between Soapstone Road Interchange Road and Reservoir Road Interchange	4.37	55	10,700	46,759	11,400	49,818
5	US 220 between Resevoir Road Interchange and Virginia State Line	0.90	55	12,000	10,800	14,000	12,600
	Alternative A Existing Alignment	**Length (mi)**	**Speed Limit (mph)**	**Opening Year 2025**		**Design Year 2040**	
	Segment			**ADT**	**VMT**	**ADT**	**VMT**
1	US 220 between Kilarney Court and Route 58 Interchange	0.21	45	17,500	3,675	22,000	4,620
2	US 220 between Kilarney Court and Marrowbone Circle	0.28	45	17,000	4,760	21,600	6,048
3	US 220 between Marrowbone Circle and Shamrock Drive	0.10	45	14,700	1,470	19,100	1,910
4	US 220 between Shamrock Drive and Covington Lane	0.21	45	12,800	2,688	17,200	3,612
5	US 220 between Covington Lane and Steven Drive/ Drewry Mason School Road	0.31	45	13,800	4,278	18,300	5,673
6	US 220 between Steven Drive/ Drewry Mason School Road and Water Plant Road/ M	0.36	45	11,100	3,996	15,400	5,544
7	US 220 between Water Plant Road/ Mica Road and Soaptone Road/ Main Street	0.92	55	10,400	9,568	14,300	13,156
8	US 220 between Soaptone Road/ Main Street and Morehead Avenue	0.60	55	8,900	5,340	12,000	7,200
9	US 220 between Morehead Avenue and Lee Ford Camp Road/ Church Street	0.69	55	5,300	3,657	7,400	5,106
10	US 220 bewtween Stone View Road/ Old Sand Road and Route 58 Interchange	0.33	45	17,500	5,775	18,800	6,204
11	Route 58 between US 220 and Old Sand Road	0.12	65	13,900	1,668	16,400	1,968
12	Morehead Road between US 220 and Church Street/ Main Street	0.25	35	6,100	1,525	7,100	1,775
13	US 220 between Lee Ford Camp Road/ Church Street and White House Road	1.02	55	6,500	6,630	8,300	8,466
14	Route 58 between US 220 and Fisher Farm Road	0.74	65	12,200	9,028	13,900	10,286
			Totals		**166,243**		**193,824**

	No Build	Length (mi)	Speed Limit (mph)	Opening Year 2025		Design Year 2040	
	Segment			ADT	VMT	ADT	VMT
1	US 220 between Kilarney Court and Route 58 Interchange	0.21	45	27,400	5,754	31,900	6,699
2	US 220 between Kilarney Court and Marrowbone Circle	0.28	45	27,100	7,588	31,700	8,876
3	US 220 between Marrowbone Circle and Shamrock Drive	0.10	45	24,800	2,480	29,200	2,920
4	US 220 between Shamrock Drive and Covington Lane	0.21	45	23,000	4,830	27,300	5,733
5	US 220 between Covington Lane and Steven Drive/ Drewry Mason School Road	0.31	45	24,100	7,471	28,500	8,835
6	US 220 between Steven Drive/ Drewry Mason School Road and Water Plant Road/ M	0.36	45	21,400	7,704	25,600	9,216
7	US 220 between Water Plant Road/ Mica Road and Soaptone Road/ Main Street	0.92	55	19,700	18,124	23,400	21,528
8	US 220 between Soaptone Road/ Main Street and Morehead Avenue	0.60	55	17,500	10,500	21,400	12,840
9	US 220 between Morehead Avenue and Lee Ford Camp Road/ Church Street	0.69	55	11,300	7,797	14,700	10,143
10	US 220 bewtween Stone View Road/ Old Sand Road and Route 58 Interchange	0.33	45	18,000	5,940	19,300	6,369
11	Route 58 between US 220 and Old Sand Road	0.12	65	13,900	1,668	16,300	1,956
12	Morehead Road between US 220 and Church Street/ Main Street	0.25	35	6,700	1,675	6,300	1,575
13	US 220 between Lee Ford Camp Road/ Church Street and White House Road	1.02	55	13,300	13,566	17,200	17,544
14	US 220 between Resevoir Road Interchange and Virginia State Line	0.90	55	13,300	14,000	17,200	15,480
15	Route 58 between US 220 and Fisher Farm Road	0.74	65	18,000	13,320	20,000	14,800
16	Route 58 between Fisher Farm Road and Cameron Road	1.4	65	17,000	23,800	19,200	26,880
			Totals		**146,217**		**171,394**

Table 4-25: Alternative B and No-Build ADTs

	Alternative B Proposed Alignment	Length (mi)	Speed Limit (mph)	Opening Year 2025		Design Year 2040	
	Segment			ADT	VMT	ADT	VMT
1	Route 58 between Fisher Farm Road and Cameron Road	1.40	65	17,300	24,220	20,000	28,000
2	US 220 between US 58 Interchange and Soapstone Road Interchange	2.04	55	11,900	24,276	12,800	26,112
3	US 220 between Soapstone Road Interchange Road and Reservoir Road Interchang	3.82	55	10,700	40,874	11,300	43,166
4	US 220 between Resevoir Road Interchange and Virginia State Line	0.90	55	12,000	10,800	14,200	12,780
	Alternative B Existing Alignment	**Length (mi)**	**Speed Limit (mph)**	**Opening Year 2025**		**Design Year 2040**	
	Segment			**ADT**	**VMT**	**ADT**	**VMT**
1	US 220 between Kilarney Court and Route 58 Interchange	0.21	45	17,600	3,696	22,000	4,620
2	US 220 between Kilarney Court and Marrowbone Circle	0.28	45	17,100	4,788	21,600	6,048
3	US 220 between Marrowbone Circle and Shamrock Drive	0.10	45	14,800	1,480	19,100	1,910
4	US 220 between Shamrock Drive and Covington Lane	0.21	45	12,900	2,709	17,200	3,612
5	US 220 between Covington Lane and Steven Drive/ Drewry Mason School Road	0.31	45	13,600	4,216	18,200	5,642
6	US 220 between Steven Drive/ Drewry Mason School Road and Water Plant Road/	0.36	45	11,000	3,960	15,300	5,508
7	US 220 between Water Plant Road/ Mica Road and Soaptone Road/ Main Street	0.92	55	10,200	9,384	14,500	13,340
8	US 220 between Soaptone Road/ Main Street and Morehead Avenue	0.60	55	9,700	5,820	14,000	8,400
9	US 220 between Morehead Avenue and Lee Ford Camp Road/ Church Street	0.69	55	4,800	3,312	7,500	5,175
10	US 220 bewtween Stone View Road/ Old Sand Road and Route 58 Interchange	0.33	45	17,400	5,742	18,600	6,138
11	Route 58 between US 220 and Old Sand Road	0.12	65	13,900	1,668	16,400	1,968
12	Morehead Road between US 220 and Church Street/ Main Street	0.25	35	5,900	1,475	8,000	2,000
13	US 220 between Lee Ford Camp Road/ Church Street and White House Road	1.02	55	6,000	6,120	7,900	8,058
14	Route 58 between US 220 and Fisher Farm Road	0.74	65	12,500	9,250	14,500	10,730
			Totals		**163,790**		**193,207**
	No Build	**Length (mi)**	**Speed Limit (mph)**	**Opening Year 2025**		**Design Year 2040**	
	Segment			**ADT**	**VMT**	**ADT**	**VMT**
1	US 220 between Kilarney Court and Route 58 Interchange	0.21	45	27,400	5,754	31,900	6,699
2	US 220 between Kilarney Court and Marrowbone Circle	0.28	45	27,100	7,588	31,700	8,876
3	US 220 between Marrowbone Circle and Shamrock Drive	0.10	45	24,800	2,480	29,200	2,920
4	US 220 between Shamrock Drive and Covington Lane	0.21	45	23,000	4,830	27,300	5,733
5	US 220 between Covington Lane and Steven Drive/ Drewry Mason School Road	0.31	45	24,100	7,471	28,500	8,835
6	US 220 between Steven Drive/ Drewry Mason School Road and Water Plant Road/	0.36	45	21,400	7,704	25,600	9,216
7	US 220 between Water Plant Road/ Mica Road and Soaptone Road/ Main Street	0.92	55	19,700	18,124	23,400	21,528
8	US 220 between Soaptone Road/ Main Street and Morehead Avenue	0.60	55	17,500	10,500	21,400	12,840
9	US 220 between Morehead Avenue and Lee Ford Camp Road/ Church Street	0.69	55	11,300	7,797	14,700	10,143
10	US 220 bewtween Stone View Road/ Old Sand Road and Route 58 Interchange	0.33	45	18,000	5,940	19,300	6,369
11	Route 58 between US 220 and Old Sand Road	0.12	65	13,900	1,668	16,300	1,956
12	Morehead Road between US 220 and Church Street/ Main Street	0.25	35	6,700	1,675	6,300	1,575
13	US 220 between Lee Ford Camp Road/ Church Street and White House Road	1.02	55	13,300	13,566	17,200	17,544
14	US 220 between Resevoir Road Interchange and Virginia State Line	0.90	55	13,300	14,000	17,200	15,480
15	Route 58 between US 220 and Fisher Farm Road	0.74	65	18,000	13,320	20,000	14,800
16	Route 58 between Fisher Farm Road and Cameron Road	1.4	65	17,000	23,800	19,200	26,880
			Totals		**146,217**		**171,394**

Table 4-26: Alternative C and No-Build ADTs

	Alternative C Proposed Alignment	Length (mi)	Speed Limit (mph)	Opening Year 2025		Design Year 2040	
	Segment			ADT	VMT	ADT	VMT
1	Route 58 between Fisher Farm Road and Cameron Road	1.40	65	17,300	24,220	20,000	28,000
2	US 220 between US 58 Interchange and Soapstone Road Interchange	2.89	55	11,900	34,391	12,800	36,992
3	US 220 between Soapstone Road Interchange Road and Reservoir Road Interchang	2.57	55	10,700	27,499	11,300	29,041
4	US 220 between Resevoir Road Interchange and Virginia State Line	0.90	55	12,000	10,800	14,200	12,780
	Alternative C Existing Alignment	**Length (mi)**	**Speed Limit (mph)**	**Opening Year 2025**		**Design Year 2040**	
	Segment			**ADT**	**VMT**	**ADT**	**VMT**
1	US 220 between Kilarney Court and Route 58 Interchange	0.21	45	17,600	3,696	22,000	4,620
2	US 220 between Kilarney Court and Marrowbone Circle	0.28	45	17,100	4,788	21,600	6,048
3	US 220 between Marrowbone Circle and Shamrock Drive	0.10	45	14,800	1,480	19,100	1,910
4	US 220 between Shamrock Drive and Covington Lane	0.21	45	12,900	2,709	17,200	3,612
5	US 220 between Covington Lane and Steven Drive/ Drewry Mason School Road	0.31	45	13,600	4,216	18,200	5,642
6	US 220 between Steven Drive/ Drewry Mason School Road and Water Plant Road/	0.36	45	11,000	3,960	15,300	5,508
7	US 220 between Water Plant Road/ Mica Road and Soaptone Road/ Main Street	0.92	55	10,200	9,384	14,500	13,340
8	US 220 between Soaptone Road/ Main Street and Morehead Avenue	0.60	55	9,700	5,820	14,000	8,400
9	US 220 between Morehead Avenue and Lee Ford Camp Road/ Church Street	0.69	55	4,800	3,312	7,500	5,175
10	US 220 bewtween Stone View Road/ Old Sand Road and Route 58 Interchange	0.33	45	17,400	5,742	18,600	6,138
11	Route 58 between US 220 and Old Sand Road	0.12	65	13,900	1,668	16,400	1,968
12	Morehead Road between US 220 and Church Street/ Main Street	0.25	35	5,900	1,475	8,000	2,000
13	US 220 between Lee Ford Camp Road/ Church Street and White House Road	1.02	55	6,000	6,120	7,900	8,058
14	Route 58 between US 220 and Fisher Farm Road	0.74	65	12,500	9,250	14,500	10,730
			Totals		**160,530**		**189,962**
	No Build	**Length (mi)**	**Speed Limit (mph)**	**Opening Year 2025**		**Design Year 2040**	
	Segment			**ADT**	**VMT**	**ADT**	**VMT**
1	US 220 between Kilarney Court and Route 58 Interchange	0.21	45	27,400	5,754	31,900	6,699
2	US 220 between Kilarney Court and Marrowbone Circle	0.28	45	27,100	7,588	31,700	8,876
3	US 220 between Marrowbone Circle and Shamrock Drive	0.10	45	24,800	2,480	29,200	2,920
4	US 220 between Shamrock Drive and Covington Lane	0.21	45	23,000	4,830	27,300	5,733
5	US 220 between Covington Lane and Steven Drive/ Drewry Mason School Road	0.31	45	24,100	7,471	28,500	8,835
6	US 220 between Steven Drive/ Drewry Mason School Road and Water Plant Road/	0.36	45	21,400	7,704	25,600	9,216
7	US 220 between Water Plant Road/ Mica Road and Soaptone Road/ Main Street	0.92	55	19,700	18,124	23,400	21,528
8	US 220 between Soaptone Road/ Main Street and Morehead Avenue	0.60	55	17,500	10,500	21,400	12,840
9	US 220 between Morehead Avenue and Lee Ford Camp Road/ Church Street	0.69	55	11,300	7,797	14,700	10,143
10	US 220 bewtween Stone View Road/ Old Sand Road and Route 58 Interchange	0.33	45	18,000	5,940	19,300	6,369
11	Route 58 between US 220 and Old Sand Road	0.12	65	13,900	1,668	16,300	1,956
12	Morehead Road between US 220 and Church Street/ Main Street	0.25	35	6,700	1,675	6,300	1,575
13	US 220 between Lee Ford Camp Road/ Church Street and White House Road	1.02	55	13,300	13,566	17,200	17,544
14	US 220 between Resevoir Road Interchange and Virginia State Line	0.90	55	13,300	14,000	17,200	15,480
15	Route 58 between US 220 and Fisher Farm Road	0.74	65	18,000	13,320	20,000	14,800
16	Route 58 between Fisher Farm Road and Cameron Road	1.4	65	17,000	23,800	19,200	26,880
			Totals		**146,217**		**171,394**

4.2.6 Incomplete or Unavailable Information for Project-Specific MSAT Health Impacts Analysis

As per FHWA guidance, there is not enough complete or available information to credibly predict project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The EPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. EPA is the lead authority for administering the CAA and its amendments, and has specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. The EPA maintains the IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/iris/). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's updated interim guidance on MSAT analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings, cancer in animals, and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (HEI, http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (HEI, http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts, with each step in the process building on the model predictions obtained in the previous step. All methodologies are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime assessments (i.e., 70 years), particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways to: (1) determine the portion of time that people are actually exposed at a specific location; and (2) establish the extent attributable to a proposed action especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI.[33] As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare

[33] See: http://pubs.healtheffects.org/view.php?id=282

for MSAT compounds, and in particular, for diesel PM. The EPA and the HEI have not established a basis for quantitative risk assessment of diesel PM in ambient settings.[34,35]

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the CAA to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires the EPA to determine an "acceptable" level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, where the goal is to maximize the number of people with risks of less than one in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than one in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the US Court of Appeals for the District of Columbia Circuit upheld the EPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits. These assessments, such as reducing traffic congestion, accident rates, and fatalities, in addition to improved access for emergency response, may be better suited using a quantitative analysis.

4.2.7 MSAT Conclusions

What is known about MSATs is still evolving. Information is currently incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with each of the project Alternatives. Under the Build Alternative, there may be the same or slightly higher MSAT emissions in the Design-Year relative to the No-Build Alternative due to increased VMT. There could also be increases in MSAT levels in a few localized areas where VMT increases. However, the EPA's vehicle and fuel regulations are expected to result in significantly lower MSAT levels in the future than exist today due to cleaner engine standards coupled with fleet turnover. The magnitude of the EPA-projected reductions is so great that, even after accounting for VMT growth, MSAT emissions in the study area would be significantly lower in the future than they are today, regardless of the preferred alternative chosen.

4.3 CLIMATE CHANGE AND GREENHOUSE GASES

As noted in **Section 2.10**, GHG emissions are generated during roadway construction and maintenance activities. **Table 4-27** shows a summary of the daily VMT expected for each Alternative.

[34] See: http://www.epa.gov/risk/basicinformation.htm#g

[35] See: http://pubs.healtheffects.org/getfile.php?u=395

Table 4-27: Build Alternatives and No-Build Daily VMT

	Existing	2025					
		No-Build	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Daily VMT	129,496	146,217	166,243	163,790	160,530	150,199	140,397
VMT - No-Build (%)	N/A	N/A	13.7%	12.0%	9.8%	2.7%	-4.0%
VMT - Existing (%)	N/A	12.9%	28.4%	26.5%	24.0%	16.0%	8.4%

	Existing	2040					
		No-Build	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Daily VMT	129,496	171,394	193,824	193,207	189,962	185,079	169,920
VMT - No-Build (%)	N/A	N/A	13.1%	12.7%	10.8%	8.0%	-0.9%
VMT - Existing (%)	N/A	32.4%	49.7%	49.2%	46.7%	42.9%	31.2%

Under the No-Build Alternative, daily VMT would gradually increase between 2018 and 2040 as employment and population in the area increase. Similarly, under the Build Alternatives, daily VMT is expected to increase relative to the No-Build Alternative for all Build Alternatives where additional alignments would be constructed. More specific, under the No-Build Alternative, daily VMT increases approximately 32 percent between 2018 and 2040 while under the Build Alternatives, daily VMT would increase on average by approximately 44% compared to 2018 levels (the increases range from 31% to 50% depending on Alternative). Nationally, the Energy Information Administration (EIA) estimates that light-duty vehicles VMT would increase by approximately 38 percent between 2012 and 2040[36], so the VMT increase under the majority of Build Alternatives is still slightly above the projected national rate.

A major factor in mitigating this increase in VMT is EPA's GHG emissions standards, implemented in concert with national fuel economy standards. EIA projects that vehicle energy efficiency (and thus, GHG emissions) on a per-mile basis would improve by 30 percent between 2012 and 2040[37]. For example, the fuel economy of new light-duty vehicles (LDVs), measured in terms of their compliance values in CAFE testing, rises from 32.7 mpg in 2012 to 48.2 mpg in 2040, as new fuel-saving technologies are adopted. Similarly, in 2040, passenger car fuel economy averages 55.6 mpg, and light-duty truck fuel economy averages 40.9 mpg[38]. This improvement in vehicle emissions rates would help offset the increase in VMT. Similar to MSATS, under each alternative there may be localized areas where VMT would increase, and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in GHG emissions may occur. The localized increases in GHG emissions would likely be most pronounced along the new roadway sections that would be built along the proposed US 220 alignment under the Build Alternatives. However, even if these increases do occur, they too would be mitigated in the future due to implementation of EPA's vehicle and fuel regulations along with other mitigating factors.

Other factors related to the project would also help reduce GHG emissions relative to the No-Build Alternative. The project would improve vehicle speeds by reducing the number of curves and increasing the typical curve radius and design speed. As shown in **Table 4-28**, the average travel speed across the entire study area would increase from 51.3 miles per hour under the No-Build Alternative to 51.5 to 54.1 miles per hour under the Build Alternatives. GHG emission rates decrease with speed over the range of average speeds encountered in this corridor, although they do increase at very high speeds. For example, 2040 MOVES2014b GHG emission rates at

[36] https://www.hsdl.org/?view&did=767364. Calculated from Annual Energy Outlook 2015, Table A7. The increase in VMT is calculated from 2012 because AEO2015 does not include data for 2010

[37] https://www.eia.gov/outlooks/aeo/pdf/0383(2014).pdf

[38] https://www.eia.gov/outlooks/aeo/pdf/0383(2014).pdf (page MT-14)

45 mph are estimated at 1,218 grams per mile, while emission rates at 55 mph for 2040 are lower at 1,133 grams per mile. Reduction of the roadway grade also reduces energy consumption and GHG emissions; the maximum design grade for the new Route 220 roadway alternatives is 4 percent. The existing Route 220 roadway has a maximum grade of 7 percent, which is used on the southbound roadway in Segment A. The existing approaches to the Marrowbone Creek bridge in Segment C are constructed with 6 percent grades. In addition, all other roadways and interchange ramps that are within the limits of work would have maximum design grades of 5 percent. Soapstone Road currently has grades of 9.5 percent near the locations of a potential interchange with Alternatives B and C, and this segment of roadway would be rebuilt at a maximum grade of 5 percent. EPA estimates that each 1 percent decrease in grade reduces energy consumption and GHG emissions by 7 percent, although the effect is not linear[39].

Section 4 of the Traffic and Transportation Technical Report indicates that existing roadways in the project area have crash rates that are considerably higher than the statewide average. The roadway improvements and access controls proposed with the build alternatives, coupled with the reduced volumes on the existing Route 220 roadway, are anticipated to produce emissions benefits by reducing vehicle delay and idling.

Table 4-28: Build Alternatives and No-Build Average Vehicle Speeds

	Existing	No-Build	Alternative A	Alternative B	Alternative C
Average Speed	51.3	51.3	51.7	51.7	51.7
VMT - No-Build (%)	N/A	N/A	0.9%	0.9%	0.9%
VMT - Existing (%)	N/A	0.0%	0.9%	0.9%	0.9%
		2040			
	Existing	No-Build	Alternative A	Alternative B	Alternative C
Average Speed	51.3	51.3	51.7	51.7	51.7
VMT - No-Build (%)	N/A	N/A	0.9%	0.9%	0.9%
VMT - Existing (%)	N/A	0.0%	0.9%	0.9%	0.9%

Construction and subsequent maintenance of the project would generate GHG emissions. Preparation of the roadway corridor (e.g., earth-moving activities) involves a considerable amount of energy consumption and resulting GHG emissions; manufacture of the materials used in construction and fuel used by construction equipment also contribute to GHG emissions. Typically, construction emissions associated with a new roadway account for approximately 5 percent of the total 20-year lifetime emissions from the roadway, although this can vary widely with the extent of construction activity and the number of vehicles that use the roadway. Any increase in GHG emissions from construction activities are short term and temporary.

The addition of new roadway miles to the study area roadway network would also increase the energy and GHG emissions associated with maintaining those new roadway miles in the future. However, the increase in construction and maintenance GHG emissions would be less compared to the operational GHG emissions associated with the new roadway. Depending on Alternative, the total roadway miles in the study area that need to be maintained on an ongoing basis would increase on average 11 percent relative to the No-Build Alternative. The increase in maintenance needs due to the addition of new roadway infrastructure would be partially offset by the reduced need for maintenance on existing routes (because of lower total traffic and truck volumes on those routes).

[39] EPA MOVES2010b model

4.4 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

Effects of the project that would occur at a later date or are fairly distant from the project are referred to as indirect effects. Cumulative impacts are those effects that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts are inclusive of the indirect effects. As summarized below, the potential for indirect effects or cumulative impacts to air quality that may be attributable to this project is not expected to be significant.

First, regarding the potential for indirect effects, the assessments conducted for project-specific CO and MSAT impacts can be considered indirect effects analyses because they look at air quality impacts attributable to the project that occur in the future. These analyses demonstrate that, in the future: 1) air quality impacts from CO would not cause or contribute to violations of the CO NAAQS, and 2) MSAT emissions would be significantly lower than they are today.

Regarding the potential for cumulative impacts, EPA's air quality designations for the region reflect, in part, the accumulated mobile source emissions from past and present actions. Since EPA has designated the region to be in attainment for all of the NAAQS, the potential for cumulative impacts associated with the project is not expected to be significant. In addition, the GHG qualitative assessment conducted for the project address GHG impacts attributed to the project in the future. Such a discussion satisfies NEPA's requirement that agencies analyze the cumulative effects of a proposed action because the potential effects of GHG emissions are inherently a global cumulative effect. Therefore, a separate cumulative effects analysis is not required.[40]

Therefore, the indirect and cumulative effects of the project are not expected to be significant.

4.5 CONSTRUCTION EMISSIONS ANALYSIS

Construction of this project would cause only temporary increases in emissions. A quantitative assessment of construction emissions is not indicated as the project location is not in an area subject to project-level conformity requirements for CO. Additionally, even if conformity did apply, the primary criterion for conducting construction emission analyses for conformity purposes (five years, per 40 CFR 93.123(c)(5)) would not be exceeded for the construction of this project.

[40] https://www.energy.gov/sites/prod/files/2019/06/f64/CEQ-Draft-GHG-Guidance-2019-06-26.pdf (p.30098, 84 CFR 30097, 6/26/2019)

5. MITIGATION

Emissions may be produced in the construction of this project from heavy equipment and vehicle travel to and from the site, as well as from fugitive sources. Construction emissions are short term or temporary in nature. To mitigate these emissions, all construction activities are to be performed in accordance with VDOT *Road and Bridge Specifications*[41].

In addition, as noted previously, the VDEQ provides general comments for projects by county. Their comments in part address mitigation[42]: *"…all reasonable precautions should be taken to limit the emissions of VOC and NOx. In addition, the following VDEQ air pollution regulations must be adhered to during the construction of this project: 9 VAC 5-130, Open Burning restrictions*[43]*; and 9 VAC 5-50, Article 1, Fugitive Dust precautions*[44]*."*

[41] See http://www.virginiadot.org/business/const/spec-default.asp

[42] Spreadsheet entitled: "DEQ SERP Comments rev8b", March 2017

[43] See: http://leg1.state.va.us/000/reg/TOC09005.HTM#C0130

[44] See: http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9VAC5-50-60

6. CONSULTATION

6.1 PUBLIC CONSULTATION

Public consultation is generally conducted and documented within the overall NEPA process, and not separately for any specialty area (including air quality). Please refer to the overall NEPA documentation for a summary of public consultation activities for this project.

6.2 INTER-AGENCY CONSULTATION

All models, methods, assumptions and protocols specified or referenced within the VDOT Resource Document to be applied in project-level analyses for projects in Virginia were subjected to inter-agency consultation with FHWA, DEQ and other agencies as required by the federal transportation conformity rule (Interagency Consultation), where applicable, and for purposes of NEPA/Interagency Consultation prior to it being finalized in 2016. Interagency Consultation was required at that time as it was before project-level conformity requirements in Virginia were eliminated for CO (with the expiry of the CO maintenance plan on March 16, 2016) and PM (with EPA's revocation of the applicable NAAQS effective October 24, 2016). Appendix A of the Resource Document provides a summary of the consultation process and results. Currently, inter-agency consultation is limited to that needed for purposes of NEPA.

All models, methods, assumptions and protocols specified or referenced within the VDOT Resource Document were subjected to inter-agency consultation with FHWA, DEQ and other agencies for purposes of NEPA prior to being finalized in 2016. Appendix A of the Resource Document provides a summary of the consultation process and results.

7. CONCLUSIONS

The proposed improvements were assessed for potential air quality impacts and compliance with applicable air quality regulations and requirements. All models, methods/protocols and assumptions applied in modeling and analyses were made consistent with those provided or specified in the VDOT Resource Document. The assessment indicates that the project would meet all applicable air quality requirements of NEPA and federal and state transportation conformity regulations. As such, the project would not cause or contribute to a new violation, increase the frequency or severity of any violation, or delay timely attainment of the NAAQS established by the EPA.

8. REFERENCES

Council on Environmental Quality (CEQ) 2017. *Withdrawal of Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews*. Retrieved from: https://www.federalregister.gov/documents/2017/04/05/2017-06770/withdrawal-of-final-guidance-for-federal-departments-and-agencies-on-consideration-of-greenhouse-gas

Council on Environmental Quality (CEQ). 2019. *Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions*. FR Vol 84. No. 123. Retrieved from: https://www.energy.gov/sites/prod/files/2019/06/f64/CEQ-Draft-GHG-Guidance-2019-06-26.pdf

Federal Highway Administration (FHWA). 1987. *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*. FHWA Technical Advisory T6640.8A. Retrieved from: https://www.environment.fhwa.dot.gov/projdev/impTA6640.asp#aq

Federal Highway Administration (FHWA). 2016a. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Retrieved from: https://www.fhwa.dot.gov/Environment/air_quality/air_toxics/policy_and_guidance/msat/2016msat.pdf

Federal Highway Administration (FHWA). 2016b. *CAL3Interface – A Graphical User Interface for the CALINE3 and CAL3QHC Highway Air Quality Models*. Michael Claggett, Ph.D., FHWA Resource Center.

Federal Highway Administration and Virginia Department of Transportation (FHWA and VDOT). 2016. *Programmatic Agreement for Project-Level Air Quality Analyses for Carbon Monoxide*. Retrieved from: http://www.virginiadot.org/projects/resources/air/2016_FHWA-VDOT_PA_for_CO_from_NCHRP25-2578_Attachment2_FINAL.pdf

National Weather Service (NWS). 2019. *Blacksburg, VA Forecast Office*. Retrieved from: https://w2.weather.gov/climate/index.php?wfo=rnk

U.S. Energy Information Administration (EIA). 2014. *Annual Energy Outlook 2014 with Projections to 2040*. DOE/EIA 0383. Retrieved from: https://www.eia.gov/outlooks/aeo/pdf/0383(2014).pdf

U.S. Energy Information Administration (EIA). 2015. *Annual Energy Outlook 2015 with Projections to 2040*. DOE/EIA 0383. Retrieved from: https://www.hsdl.org/?view&did=767364

U.S. Environmental Protection Agency (EPA). 1992. *Guideline for Modeling Carbon Monoxide from Roadway Intersections*. EPA-454/R-92-005. Office of Air Quality Planning and Standards. Retrieved from: https://www3.epa.gov/scram001/guidance/guide/coguide.pdf

U.S. Environmental Protection Agency (EPA). 1995. *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*. EPA-454/R-92-006 (Revised).

U.S. Environmental Protection Agency (EPA) 2014. *Motor Vehicle Emissions Simulator (MOVES)" version 2014b.* Retrieved from: https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves

U.S. Environmental Protection Agency (EPA). 2019. *Green Book, Virginia Non-attainment Maintenance Status for Each County by Year for All Criteria Pollutants.* Retrieved from https://www3.epa.gov/airquality/greenbook/anayo_va.html

Virginia Department of Environmental Quality (VDEQ). 2016. *Virginia Ambient Air Monitoring 2016 Data Report.* Retrieved from: https://www.deq.virginia.gov/Portals/0/DEQ/Air/AirMonitoring/Annual_Report_2016.pdf?ver=2017-10-03-144129-973

Virginia Department of Environmental Quality (VDEQ). 2020. *Air Quality Laws Regulations and Guidance*. Retrieved from: https://www.deq.virginia.gov/Programs/Air/Laws,Regulations,Guidance.aspx

Virginia Department of Transportation (VDOT). 2016. *Road and Bridge Specifications*.

Virginia Department of Transportation. (VDOT). 2018. *Project-Level Air Quality Analysis Resource Document*, Version 2.0. Retrieved from: https://www.virginiadot.org/projects/resources/air/VDOT_Project-Level_Air_Quality_Resource_Document.pdf

Virginia Department of Transportation (VDOT). 2019a. Statewide Transportation Improvement Program. FY 18-21. Retrieved from : http://www.virginiadot.org/about/resources/STIP_External.pdf

Virginia Department of Transportation (VDOT). 2019b. Six-Year Improvement Program, Fiscal Year 2020-2025 Final.

Virginia Department of Transportation. (VDOT). 2011. *West Piedmont Planning District Commission 2035 Rural Long Range Transportation Plan*. Retrieved from: http://www.wppdc.org/content/wppdc/uploads/PDF/transportation/west_piedmont_2035_rlrp_final.pdf

Virginia Department of Transportation (VDOT). 2020a. *Martinsville Southern Connector Study Alternatives Analysis Technical Report*.

Virginia Department of Transportation (VDOT). 2020b. *Martinsville Southern Connector Study Natural Resources Technical Report*.

APPENDIX A

TRAFFIC ANALYSIS

Table 3-11: Traffic Volumes on Selected Road Segments – Auto Daily (2025)

No.	Segment	Auto - Daily						
		Direction	2018 Base	2025 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	5,680	6,020	6,195	6,195	6,195	6,060
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	6,690	7,030	7,122	7,123	7,135	7,152
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	7,035	7,519	5,212	5,248	5,046	7,533
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	6,056	6,512	4,512	4,751	4,173	6,698
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	5,120	5,550	5,566	5,566	5,569	5,657
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	5,780	6,210	6,210	6,210	6,210	6,210
4	Route 220 (North Route 58/Route 220 Interchange)	NB	8,230	8,550	8,588	8,589	8,599	8,659
4	Route 220 (North Route 58/Route 220 Interchange)	SB	6,640	6,910	6,910	6,910	6,910	7,059
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	10,777	11,773	7,837	7,947	7,353	6,639
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	10,469	11,393	6,962	6,891	6,688	6,700
6	Route 220 (North of NC border)	NB	4,200	4,650	4,114	4,114	4,000	4,000
6	Route 220 (North of NC border)	SB	4,730	5,210	4,585	4,585	4,595	4,539
7	New Frontage Rd (North of NC border)	NB	-	-	635	635	748	748
7	New Frontage Rd (North of NC border)	SB	-	-	705	705	707	698
8	Soapstone Road	EB	440	460	474	474	460	460
8	Soapstone Road	WB	490	500	500	500	504	504
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	4,873	5,006	4,758	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	4,902	5,240	4,952	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	4,380	4,264	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	4,755	4,833	-	-

Table 3-12: Traffic Volumes on Selected Road Segments – Auto Daily (2040)

No.	Segment	Auto - Daily						
		Direction	2018 Base	2040 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	5,680	6,870	7,272	7,272	7,272	6,920
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	6,690	7,980	8,191	8,192	8,221	8,258
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	7,035	8,221	6,250	6,270	5,440	8,488
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	6,056	7,386	5,029	5,451	4,828	7,866
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	5,120	6,610	6,678	6,678	6,683	6,902
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	5,780	7,310	7,310	7,310	7,310	7,310
4	Route 220 (North Route 58/Route 220 Interchange)	NB	8,230	9,220	9,322	9,324	9,348	9,506
4	Route 220 (North Route 58/Route 220 Interchange)	SB	6,640	7,500	7,500	7,500	7,500	7,883
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	10,777	13,871	9,749	10,001	9,612	8,027
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	10,469	13,233	9,186	9,140	8,526	8,203
6	Route 220 (North of NC border)	NB	4,200	5,870	4,850	5,034	5,031	5,031
6	Route 220 (North of NC border)	SB	4,730	6,460	5,370	5,370	5,224	5,353
7	New Frontage Rd (North of NC border)	NB	-	-	1,318	1,134	1,136	1,136
7	New Frontage Rd (North of NC border)	SB	-	-	1,343	1,343	1,519	1,218
8	Soapstone Road	EB	440	500	527	527	500	500
8	Soapstone Road	WB	490	550	550	550	561	562
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	5,152	5,225	4,901	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	5,094	5,426	5,478	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	4,589	4,455	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	4,915	4,807	-	-

**Note: Alignment Option C volumes will be adjusted as part of the post processing effort*

Table 3-13: Traffic Volumes on Selected Road Segments – Auto AM Peak Period (2025)

No.	Segment	Auto - AM Peak						
		Direction	2018 Base	2025 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	1,330	1,390	1,437	1,437	1,437	1,400
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	1,230	1,260	1,291	1,291	1,293	1,293
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	1,350	1,425	929	1,115	621	1,470
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	1,340	1,370	1,150	1,150	760	1,480
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	850	880	891	891	890	893
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	1,000	1,120	1,120	1,120	1,120	1,120
4	Route 220 (North Route 58/Route 220 Interchange)	NB	1,390	1,420	1,428	1,429	1,427	1,437
4	Route 220 (North Route 58/Route 220 Interchange)	SB	1,210	1,250	1,250	1,250	1,250	1,285
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	2,140	2,205	1,888	1,713	1,606	1,818
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	1,690	1,860	1,261	1,271	1,063	1,580
6	Route 220 (North of NC border)	NB	680	800	820	820	819	819
6	Route 220 (North of NC border)	SB	870	890	902	902	902	895
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	230	240	248	248	240	240
8	Soapstone Road	WB	190	190	194	194	194	192
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	555	731	640	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	846	836	851	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	317	433	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	582	572	-	-

Table 3-14: Traffic Volumes on Selected Road Segments – Auto AM Peak Period (2040)

No.	Segment	Auto - AM Peak						
		Direction	2018 Base	2040 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	1,330	1,640	1,736	1,736	1,736	1,650
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	1,230	1,360	1,404	1,404	1,411	1,409
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	1,350	1,665	1,002	1,207	663	1,710
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	1,340	1,495	1,210	1,210	800	1,589
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	850	940	963	963	958	966
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	1,000	1,400	1,400	1,400	1,400	1,400
4	Route 220 (North Route 58/Route 220 Interchange)	NB	1,390	1,520	1,537	1,538	1,536	1,561
4	Route 220 (North Route 58/Route 220 Interchange)	SB	1,210	1,360	1,360	1,360	1,360	1,433
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	2,140	2,385	2,070	1,876	1,768	2,012
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	1,690	2,345	1,608	1,618	1,383	2,095
6	Route 220 (North of NC border)	NB	680	1,140	1,200	1,200	1,199	1,199
6	Route 220 (North of NC border)	SB	870	980	1,010	1,010	1,010	989
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	230	250	265	265	250	250
8	Soapstone Road	WB	190	200	207	207	207	203
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	601	796	705	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	1,075	1,065	1,094	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	357	487	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	798	788	-	-

**Note: Alignment Option C volumes will be adjusted as part of the post processing effort*

Table 3-15: Traffic Volumes on Selected Road Segments – Auto PM Peak Period (2025)

No.	Segment	Auto - PM Peak						
		Direction	2018 Base	2025 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	1,580	1,640	1,709	1,709	1,709	1,660
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	1,660	1,770	1,800	1,805	1,804	1,806
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	1,567	1,638	1,374	1,621	756	1,664
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	1,580	1,689	1,127	1,352	946	1,727
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	1,130	1,220	1,236	1,236	1,237	1,241
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	1,470	1,510	1,510	1,510	1,510	1,510
4	Route 220 (North Route 58/Route 220 Interchange)	NB	1,570	1,670	1,680	1,683	1,684	1,694
4	Route 220 (North Route 58/Route 220 Interchange)	SB	1,650	1,700	1,700	1,700	1,700	1,747
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	2,531	2,689	2,157	1,885	2,038	2,403
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	2,631	2,731	2,478	2,223	2,081	2,571
6	Route 220 (North of NC border)	NB	920	970	998	998	998	998
6	Route 220 (North of NC border)	SB	790	920	931	931	931	931
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	300	320	331	331	320	320
8	Soapstone Road	WB	290	310	313	316	318	315
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	968	1,210	803	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	543	776	980	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	687	879	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	430	666	-	-

Table 3-16: Traffic Volumes on Selected Road Segments – Auto PM Peak Period (2040)

No.	Segment	Auto - PM Peak						
		Direction	2018 Base	2040 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	1,580	1,810	1,927	1,927	1,927	1,830
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	1,660	2,040	2,101	2,110	2,110	2,115
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	1,567	1,835	1,787	1,900	869	1,864
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	1,580	1,952	1,340	1,599	1,063	2,033
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	1,130	1,630	1,673	1,673	1,674	1,684
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	1,470	1,700	1,700	1,700	1,700	1,700
4	Route 220 (North Route 58/Route 220 Interchange)	NB	1,570	1,820	1,840	1,844	1,847	1,864
4	Route 220 (North Route 58/Route 220 Interchange)	SB	1,650	1,850	1,850	1,850	1,850	1,948
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	2,531	3,005	2,383	2,234	2,476	3,017
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	2,631	2,913	2,460	2,422	2,245	2,943
6	Route 220 (North of NC border)	NB	920	1,110	1,170	1,170	1,170	1,170
6	Route 220 (North of NC border)	SB	790	1,310	1,351	1,351	1,351	1,351
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	300	350	370	370	350	350
8	Soapstone Road	WB	290	330	335	339	344	340
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	1,477	1,596	1,074	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	778	1,058	1,200	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	1,154	1,193	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	652	941	-	-

**Note: Alignment Option C volumes will be adjusted as part of the post processing effort*

Table 3-17: Traffic Volumes on Selected Road Segments – Truck Daily (2025)

No.	Segment	Truck - Daily						
		Direction	2018 Base	2025 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	1,840	1,940	1,991	1,991	1,991	1,940
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	1,920	1,990	2,009	2,009	2,010	2,011
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	1,960	2,080	1,345	1,345	808	2,095
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	1,810	1,890	1,120	1,120	900	1,914
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	820	880	894	894	894	896
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	1,170	1,250	1,250	1,250	1,250	1,250
4	Route 220 (North Route 58/Route 220 Interchange)	NB	750	790	801	802	800	805
4	Route 220 (North Route 58/Route 220 Interchange)	SB	520	530	530	530	530	548
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	1,890	2,000	1,214	1,215	1,055	1,660
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	2,135	2,265	1,503	1,503	1,028	2,080
6	Route 220 (North of NC border)	NB	1,480	1,550	1,588	1,588	1,588	1,588
6	Route 220 (North of NC border)	SB	1,550	1,650	1,675	1,676	1,678	1,666
7	New Frontage Rd (North of NC border)	NB	-	-	-	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	-	0	0	0
8	Soapstone Road	EB	10	10	11	11	10	10
8	Soapstone Road	WB	10	10	11	11	11	10
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	-	848	1,007	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	-	828	1,292	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	-	786	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	-	817	-	-

Table 3-18: Traffic Volumes on Selected Road Segments – Truck Daily (2040)

No.	Segment	Truck - Daily						
		Direction	2018 Base	2040 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	1,840	2,140	2,253	2,253	2,253	2,140
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	1,920	2,190	2,244	2,244	2,244	2,242
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	1,960	2,270	1,459	1,624	867	2,290
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	1,810	2,070	1,190	1,190	960	2,127
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	820	1,010	1,042	1,042	1,042	1,041
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	1,170	1,400	1,400	1,400	1,400	1,400
4	Route 220 (North Route 58/Route 220 Interchange)	NB	750	860	881	882	879	886
4	Route 220 (North Route 58/Route 220 Interchange)	SB	520	600	600	600	600	633
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	1,890	2,270	1,386	1,223	1,217	1,923
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	2,135	2,555	1,686	1,686	1,172	2,293
6	Route 220 (North of NC border)	NB	1,480	1,780	1,873	1,873	1,873	1,873
6	Route 220 (North of NC border)	SB	1,550	1,880	1,945	1,946	1,953	1,921
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	10	20	22	22	20	20
8	Soapstone Road	WB	10	20	22	22	22	20
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	999	1,164	1,156	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	967	977	1,484	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	925	1,090	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	955	955	-	-

**Note: Alignment Option C volumes will be adjusted as part of the post processing effort*

Table 3-19: Traffic Volumes on Selected Road Segments – Truck AM Peak Period (2025)

No.	Segment	Truck - AM Peak						
		Direction	2018 Base	2025 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	310	330	343	343	343	330
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	380	390	395	395	396	400
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	360	380	323	312	217	380
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	350	360	290	290	261	371
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	250	260	268	268	269	269
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	240	240	240	240	240	240
4	Route 220 (North Route 58/Route 220 Interchange)	NB	150	150	152	152	153	155
4	Route 220 (North Route 58/Route 220 Interchange)	SB	120	130	130	130	130	139
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	370	380	315	315	290	326
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	320	340	276	265	172	344
6	Route 220 (North of NC border)	NB	350	380	396	396	396	396
6	Route 220 (North of NC border)	SB	280	310	316	316	317	316
7	New Frontage Rd (North of NC border)	NB	-	-	-	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	-	0	0	0
8	Soapstone Road	EB	40	40	44	44	40	40
8	Soapstone Road	WB	20	20	20	20	20	21
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	-	106	104	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	-	103	176	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	-	73	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	-	83	-	-

Table 3-20: Traffic Volumes on Selected Road Segments – Truck AM Peak Period (2040)

No.	Segment	Truck - AM Peak						
		Direction	2018 Base	2040 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	310	370	392	392	392	370
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	380	410	417	417	418	423
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	360	400	338	327	220	400
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	350	380	300	300	271	394
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	250	270	281	281	282	281
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	240	290	290	290	290	290
4	Route 220 (North Route 58/Route 220 Interchange)	NB	150	180	183	183	184	187
4	Route 220 (North Route 58/Route 220 Interchange)	SB	120	130	130	130	130	141
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	370	410	337	337	312	360
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	320	370	299	288	183	376
6	Route 220 (North of NC border)	NB	350	410	435	435	435	435
6	Route 220 (North of NC border)	SB	280	340	352	352	354	352
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	40	40	44	44	40	40
8	Soapstone Road	WB	20	20	20	20	20	21
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	128	117	115	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	115	115	200	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	84	84	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	95	95	-	-

**Note: Alignment Option C volumes will be adjusted as part of the post processing effort*

Table 3-21: Traffic Volumes on Selected Road Segments – Truck PM Peak Period (2025)

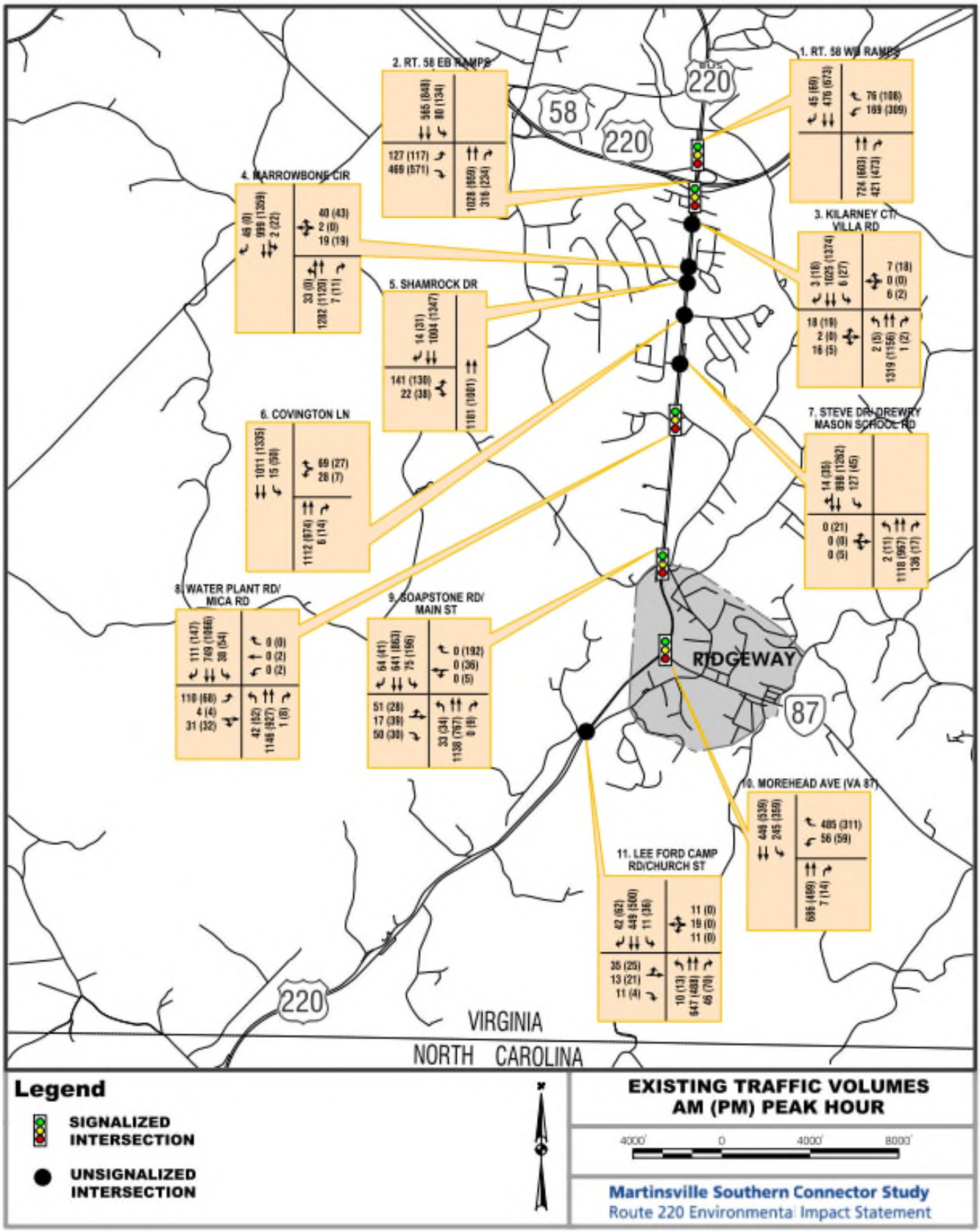
No.	Segment	Truck - PM Peak						
		Direction	2018 Base	2025 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	260	270	280	280	280	270
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	280	280	285	285	283	287
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	270	280	239	188	125	280
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	240	240	160	160	130	247
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	90	90	91	91	91	93
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	140	150	150	150	150	150
4	Route 220 (North Route 58/Route 220 Interchange)	NB	160	160	162	162	162	164
4	Route 220 (North Route 58/Route 220 Interchange)	SB	100	100	100	100	100	108
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	270	270	192	192	162	279
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	290	310	266	215	152	315
6	Route 220 (North of NC border)	NB	240	260	272	272	272	272
6	Route 220 (North of NC border)	SB	240	270	275	275	276	275
7	New Frontage Rd (North of NC border)	NB	-	-	-	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	-	0	0	0
8	Soapstone Road	EB	60	60	62	62	60	60
8	Soapstone Road	WB	10	10	10	10	10	10
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	-	104	112	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	-	102	165	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	-	62	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	-	102	-	-

Table 3-22: Traffic Volumes on Selected Road Segments – Truck PM Peak Period (2040)

No.	Segment	Truck - PM Peak						
		Direction	2018 Base	2040 No-Build	Alignment A	Alignment B/C*	Alignment D	Alignment E
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	EB	260	310	329	329	329	310
1	Route 58 (West of Route 58/Joseph Martin Hwy Interchange)	WB	280	300	308	308	306	309
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	EB	270	320	265	212	138	320
2	Route 58 (East of Route 58/Joseph Martin Hwy Interchange)	WB	240	260	170	170	140	269
3	Route 58 (East of Route 58/Route 220 Interchange)	EB	90	110	113	113	113	114
3	Route 58 (East of Route 58/Route 220 Interchange)	WB	140	180	180	180	180	180
4	Route 220 (North Route 58/Route 220 Interchange)	NB	160	180	182	182	182	185
4	Route 220 (North Route 58/Route 220 Interchange)	SB	100	110	110	110	110	118
5	Route 220 (South of Route 220/Route 58 Interchange)	NB	270	300	213	213	183	313
5	Route 220 (South of Route 220/Route 58 Interchange)	SB	290	360	300	247	173	365
6	Route 220 (North of NC border)	NB	240	270	286	286	286	286
6	Route 220 (North of NC border)	SB	240	300	311	311	313	308
7	New Frontage Rd (North of NC border)	NB	-	-	0	0	0	0
7	New Frontage Rd (North of NC border)	SB	-	-	0	0	0	0
8	Soapstone Road	EB	60	60	64	64	60	60
8	Soapstone Road	WB	10	10	10	10	10	10
9	New Alignment (North of New Interchange with Soapstone Rd)	NB	-	-	169	116	124	-
9	New Alignment (North of New Interchange with Soapstone Rd)	SB	-	-	127	127	201	-
10	New Alignment (South of New Interchange with Soapstone Rd)	NB	-	-	74	74	-	-
10	New Alignment (South of New Interchange with Soapstone Rd)	SB	-	-	127	127	-	-

**Note: Alignment Option C volumes will be adjusted as part of the post processing effort*

Figure 4-1: Existing (2018) Peak Hour Intersection Volumes



4.2.2 Capacity Results

Table 4-4 summarizes the levels of service, delays, and queues by lane group, approach, and overall intersection (for signalized intersections). Detailed Synchro worksheets are included in **Appendix E**.

Table 4-4: Existing (2018) Capacity Analysis Summary

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**B**	**12.7**		**B**	**16.7**	
	WB	**D**	**38.7**	-	**D**	**50.1**	-
	WBL/T	D	42.6	209.0	E	57.5	305.0
	WBR	C	28.6	32.0	C	27.8	40.0
	NB	**A**	**7.2**	**126.0**	**A**	**6.7**	**84.0**
	SB	**A**	**6.2**	-	**A**	**7.3**	-
	SBT	A	6.2	70.0	A	7.4	123.0
	SBR	A	5.2	8.0	A	5.7	14.0
2. Route 58 EB Ramp	**Overall**	**D**	**44..9**		**F**	**176.8**	
	EB	**F**	**129.9**	-	**F**	**580.8**	-
	EBL	E	59.1	175.0	D	50.4	135.0
	EBR	F	155.1	455.0	F	682.0	797.0
	NB	**B**	**19.4**	-	**B**	**19.8**	-
	NBT	C	20.3	420.0	C	20.6	241.0
	NBR	B	16.4	156.0	B	17.1	115.0
	SB	**B**	**14.0**	-	**B**	**16.4**	-
	SBL	E	62.6	112.0	E	62.4	179.0
	SBT	A	6.4	99.0	A	7.0	161.0
3. Kilarney Court/Villa Road	**EB**	**F**	**192.7**	**97.5**	**F**	**173.5**	**30.0**
	WB	**F**	**132.6**	**45.0**	**E**	**39.6**	**15.0**
	NB	**A**	**0.0**	-	**A**	**0.2**	-
	NBL	B	10.9	0.0	B	13.6	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.3**	-
	SBL	B	12.3	2.5	B	11.3	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**1042.6**	**382.5**	**F**	**440.9**	**230.0**
	NB	**A**	**2.7**	-	**A**	**0.0**	-
	NBL/T	B	12.2	7.5	A	0.0	-
	NBT	A	2.4	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.0**	-
	SBL/T	B	12.4	0.0	B	11.2	5.0
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**557.2**	**450.0**	**F**	**162.7**	**852.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**F**	**124.2**	**197.5**	**D**	**34.3**	**30.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.5**	-
	SBL	B	12.2	2.5	B	10.4	7.5
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	-	**F**	**338.9**	**102.5**
	NB	**A**	**0.0**	-	**A**	**0.3**	-
	NBL	B	10.6	0.0	B	13.3	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.8**	-	**A**	**0.5**	-
	SBL	C	15.4	30.0	B	11.4	10.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8. Water Plant Road	**Overall**	**B**	**15.6**	-	**B**	**21.5**	-
	EB	**D**	**43.4**	-	**D**	**50.0**	-
	EBL	D	45.5	132.0	D	52.4	99.0
	EBT/R	D	39.0	0.0	D	46.3	18.0
	WB	**A**	**0.0**	-	**D**	**50.3**	-
	WBL	A	0.0	0.0	D	50.0	4.0
	WBT	A	0.0	0.0	D	50.5	5.0
	WBR	A	0.0	0.0	A	A	0.0
	NB	**B**	**14.5**	-	**B**	**18.3**	-
	NBL	D	51.4	62.0	E	61.5	37.0
	NBT	B	12.9	420.0	B	15.4	166.0
	NBR	A	6.8	0.0	B	10.5	0.0
	SB	**B**	**11.5**	-	**C**	**20.6**	-
	SBL	D	49.2	60.0	E	56.9	48.0
	SBT	A	9.9	239.0	B	19.6	304.0
	SBR	A	7.8	11.0	B	11.3	0.0
9. Soapstone Road/Main Street	**Overall**	**C**	**28.9**		**D**	**45.4**	
	EB	**E**	**62.0**	-	**D**	**80.0**	-
	EBL/T	E	63.3	121.0	F	82.7	140.0
	EBR	E	60.2	0.0	E	75.5	0.0
	WB	**E**	**75.2**	-	**F**	**87.8**	-
	WBL/T	E	60.6	15.0	E	60.2	81.0
	WBR	E	78.8	0.0	F	97.6	77.0
	NB	**C**	**29.2**	-	**D**	**36.2**	-
	NBL	F	112.7	63.0	F	90.6	74.0
	NBT	C	26.3	623.0	C	33.3	348.0
	NBR	A	0.0	0.0	C	25.3	0.0
	SB	**B**	**19.4**	-	**D**	**97.5**	-
	SBL	E	68.8	124.0	F	37.2	310.0
	SBT	B	13.4	279.0	C	21.1	385.0
	SBR	B	11.8	0.0	B	15.4	0.0
10. Morehead Avenue (VA 87)	**Overall**	**E**	**74.8**		**C**	**31.1**	
	WB	**F**	**203.7**	-	**E**	**55.0**	-
	WBL	C	34.4	70.0	D	37.7	68.0
	WBR	F	227.9	206.0	E	59.2	55.0
	NB	**C**	**28.1**	-	**C**	**31.4**	-
	NBT	C	28.2	311.0	C	31.6	201.0
	NBR	C	21.2	3.0	C	23.8	12.0
	SB	**B**	**15.4**	-	**C**	**22.2**	-
	SBL	C	21.9	141.0	D	37.2	238.0
	SBT	B	11.7	120.0	B	11.3	148.0
11. Lee Ford Camp Road/Chruch Street	**EB**	**D**	**27.1**	**1.1**	**D**	**28.2**	**25.0**
	WB	**D**	**26.1**	**0.7**	**A**	**0.0**	-
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.5	0.0	A	8.8	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.5**	-
	SBL	A	9.3	0.0	A	8.7	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

There are some Route 220 intersections, approaches and lane groups that operate at levels of service below capacity which are listed below.

Route 58 Eastbound Ramps: The overall intersection operates below capacity during the PM peak hour, and the eastbound approaches have excessive delays during both peak hours. The eastbound right-turn operates with excessive delays and queues as well.

Kilarney Court/Villa Road: The eastbound and westbound approaches of Kilarney Court and Villa Road operate with excessive delays during both peak hours.

Figure 5-1: 2018, 2025, and 2040 Route 220 AADT

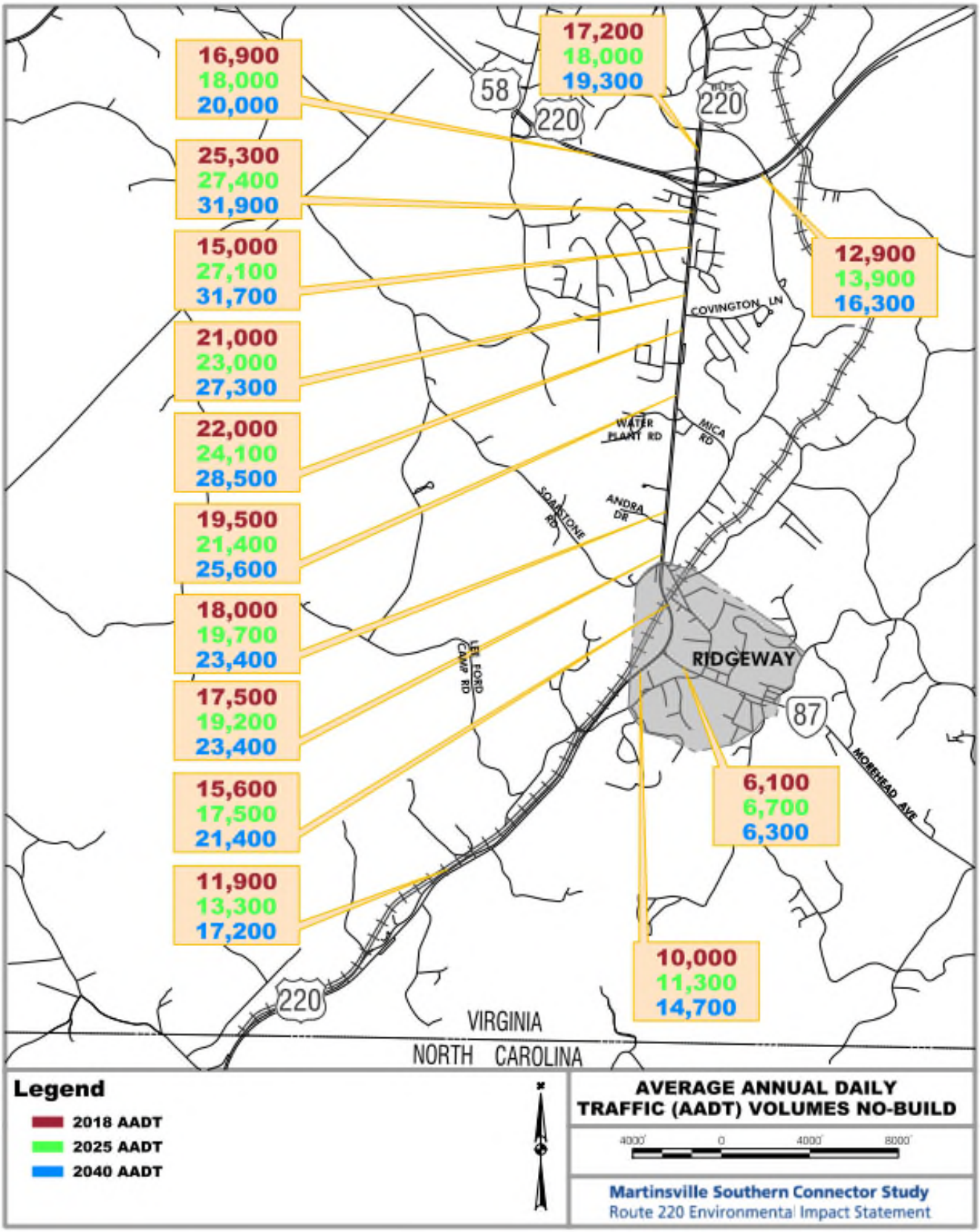


Figure 5-2: 2018, 2025, and 2040 Route 220 Truck AADT and Percentages

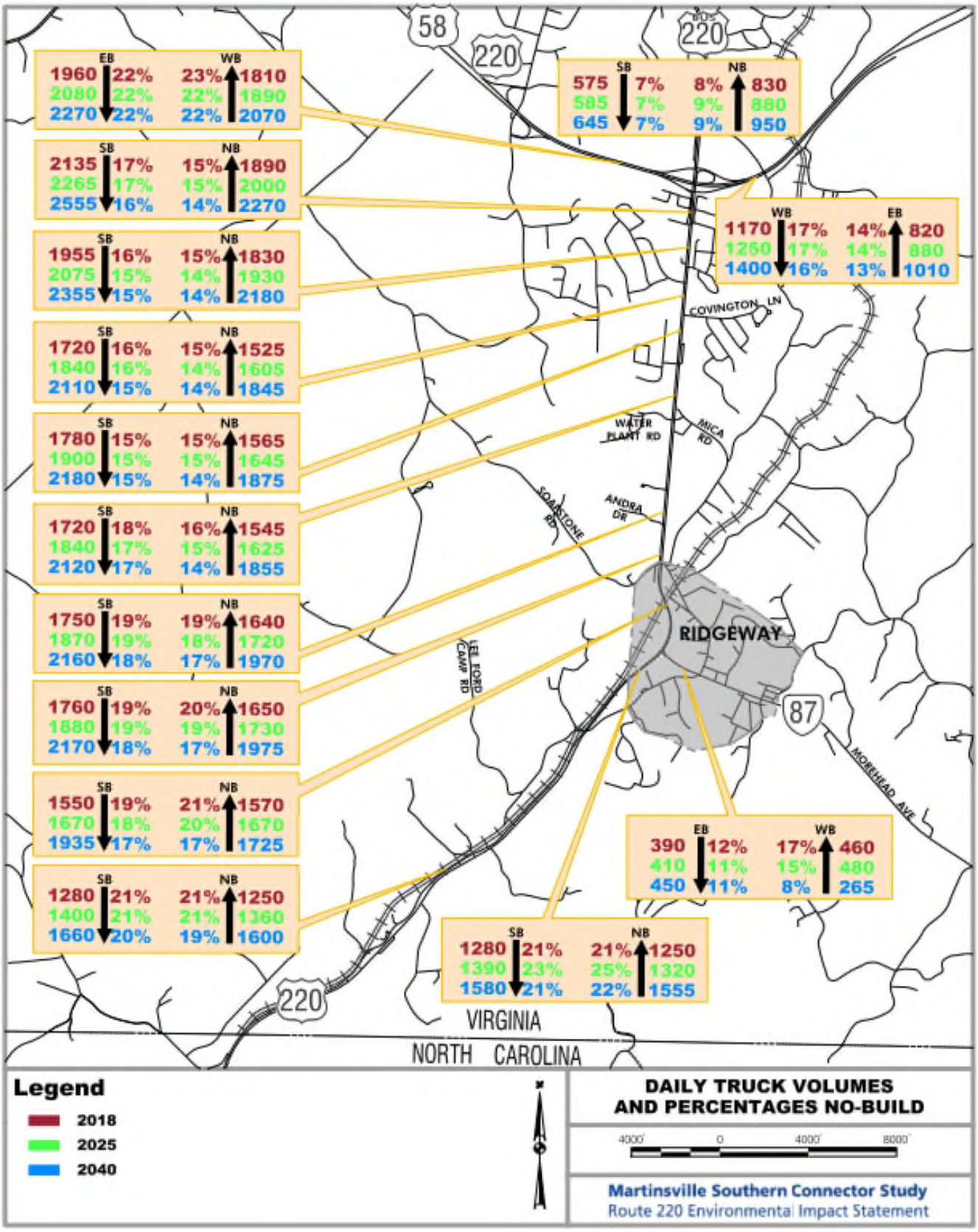


Figure 5-3: 2025 No-Build Peak Hour Intersection Volumes

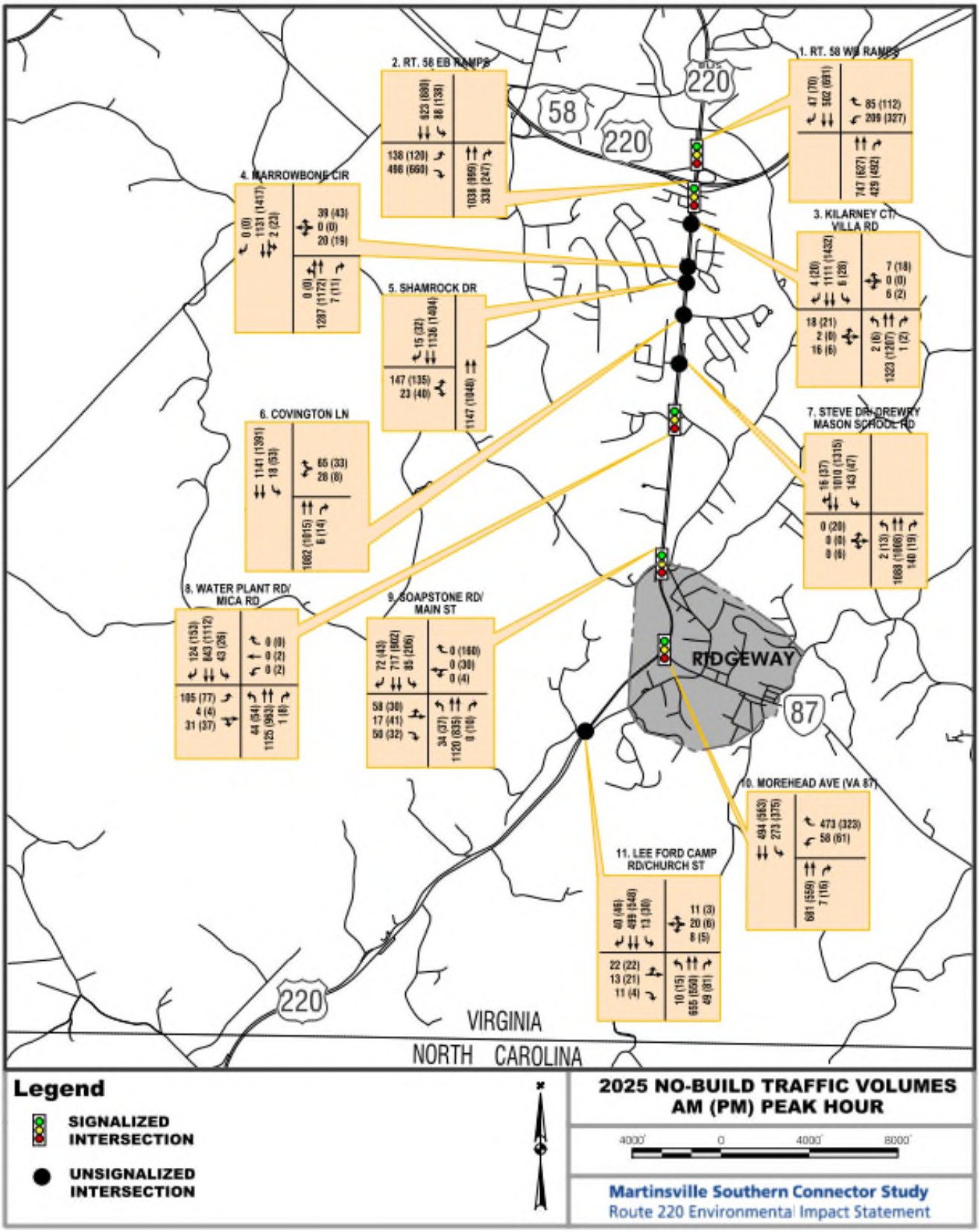
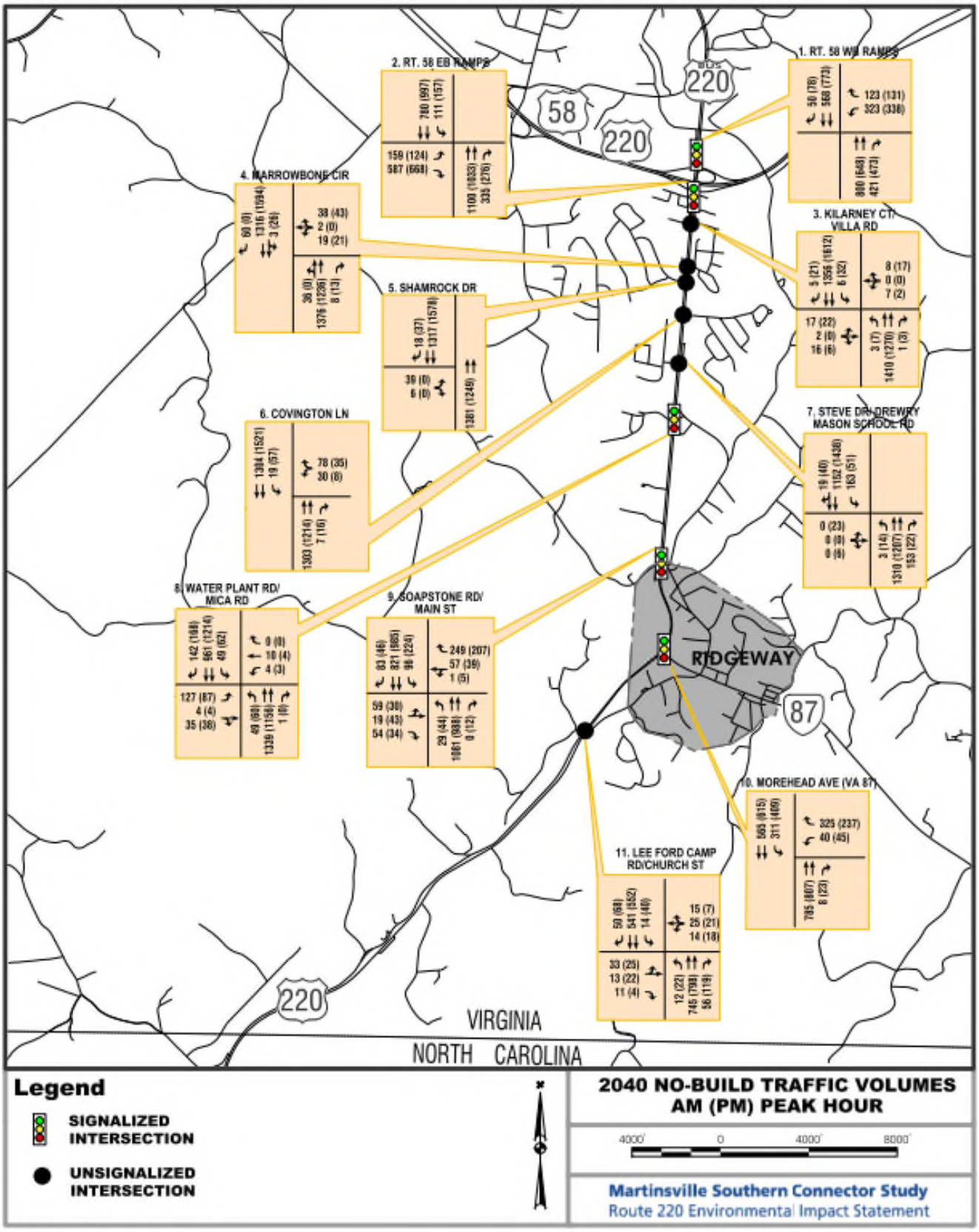


Figure 5-4: 2040 No-Build Peak Hour Intersection Volumes



5.2 OPERATIONAL ANALYSES

5.2.1 Capacity Results

Capacity analysis was again computed using Synchro 10 using existing signal timings. **Table 5-2** and **Table 5-3** summarize the levels of service, delays, and queues for the no-build condition for 2025 and 2040, respectively. Synchro worksheets are included in **Appendix G.** There are some intersections, approaches and lane groups that operate with excessive delays and/or queues, which are listed below.

Table 5-2: 2025 Capacity Analysis Summary

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**B**	**14.3**		**D**	**38.7**	
	WB	**D**	**43.5**	-	**F**	**131.5**	-
	WBL/T	D	49.3	259.0	F	164.5	456.0
	WBR	C	28.1	34.0	C	27.7	37.0
	NB	**A**	**7.6**	**129.0**	**A**	**7.5**	**106.0**
	SB	**A**	**6.7**	-	**A**	**7.8**	-
	SBT	A	6.8	67.0	A	8.0	119.0
	SBR	A	5.5	0.0	A	5.9	14.0
2. Route 58 EB Ramp	**Overall**	**E**	**63.7**		**F**	**185.7**	
	EB	**F**	**211.6**	-	**F**	**681.9**	-
	EBL	E	61.6	184.0	E	55.6	161.0
	EBR	F	266.8	568.0	F	832.7	1082.0
	NB	**C**	**20.5**	-	**C**	**24.4**	-
	NBT	C	21.5	441.0	C	25.7	479.0
	NBR	B	17.7	179.0	B	19.4	146.0
	SB	**B**	**14.3**	-	**B**	**16.1**	-
	SBL	E	62.9	125.0	E	63.9	175.0
	SBT	A	6.8	117.0	A	8.0	182.0
3. Kilarney Court/Villa Road	**EB**	**F**	**284.1**	**115.0**	**F**	**846.9**	**115.0**
	WB	**F**	**188.4**	**52.5**	**E**	**47.0**	**27.5**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	11.5	0.0	B	14.2	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.6**	-
	SBL	B	12.6	2.5	B	12.9	15.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**468.0**	**292.5**	**F**	**874.1**	**370.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	0.0	A	0.0	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.7**	-
	SBL/T	B	12.7	2.5	B	13.3	15.0
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**932.7**	**570.0**	**F**	**1311.9**	**685.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**F**	**155.6**	**202.5**	**E**	**47.5**	**52.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.3**	-	**A**	**0.7**	-
	SBL	B	12.3	5.0	B	12.8	12.5
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	**0.0**	**F**	**337.5**	**97.5**
	NB	**A**	**0.0**	-	**A**	**0.3**	-
	NBL	B	11.4	0.0	B	14.3	5.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.9**	-	**A**	**0.4**	-
	SBL	C	16.1	37.5	B	11.4	7.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8. Water Plant Road	**Overall**	**B**	**15.7**		**C**	**20.2**	
	EB	**D**	**43.5**	-	**D**	**49.8**	-
	EBL	D	45.8	126.0	D	51.0	113.0
	EBT/R	D	39.1	0.0	D	48.4	0.0
	WB	**A**	**0.0**	-	**D**	**53.2**	-
	WBL	A	0.0	0.0	D	54.2	8.0
	WBT	A	0.0	0.0	D	51.9	8.0
	WBR	A	0.0	0.0	A	0.0	0.0
	NB	**B**	**14.9**	-	**B**	**17.9**	-
	NBL	D	52.2	63.0	E	60.8	83.0
	NBT	B	13.2	425.0	B	15.3	419.0
	NBR	A	6.8	0.0	A	9.3	0.0
	SB	**B**	**12.0**	-	**D**	**18.5**	-
	SBL	D	49.8	65.0	B	54.1	51.0
	SBT	B	10.2	281.0	B	18.6	576.0
	SBR	A	7.9	18.0	B	11.8	39.0
9. Soapstone Road/Main Street	**Overall**	**C**	**21.6**		**E**	**58.3**	
	EB	**D**	**54.9**	-	**F**	**84.3**	-
	EBL/T	E	56.7	116.0	F	88.0	133.0
	EBR	D	52.3	0.0	E	76.2	0.0
	WB	**A**	**0.0**	-	**F**	**100.5**	-
	WBL/T	A	0.0	0.0	E	61.8	82.0
	WBR	A	0.0	0.0	F	111.1	8.0
	NB	**C**	**21.4**	-	**D**	**54.2**	-
	NBL	F	103.9	59.0	F	130.0	78.0
	NBT	B	18.5	511.0	D	50.5	517.0
	NBR	A	0.0	0.0	C	29.1	0.0
	SB	**B**	**14.8**	-	**D**	**49.2**	-
	SBL	E	61.6	123.0	F	134.7	365.0
	SBT	A	9.1	248.0	C	26.9	499.0
	SBR	A	7.9	0.0	C	20.2	0.0
10. Morehead Avenue (VA 87)	**Overall**	**F**	**89.1**		**D**	**41.0**	
	WB	**F**	**248.7**	-	**F**	**98.1**	-
	WBL	D	35.5	76.0	D	38.1	80.0
	WBR	F	280.0	255.0	F	111.7	43.0
	NB	**C**	**29.1**	-	**C**	**29.9**	-
	NBT	C	29.3	311.0	C	30.2	212.0
	NBR	C	21.9	3.0	C	24.6	0.0
	SB	**B**	**16.7**	-	**C**	**21.3**	-
	SBL	C	25.1	160.0	C	34.9	174.0
	SBT	B	11.8	136.0	B	11.7	117.0
11. Lee Ford Camp Road/Chruch Street	**EB**	**D**	**28.6**	**22.5**	**E**	**35.8**	**30.0**
	WB	**D**	**29.0**	**20.0**	**D**	**26.6**	**7.5**
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.7	0.0	A	8.9	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	A	9.3	2.5	A	9.1	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Route 58 Westbound Ramps: The westbound approach operates with excessive delays during the PM peak hour.

Route 58 Eastbound Ramps: The overall intersection operates over capacity during both peak hours. During both peak hours, there are extensive delays and queues eastbound. The southbound

left-turn also experiences extensive delays during both peak hours.

Kilarney Court/Villa Road: The eastbound and westbound approaches both operate with extensive delays during both peak hours.

Marrowbone Circle: The westbound approach of Marrowbone Circle operates with extensive delays during the both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive operates with extensive delays and queues during both peak hours.

Covington Lane: The westbound approach of Covington Lane operates with extensive delays during both peak hours.

Steve Drive: The eastbound approach of Steve Drive experiences extensive delays during the PM peak hour only.

Water Plant Road: The northbound left-turn experiences extensive delays during the PM peak hour only.

Soapstone Road/Main Street: The eastbound, northbound left and southbound left experience extensive delays during both peak hours. The westbound approach experiences long delays during the PM peak hour.

Morehead Avenue: The westbound approach experiences extensive delays during both peak hours.

Lee Ford Camp Road: The eastbound approach experiences extensive delays during the PM peak hour only.

Table 5-3: 2040 Capacity Analysis Summary

Intersection	Movement	AM LOS	AM Delay (sec)	AM Queue (ft)	PM LOS	PM Delay (sec)	PM Queue (ft)
1. Route 58 WB Ramp	**Overall**	**B**	**12.8**		**B**	**15.5**	
	WB	**D**	**36.8**	-	**D**	46.5	-
	WBL/T	D	40.6	286.0	D	50.8	340.0
	WBR	C	26.9	64.0	C	**33.4**	46.0
	NB	**A**	**1.5**	**22.0**	**A**	**0.8**	**8.0**
	SB	**A**	**9.0**	-	**B**	11.7	-
	SBT	A	9.1	145.0	B	11.9	265.0
	SBR	A	7.5	18.0	A	**8.9**	24.0
2. Route 58 EB Ramp	**Overall**	**E**	**55.8**		**E**	**75.7**	
	EB	**F**	**94.9**	-	**F**	**139.3**	-
	EBL	B	19.9	127.0	C	25.0	114.0
	EBR	F	115.1	677.0	F	160.4	866.0
	NB	**D**	**54.0**	-	**E**	**75.2**	-
	NBT	E	62.2	564.0	F	86.6	713.0
	NBR	C	27.1	192.0	C	33.0	230.0
	SB	**C**	**24.2**	-	**C**	**33.9**	-
	SBL	F	112.2	193.0	F	144.7	292.0
	SBT	B	11.7	153.0	B	16.4	265.0
3. Kilarney Court/Villa Road	**EB**	**F**	**388.8**	**102.5**	**F**	**1202.4**	**115.0**
	WB	**F**	**193.2**	**40.0**	**F**	**55.1**	**20.0**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	13.1	0.0	C	15.2	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	A	0.1	-	A	0.3	-
	SBL	B	13.5	0.0	B	14.2	7.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**1162.5**	**202.5**	**F**	**698.1**	**202.5**
	NB	**A**	**4.7**	-	**A**	**0.0**	-
	NBL/T	B	14.7	7.5	A	0.0	-
	NBT	A	4.5	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	-	**A**	**0.2**	-
	SBL/T	B	13.2	0.0	B	13.8	5.0
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**1445.2**	**497.5**	**F**	**2105.8**	**565.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**F**	**145.0**	**155.0**	**F**	**59.2**	**40.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.5**	-
	SBL	B	12.2	2.5	B	13.2	10.0
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	**0.0**	**F**	**356.8**	**80.0**
	NB	**A**	**0.0**	-	**A**	**0.2**	-
	NBL	B	11.8	0.0	B	14.4	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**2.4**	-	**A**	**0.4**	-
	SBL	C	19.5	52.5	B	13.4	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Intersection	Movement	AM LOS	AM Delay (sec)	AM Queue (ft)	PM LOS	PM Delay (sec)	PM Queue (ft)
8. Water Plant Road	**Overall**	**B**	**10.9**		**C**	**24.1**	
	EB	**C**	**31.7**	-	**D**	**50.6**	-
	EBL	C	33.2	104.0	E	56.8	125.0
	EBT/R	C	27.2	26.0	D	39.3	35.0
	WB	**A**	**0.0**	-	**D**	**43.3**	-
	WBL	A	0.0	0.0	D	42.9	14.0
	WBT	A	0.0	0.0	D	43.7	18.0
	WBR	A	0.0	0.0	A	0.0	0.0
	NB	**B**	**10.3**	-	**C**	**24.1**	-
	NBL	D	39.1	66.0	E	61.7	113.0
	NBT	A	9.2	329.0	C	22.0	470.0
	NBR	A	4.3	0.0	B	10.6	0.0
	SB	**A**	**8.8**	-	**C**	**21.8**	-
	SBL	D	38.2	66.0	D	46.9	94.0
	SBT	A	7.8	233.0	C	21.8	500.0
	SBR	A	5.2	25.0	B	12.4	13.0
9. Soapstone Road/Main Street	**Overall**	**B**	**11.3**		**D**	**48.3**	
	EB	**D**	**51.0**	-	**E**	**61.4**	-
	EBL/T	D	51.8	96.0	E	63.7	60.0
	EBR	D	50.0	6.0	E	56.4	0.0
	WB	**E**	**56.1**	-	**F**	**116.5**	-
	WBL/T	D	48.5	17.0	D	45.1	44.0
	WBR	E	58.1	0.0	F	132.6	0.0
	NB	**A**	**10.0**	**0.0**	**D**	**37.2**	-
	NBL	A	4.9	8.0	E	66.7	64.0
	NBT	B	10.1	531.0	D	36.1	660.0
	NBR	A	0.0	-	C	20.8	0.0
	SB	**A**	**6.7**	-	**D**	**41.2**	-
	SBL	A	8.5	42.0	F	126.2	322.0
	SBT	A	6.6	231.0	C	23.0	476.0
	SBR	A	5.1	15.0	B	15.3	0.0
10. Morehead Avenue	**Overall**	**E**	**55.1**		**D**	**47.2**	
	WB	**F**	**161.8**	-	**F**	**182.8**	-
	WBL	C	26.1	68.0	D	43.5	89.0
	WBR	F	179.1	185.0	F	209.6	89.0
	NB	**C**	**23.4**	-	**C**	**23.7**	-
	NBT	C	23.5	315.0	C	23.9	379.0
	NBR	B	16.4	11.0	B	17.1	22.0
	SB	**B**	**13.9**	-	**B**	**14.6**	-
	SBL	C	21.3	9.0	C	25.5	64.0
	SBT	A	9.9	6.0	A	7.3	3.0
11. Lee Ford Camp Road/Chruch Street	**EB**	E	49.2	52.5	F	71.3	57.5
	WB	**E**	**44.0**	**42.5**	**F**	**50.0**	**7.5**
	NB	A	0.1	-	A	0.2	-
	NBL	A	9.1	0.0	A	9.2	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.6**	-
	SBL	A	9.7	2.5	B	10.4	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Route 58 Eastbound Ramps: During both peak hours, there are extensive delays and queues eastbound. The northbound through and southbound left-turn also experiences extensive delays during both peak hours.

Kilarney Court/Villa Road: The eastbound and westbound approaches both operate with extensive delays during both peak hours.

Marrowbone Circle: The westbound approach of Marrowbone Circle operates with extensive delays during the both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive operates with extensive delays and queues during both peak hours.

Covington Lane: The westbound approach of Covington Lane operates with extensive delays during both peak hours.

Figure 6-1: Alternative A AADT (Existing Alignment)

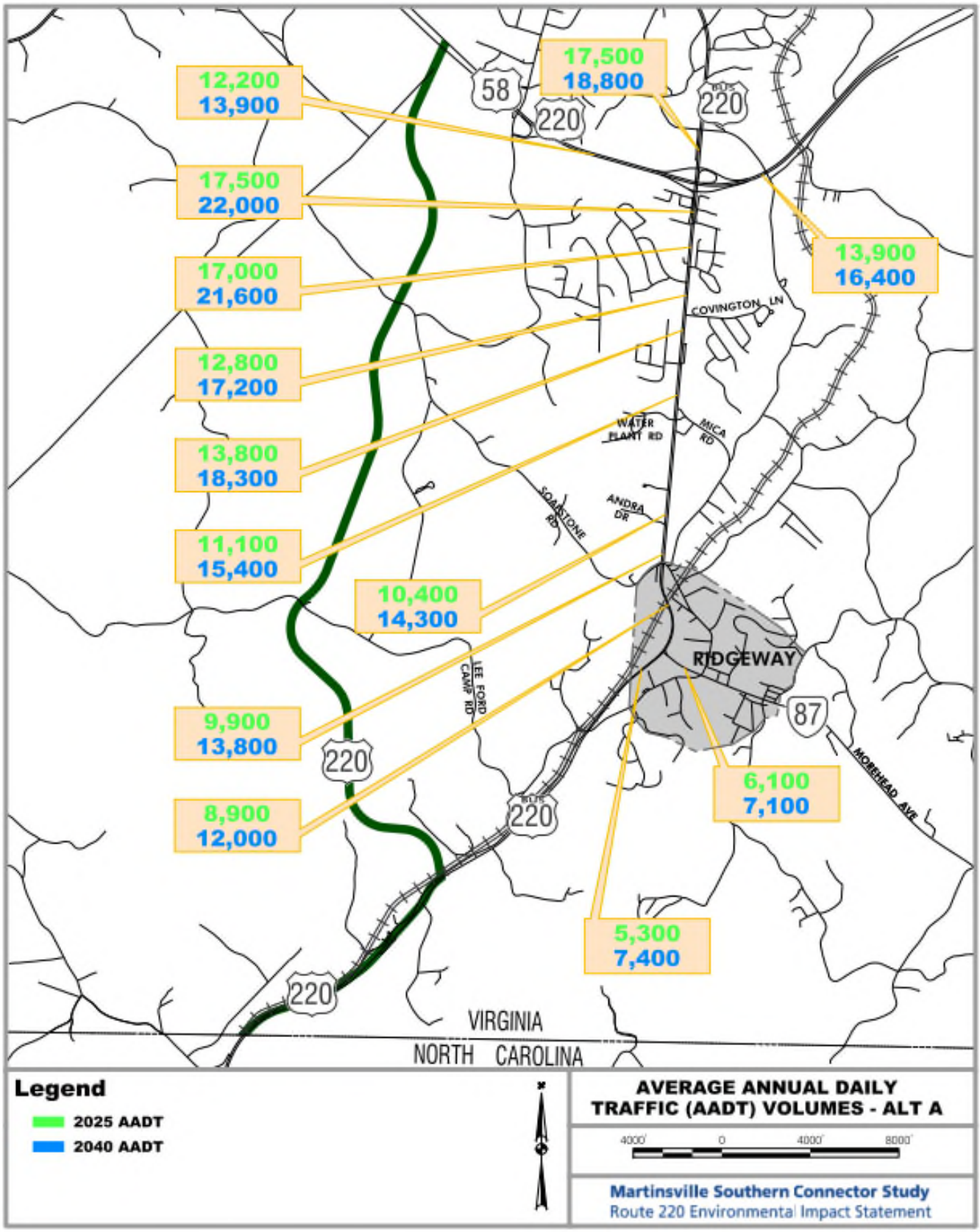


Figure 6-2: Alternative A ADT (Proposed Alignment)

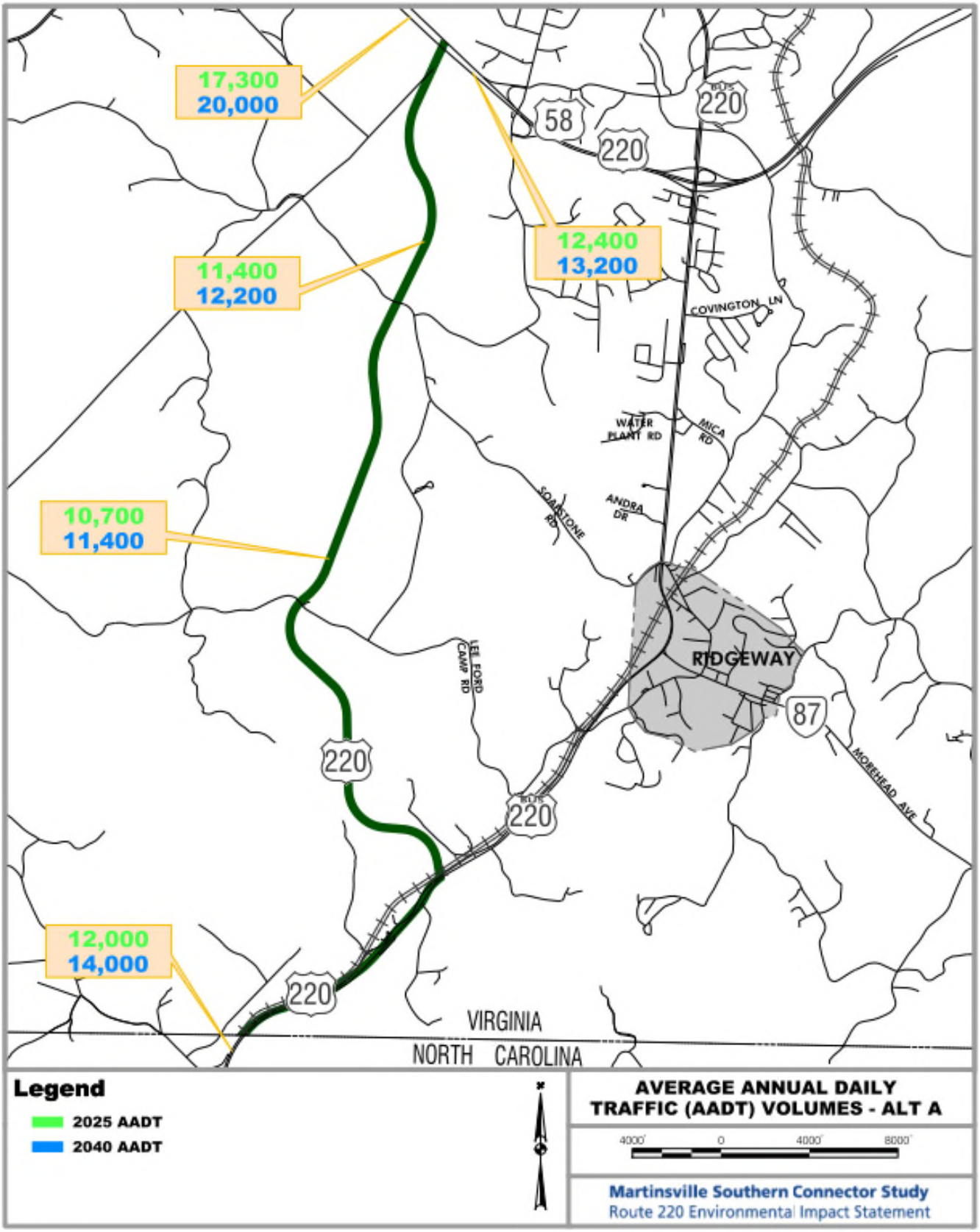


Figure 6-3: Alternative A Truck ADT and Percentages (Existing Alignment)

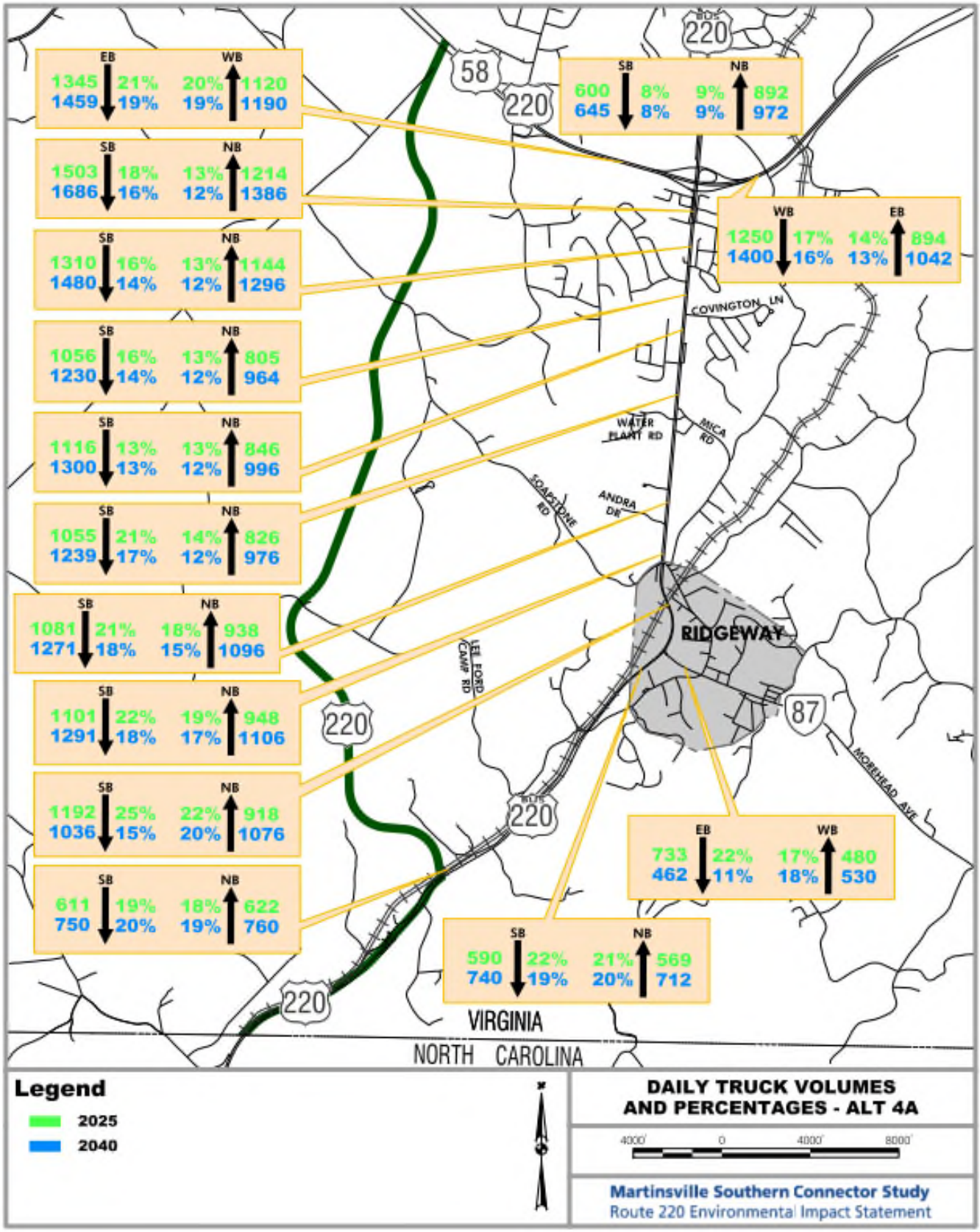

EB 1345 1459 21% 19%
WB 20% 19% 1120 1190
SB 1503 1686 18% 16%
NB 13% 12% 1214 1386
SB 1310 1480 16% 14%
NB 13% 12% 1144 1296
SB 1056 1230 16% 14%
NB 13% 12% 805 964
SB 1116 1300 13% 13%
NB 13% 12% 846 996
SB 1055 1239 21% 17%
NB 14% 12% 826 976
SB 1081 1271 21% 18%
NB 18% 15% 938 1096
SB 1101 1291 22% 18%
NB 19% 17% 948 1106
SB 1192 1036 25% 15%
NB 22% 20% 918 1076
SB 611 750 19% 20%
NB 18% 19% 622 760
SB 600 645 8% 8%
NB 9% 9% 892 972
WB 1250 1400 17% 16%
EB 14% 13% 894 1042
EB 733 462 22% 11%
WB 17% 18% 480 530
SB 590 740 22% 19%
NB 21% 20% 569 712
58
220
87
RIDGEWAY
COVINGTON LN
WATER PLANT RD
MICA RD
SOAPSTONE RD
ANDRA DR
LEE FORD CAMP RD
MOREHEAD AVE
VIRGINIA
NORTH CAROLINA
Legend
2025
2040
DAILY TRUCK VOLUMES
AND PERCENTAGES - ALT 4A
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Figure 6-4: Alternative A Truck Percentages (New Alignment)

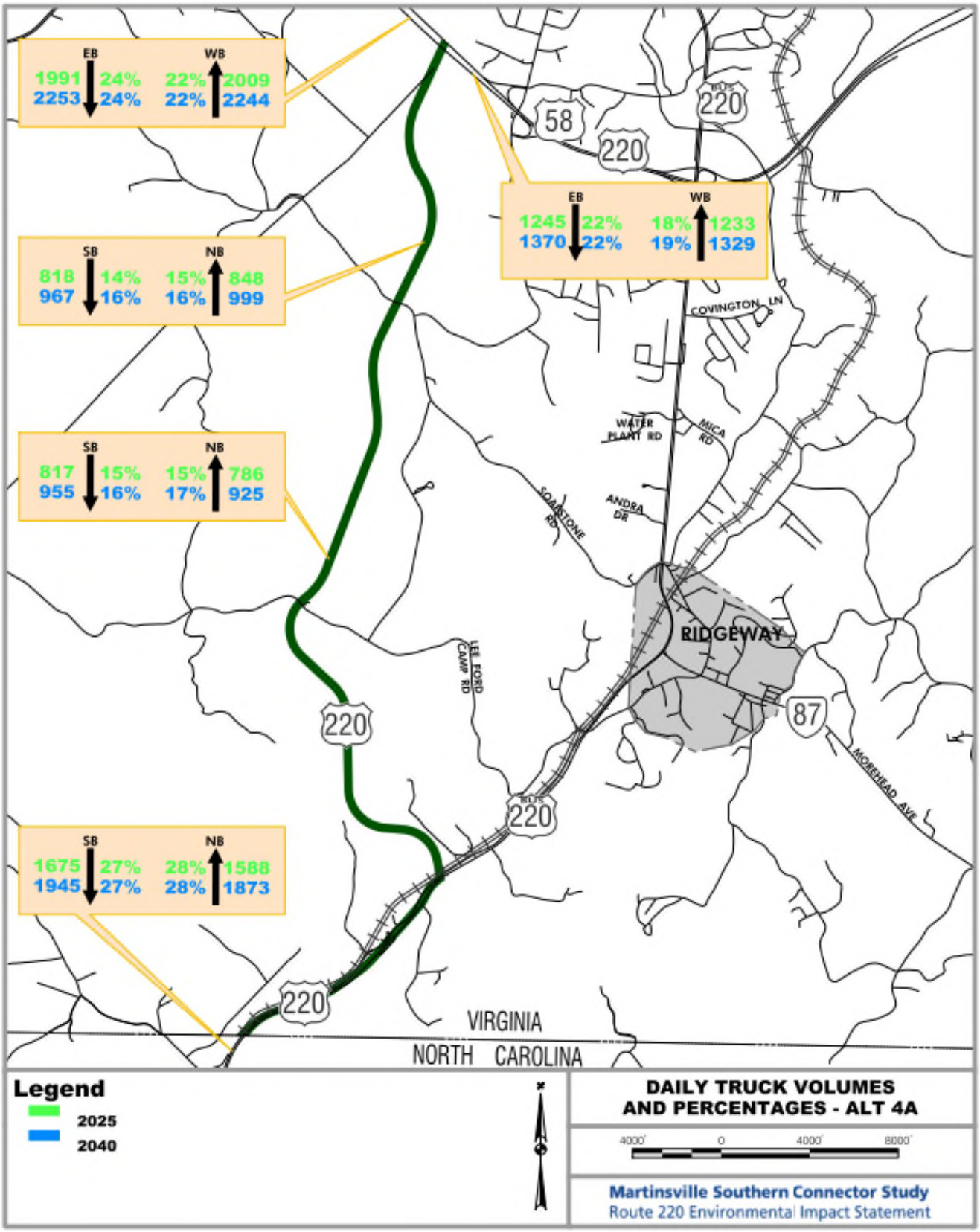


Figure 6-5: Alternative A 2025 Peak Hour Intersection Volumes

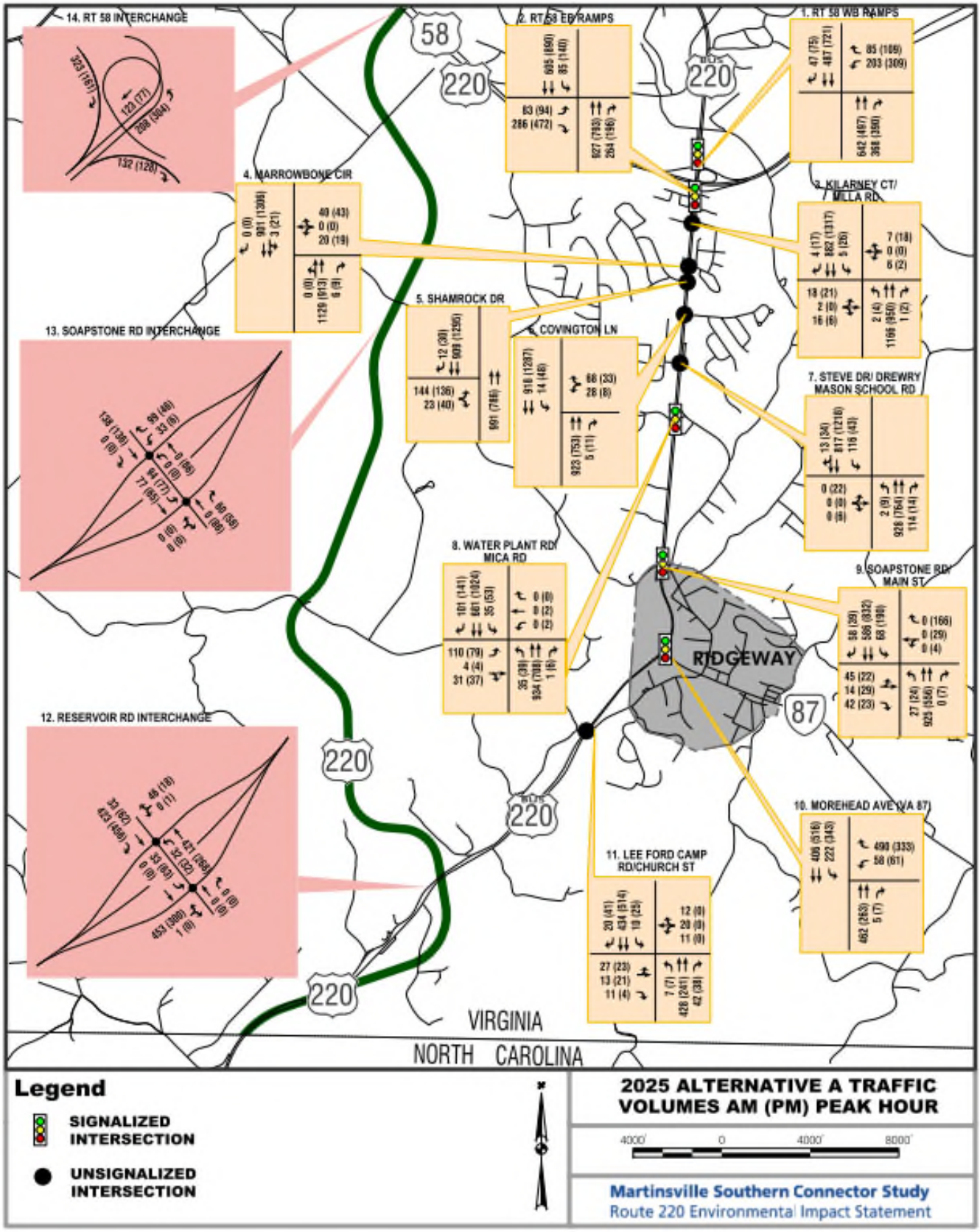
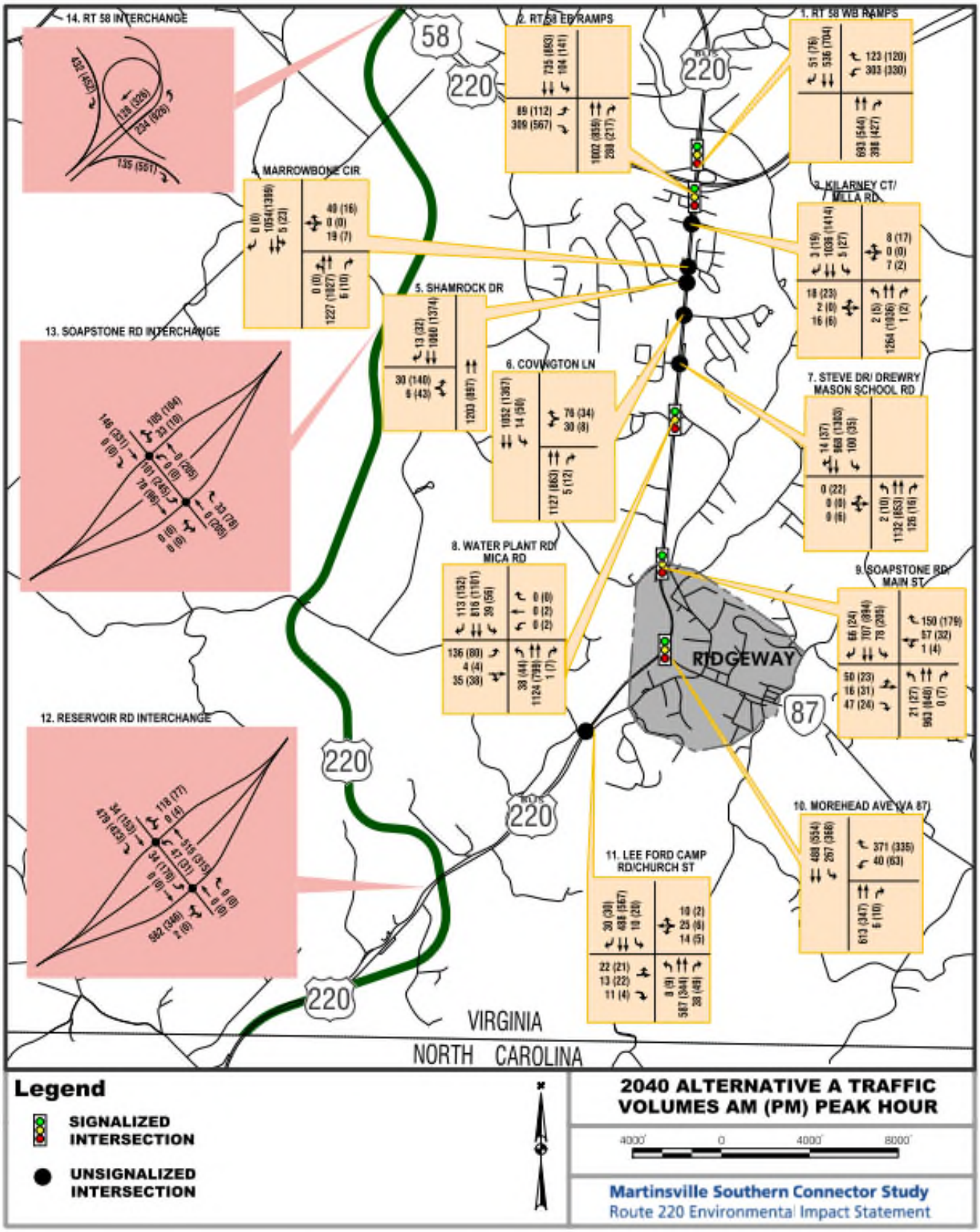

14. RT 58 INTERCHANGE
2. RT 58 EB RAMPS
1. RT 58 WB RAMPS
4. MARROWBONE CIR
3. KILARNEY CT/ MILLA RD
5. SHAMROCK DR
6. COVINGTON LN
7. STEVE DR/ DREWRY MASON SCHOOL RD
13. SOAPSTONE RD INTERCHANGE
8. WATER PLANT RD/ MICA RD
9. SOAPSTONE RD/ MAIN ST
RIDGEWAY
12. RESERVOIR RD INTERCHANGE
10. MOREHEAD AVE (VA 87)
11. LEE FORD CAMP RD/CHURCH ST
58
220
87
VIRGINIA
NORTH CAROLINA
Legend
SIGNALIZED INTERSECTION
UNSIGNALIZED INTERSECTION
2025 ALTERNATIVE A TRAFFIC VOLUMES AM (PM) PEAK HOUR
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Figure 6-6: Alternative A 2040 Peak Hour Intersection Volumes



6.2 OPERATIONAL ANALYSES

6.2.1 Capacity Results

Capacity analysis was again computed using Synchro 10. Signal timings along the corridor were optimized for future conditions. **Table 6-1** and **Table 6-2** summarize the levels of service, delays, and queues for the Alternative A build conditions for 2025, and **Table 6-3** and **Table 6-4** summarizes these values for 2040. Synchro worksheets are included in **Appendix H.** There are some intersections, approaches and lane groups that operate with excessive delays and/or queues, which are listed below.

Table 6-1: Alternative A 2025 Capacity Analysis Summary (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**A**	**9.1**		**B**	**13.0**	
	WB	**C**	**26.8**	-	**C**	29.1	-
	WBL/T	C	29.1	136.0	C	31.8	209.0
	WBR	C	21.4	28.0	C	**21.6**	30.0
	NB	**A**	**2.3**	**20.0**	**A**	**2.9**	**21.0**
	SB	**A**	**7.6**	-	**B**	10.9	-
	SBT	A	7.7	102.0	B	11.2	195.0
	SBR	A	6.3	10.0	A	**8.2**	22.0
2. Route 58 EB Ramp	**Overall**	**B**	**16.1**		**C**	**34.5**	
	EB	**C**	**29.7**	-	**E**	**57.1**	-
	EBL	C	27.8	73.0	B	19.4	73.0
	EBR	C	30.3	123.0	E	64.6	402.0
	NB	**B**	**16.3**	-	**D**	**37.0**	-
	NBT	B	75.5	263.0	D	40.8	328.0
	NBR	B	11.9	56.0	C	21.7	67.0
	SB	**A**	**8.7**	-	**B**	**19.8**	-
	SBL	D	42.4	88.0	E	62.4	180.0
	SBT	A	3.9	62.0	B	13.0	222.0
3. Kilarney Court/Villa Road	**EB**	**F**	**70.0**	**45.0**	**F**	**297.4**	**80.0**
	WB	**F**	**56.8**	**15.0**	**C**	**22.8**	**10.0**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	10.2	0.0	B	13.2	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	A	0.1	-	A	0.2	-
	SBL	B	11.9	0.0	B	10.8	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**66.7**	**1687.5**	**F**	**63.1**	**67.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	-	**A**	**0.2**	-
	SBL/T	B	11.7	0.0	B	10.6	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**421.7**	**367.5**	**F**	**873.2**	**487.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**E**	**35.2**	**60.0**	**C**	**21.9**	**15.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	B	10.5	0.1	A	9.9	5.0
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	**0.0**	**F**	**102.4**	**47.5**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.9	0.0	B	12.6	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.6**	-	**A**	**0.3**	-
	SBL	B	13.0	22.5	A	10.0	0.2
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8. Water Plant Road	**Overall**	**B**	**14.5**		**C**	**21.2**	
	EB	**C**	**33.4**	-	**D**	**40.2**	-
	EBL	D	35.9	111.0	D	44.1	112.0
	EBT/R	C	25.6	25.0	C	32.8	32.0
	WB	**A**	**0.0**	-	**D**	**41.7**	-
	WBL	A	0.0	0.0	D	42.0	8.0
	WBT	A	0.0	0.0	D	41.3	8.0
	WBR	A	0.0	0.0	A	17.3	0.0
	NB	**B**	**14.1**	-	**B**	**17.3**	-
	NBL	C	33.0	41.0	D	38.9	52.0
	NBT	B	13.4	231.0	B	16.1	214.0
	NBR	A	7.7	0.0	B	11.2	0.0
	SB	**B**	**11.6**	-	**C**	**21.7**	-
	SBL	C	31.6	41.0	D	37.3	64.0
	SBT	B	11.0	156.0	C	22.2	408.0
	SBR	A	8.4	0.0	B	12.5	0.0
9. Soapstone Road/Main Street	**Overall**	**B**	**13.9**		**C**	**33.0**	
	EB	**C**	**27.2**	-	**D**	**38.0**	-
	EBL/T	C	27.5	55.0	D	38.8	60.0
	EBR	C	26.9	0.0	D	36.3	0.0
	WB	**A**	**0.0**	-	**D**	**38.2**	-
	WBL/T	A	0.0	0.0	C	29.8	46.0
	WBR	A	0.0	0.0	D	39.9	6.0
	NB	**B**	**14.4**	-	**C**	**30.9**	-
	NBL	C	31.5	34.0	D	42.1	38.0
	NBT	B	13.9	238.0	C	30.6	214.0
	NBR	A	0.0	0.0	C	21.1	0.0
	SB	**B**	**11.3**	-	**C**	**32.8**	-
	SBL	C	30.6	66.0	D	47.6	211.0
	SBT	A	9.4	134.0	C	30.2	351.0
	SBR	A	7.3	0.0	B	16.5	0.0
10. Morehead Avenue (VA 87)	**Overall**	**F**	**123.3**		**E**	**56.8**	
	WB	**F**	**337.8**	-	**F**	**188.0**	-
	WBL	C	20.4	47.0	C	22.8	51.0
	WBR	F	375.4	202.0	F	218.9	58.0
	NB	**C**	**23.6**	-	**B**	**19.2**	-
	NBT	C	23.7	131.0	B	19.3	73.0
	NBR	B	16.4	7.0	B	16.5	8.0
	SB	**B**	**10.0**	-	**A**	**9.7**	-
	SBL	B	14.5	78.0	B	14.0	116.0
	SBT	A	7.6	64.0	A	6.9	76.0
11. Lee Ford Camp Road/Chruch Street	**EB**	C	21.0	20.0	C	21.5	17.5
	WB	**C**	**19.7**	**15.0**	**A**	**0.0**	-
	NB	A	0.1	-	A	0.2	-
	NBL	A	8.5	0.0	A	8.8	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.3**	-
	SBL	A	8.5	0.0	A	8.0	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Table 6-2: Alternative A 2025 Capacity Analysis Summary (2)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
12.1. Resevoir Interchange WB Ramp	**WB**	**B**	**11.7**	-	**B**	**10.2**	-
	WBL	A	0.0	-	B	14.3	0.0
	WBR	B	11.7	7.5	B	10.0	2.5
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**0.0**	-	**B**	**12.1**	-
	EBL	B	14.5	95.0	B	12.1	50.0
	EBT/R	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBL	A	0.0	-	A	0.0	-
	SBT	A	0.0	-	A	0.0	-
13.1. Soapstone Interchange WB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**8.9**	-	**A**	**9.0**	-
	SBL	A	9.5	2.5	A	9.9	0.0
	SBR	A	8.7	7.5	A	8.9	5.0
13.2. Soapstone Interchange EB Ramp	**EB**	**A**	**4.3**	-	**A**	**5.6**	-
	EBL	**A**	**7.5**	5.0	**A**	**7.7**	7.5
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-

Route 58 Eastbound Ramps: The eastbound right-turn and southbound left-turn experience extensive delays during the PM peak hour only.

Kilarney Court/Villa Road: Eastbound Kilarney Court experiences extensive delays during both peak hours, and westbound Villa Road experiences extensive delays during the AM peak hour only.

Marrowbone Circle: The westbound approach of Marrowbone Circle experiences extensive delays during both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive experiences extensive delays and queues during both peak hours.

Steve Drive: The eastbound approach of Steve Drive experiences extensive delays during the PM peak hour only.

Morehead Avenue: The westbound approach experiences extensive delays during both peak

hours.

Table 6-3: Alternative A 2040 Capacity Analysis Summary (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**B**	**11.3**		**B**	**16.6**	
	WB	**C**	**25.5**	-	**D**	39.7	-
	WBL/T	C	28.4	181.0	D	44.1	298.0
	WBR	B	18.4	46.0	C	**27.5**	35.0
	NB	**A**	**3.1**	**22.0**	**A**	**1.9**	**18.0**
	SB	**B**	**10.7**	-	**B**	13.5	-
	SBT	B	10.9	135.0	B	13.8	245.0
	SBR	A	8.7	14.0	B	**10.4**	25.0
2. Route 58 EB Ramp	**Overall**	**C**	**21.6**		**D**	**51.8**	
	EB	**D**	**47.4**	-	**E**	**77.5**	-
	EBL	C	26.4	78.0	C	21.0	96.0
	EBR	D	53.5	207.0	F	88.6	656.0
	NB	**B**	**18.7**	-	**E**	**56.8**	-
	NBT	C	20.4	295.0	E	63.3	482.0
	NBR	B	12.9	66.0	C	31.3	135.0
	SB	**B**	**13.6**	-	**C**	**29.7**	-
	SBL	E	62.3	117.0	F	98.4	238.0
	SBT	A	6.7	139.0	B	18.9	286.0
3. Kilarney Court/Villa Road	**EB**	**F**	**134.6**	**27.8**	**F**	**491.0**	**100.0**
	WB	**F**	**89.1**	**25.0**	**D**	**27.3**	**10.0**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	11.0	0.0	B	14.0	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL	B	12.6	0.0	B	11.3	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**109.4**	**82.5**	**F**	**56.7**	**25.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL/T	B	12.4	0.0	B	11.3	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**102.1**	**60.0**	**F**	**1253.4**	**550.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**F**	**82.5**	**122.5**	**D**	**26.7**	**20.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	B	11.8	2.5	B	10.8	7.5
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	**0.0**	**F**	**150.3**	**60.0**
	NB	**A**	**0.0**	-	**A**	**0.2**	-
	NBL	B	10.7	0.0	B	13.3	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.4**	-	**A**	**0.3**	-
	SBL	C	15.2	22.5	B	10.5	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
8. Water Plant Road	**Overall**	**B**	**16.7**		**C**	**20.7**	
	EB	**D**	**41.7**	-	**D**	**43.3**	-
	EBL	D	45.4	151.0	D	46.6	112.0
	EBT/R	C	28.9	28.0	D	37.1	34.0
	WB	**A**	**0.0**	-	**D**	**46.3**	-
	WBL	A	0.0	0.0	D	46.7	8.0
	WBT	A	0.0	0.0	D	46.0	8.0
	WBR	A	0.0	0.0	A	0.0	0.0
	NB	**B**	**16.3**	-	**B**	**17.3**	-
	NBL	D	39.1	48.0	D	44.7	65.0
	NBT	B	15.6	316.0	B	15.9	275.0
	NBR	A	7.8	0.0	B	10.5	0.0
	SB	**B**	**12.7**	-	**C**	**20.7**	-
	SBL	D	37.3	49.0	D	43.1	73.0
	SBT	B	12.1	206.0	C	20.8	461.0
	SBR	A	8.6	0.0	B	11.8	8.0
9. Soapstone Road/Main Street	**Overall**	**C**	**29.0**		**C**	**33.4**	
	EB	**D**	**52.1**	-	**D**	**52.0**	-
	EBL/T	D	53.3	94.0	D	53.6	79.0
	EBR	D	50.3	0.0	D	48.5	0.0
	WB	**D**	**52.8**	-	**E**	**59.7**	-
	WBL/T	D	40.5	85.0	D	38.2	59.0
	WBR	E	57.6	59.0	E	64.0	43.0
	NB	**C**	**26.6**	-	**C**	**30.5**	-
	NBL	D	54.5	44.0	D	54.5	51.0
	NBT	C	26.0	423.0	C	29.5	298.0
	NBR	A	0.0	0.0	C	21.1	0.0
	SB	**C**	**22.8**	-	**C**	**29.0**	-
	SBL	E	65.4	132.0	E	56.9	227.0
	SBT	B	18.9	247.0	C	23.2	357.0
	SBR	B	13.9	0.0	B	14.5	0.0
10. Morehead Avenue (VA 87)	**Overall**	**D**	**48.3**		**C**	**34.2**	
	WB	**F**	**146.4**	-	**F**	**91.1**	-
	WBL	C	23.3	41.0	C	23.6	60.0
	WBR	F	159.6	82.0	F	103.9	61.0
	NB	**C**	**26.8**	-	**C**	**26.4**	-
	NBT	C	26.9	206.0	C	26.6	82.0
	NBR	B	17.3	8.0	C	21.0	0.0
	SB	**B**	**12.5**	-	**B**	**12.6**	-
	SBL	C	20.2	112.0	B	18.1	152.0
	SBT	A	8.4	88.0	A	8.8	103.0
11. Lee Ford Camp Road/Chruch Street	**EB**	**D**	**27.9**	**0.0**	**D**	**26.8**	**22.5**
	WB	**D**	**30.7**	**27.5**	**C**	**20.6**	-
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.7	0.0	A	9.0	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.3**	-
	SBL	A	9.1	0.0	A	8.3	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Table 6-4: Alternative A 2040 Capacity Analysis Summary (2)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
12.1. Resevoir Interchange WB Ramp	**Overall**						
	WB	**B**	**14.5**	**-**	**B**	**11.3**	**-**
	WBL	A	0.0	-	C	16.4	0
	WBR	B	14.5	25	B	11	10
	NB	**A**	**0.7**	**-**	**A**	**0.8**	**-**
	NBL	A	8.8	5	A	9.0	2.5
	NBT	A	0.0	-	A	0.0	-
	SB	**A**	**0**	**-**	**A**	**0**	**-**
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
12.2. Resevoir Interchange EB Ramp	**Overall**						
	EB	**A**	**0**	**-**	**C**	**21.0**	**-**
	EBL	C	18.9	162.5	C	21.0	117.5
	EBT/R	A	0.0	-	A	0.0	-
	NB	**A**	**0**	**-**	**A**	**0**	**-**
	SB	**A**	**0**	**-**	**A**	**0**	**-**
	SBL	A	0	-	A	0	-
	SBT	A	0	-	A	0	-
13.1. Soapstone Interchange WB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**8.9**	**-**	**B**	**10.5**	**-**
	SBL	A	9.6	2.5	B	13.1	2.5
	SBR	A	8.7	10.0	B	10.2	12.5
13.2. Soapstone Interchange EB Ramp	**EB**	**A**	**4.2**	**-**	**A**	**6.3**	**-**
	EBL	A	7.5	5.0	A	0.0	-
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-

Route 58 Eastbound Ramps: The eastbound right-turn and northbound through experience extensive delays during the PM peak hour only. The southbound left-turn experience extensive delays during both peak hours.

Kilarney Court/Villa Road: Eastbound and westbound approaches experience extensive delays during both peak hours.

Marrowbone Circle: The westbound approach of Marrowbone Circle experiences extensive delays during both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive experiences extensive delays and queues during both peak hours, especially the PM peak hour.

Covington Lane: The westbound approach experiences extensive delays during both peak hours.

Steve Drive: The eastbound approach of Steve Drive experiences extensive delays during the PM peak hour only.

Soapstone Drive/ Main Street: The westbound right-turn and southbound left-turn experience extensive delays during both peak hours.

Morehead Avenue: The westbound approach experiences extensive delays during both peak hours.

Figure 7-1: Alternative B AADT (Existing Alignment)

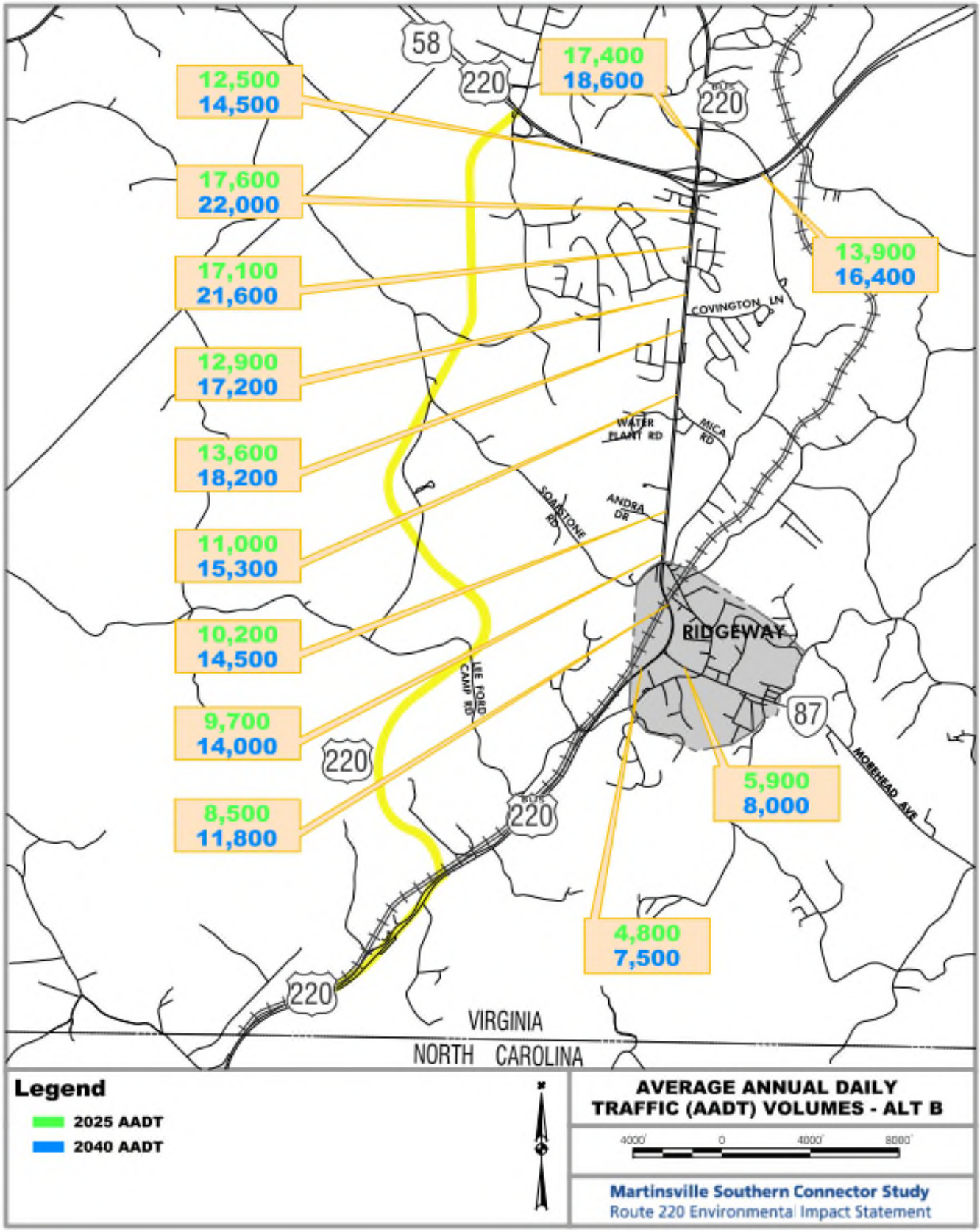

12,500
14,500
17,600
22,000
17,100
21,600
12,900
17,200
13,600
18,200
11,000
15,300
10,200
14,500
9,700
14,000
8,500
11,800
17,400
18,600
13,900
16,400
5,900
8,000
4,800
7,500
58
220
COVINGTON LN
WATER PLANT RD
MICA RD
SOAPSTONE RD
ANDRA DR
RIDGEWAY
LEE FORD CAMP RD
87
MOREHEAD AVE
VIRGINIA
NORTH CAROLINA
Legend
2025 AADT
2040 AADT
AVERAGE ANNUAL DAILY TRAFFIC (AADT) VOLUMES - ALT B
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Figure 7-2: Alternative B AADT (New Alignment)

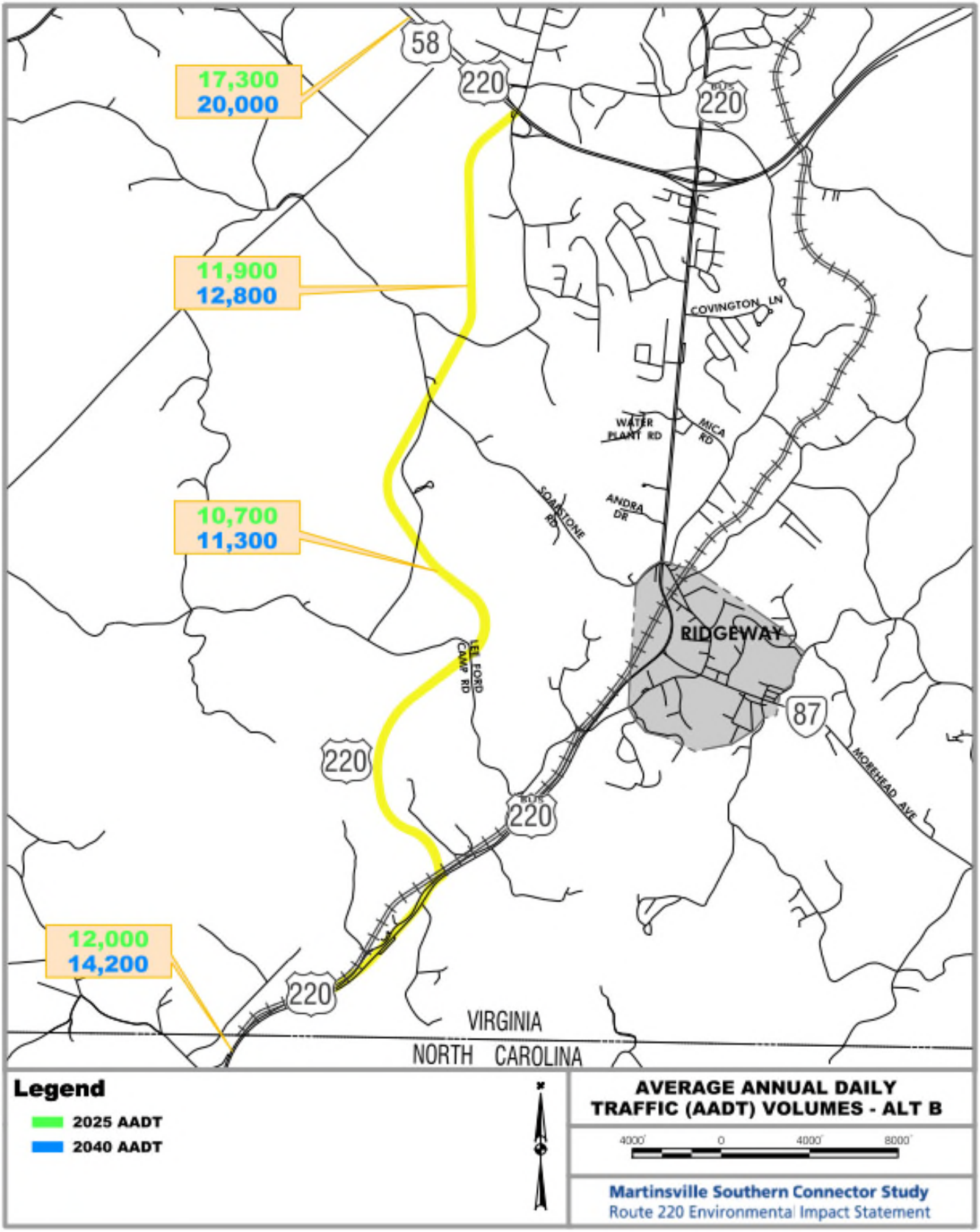


Figure 7-3: Alternative B Truck Percentages (Existing Alignment)

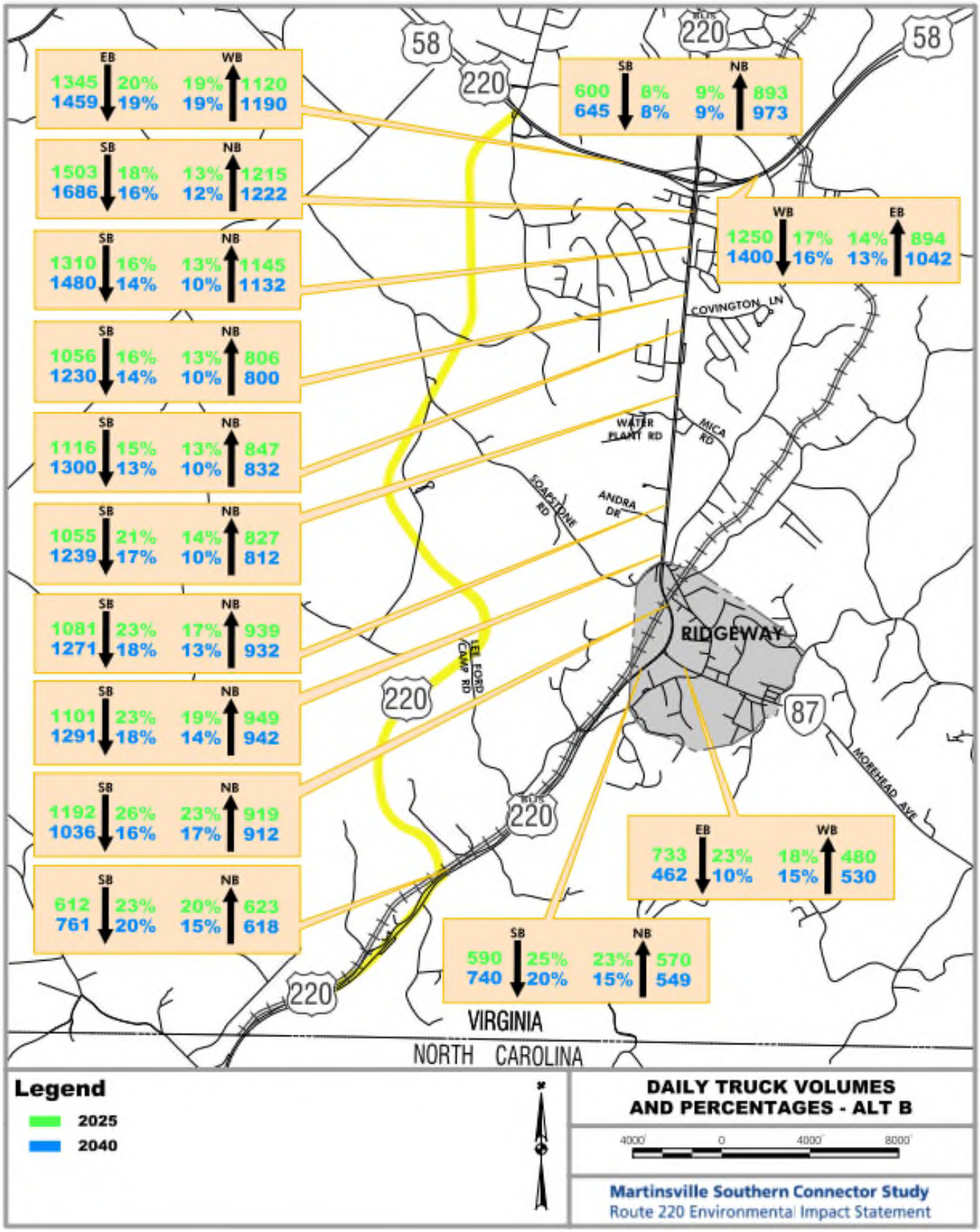

EB WB
1345 20% 19% 1120
1459 19% 19% 1190
SB NB
1503 18% 13% 1215
1686 16% 12% 1222
SB NB
1310 16% 13% 1145
1480 14% 10% 1132
SB NB
1056 16% 13% 806
1230 14% 10% 800
SB NB
1116 15% 13% 847
1300 13% 10% 832
SB NB
1055 21% 14% 827
1239 17% 10% 812
SB NB
1081 23% 17% 939
1271 18% 13% 932
SB NB
1101 23% 19% 949
1291 18% 14% 942
SB NB
1192 26% 23% 919
1036 16% 17% 912
SB NB
612 23% 20% 623
761 20% 15% 618
SB NB
600 8% 9% 893
645 8% 9% 973
WB EB
1250 17% 14% 894
1400 16% 13% 1042
EB WB
733 23% 18% 480
462 10% 15% 530
SB NB
590 25% 23% 570
740 20% 15% 549
58
220
58
220
220
220
220
87
COVINGTON LN
WATER PLANT RD
MICA RD
SOAPSTONE RD
ANDRA DR
LEE FORD CAMP RD
MOREHEAD AVE
RIDGEWAY
VIRGINIA
NORTH CAROLINA
Legend
2025
2040
DAILY TRUCK VOLUMES
AND PERCENTAGES - ALT B
4000 0 4000 8000
Martinsville Southern Connector Study
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Figure 7-4: Alternative B Truck Percentages (New Alignment)

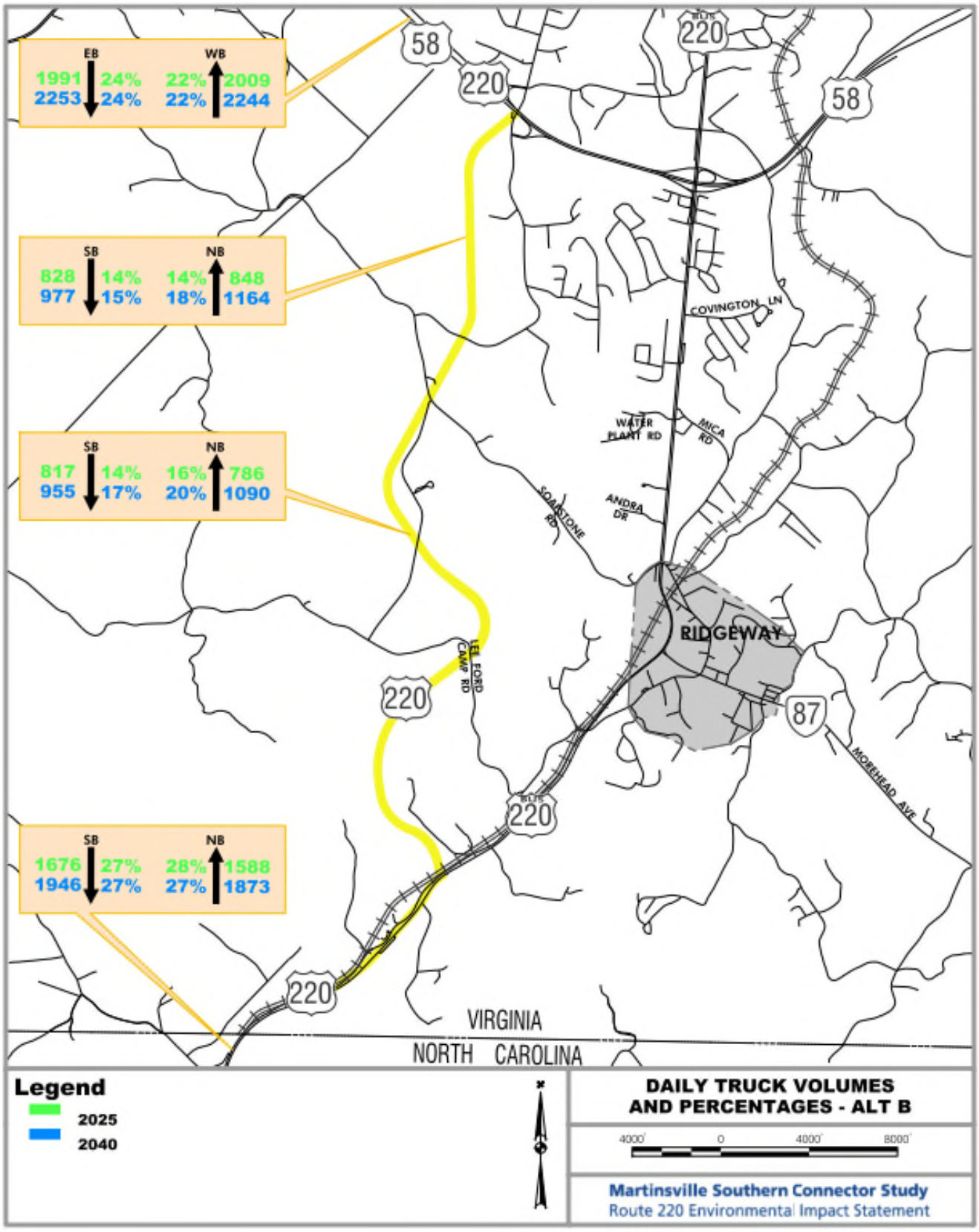


Figure 7-5: Alternative B 2025 Peak Hour Intersection Volumes

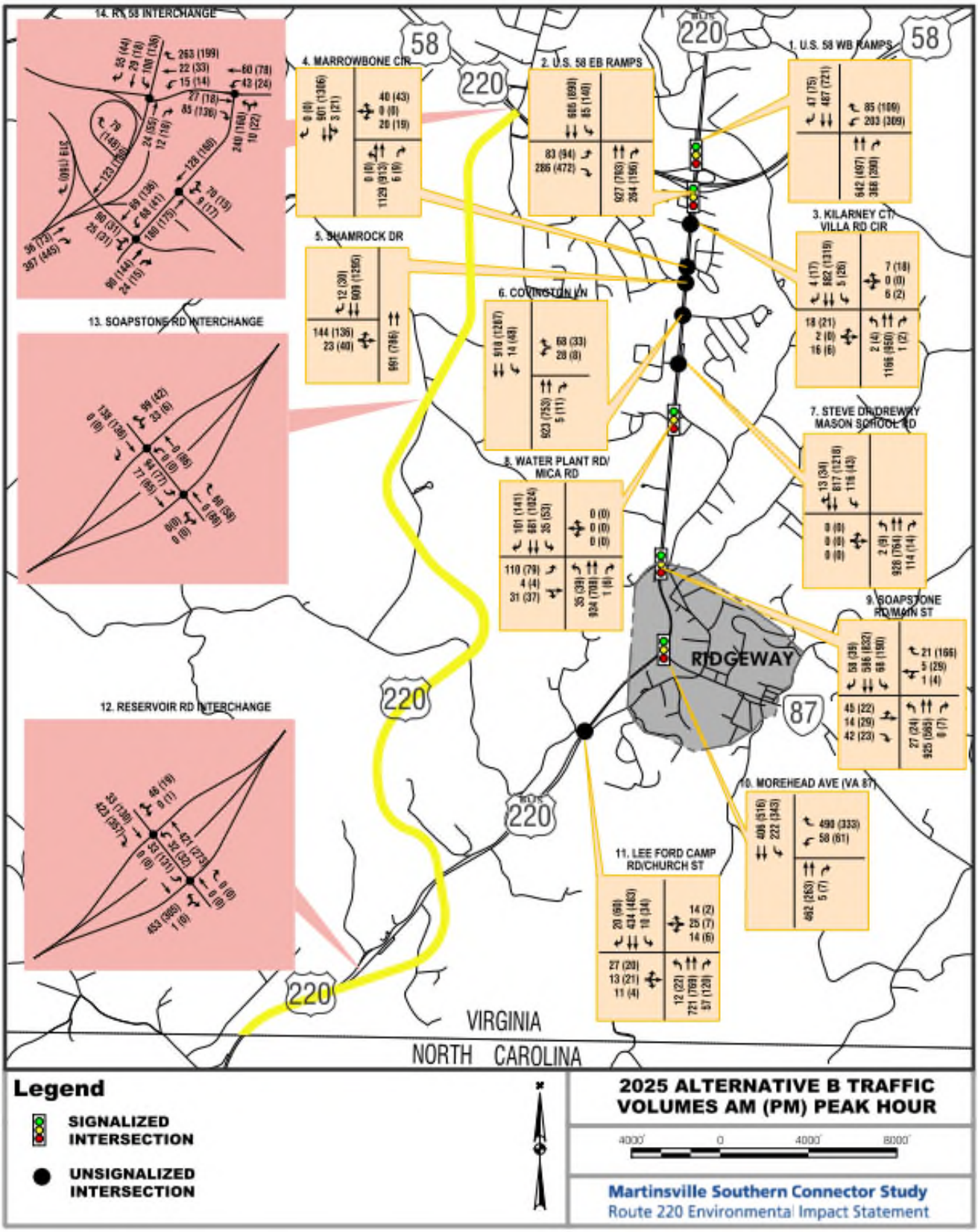
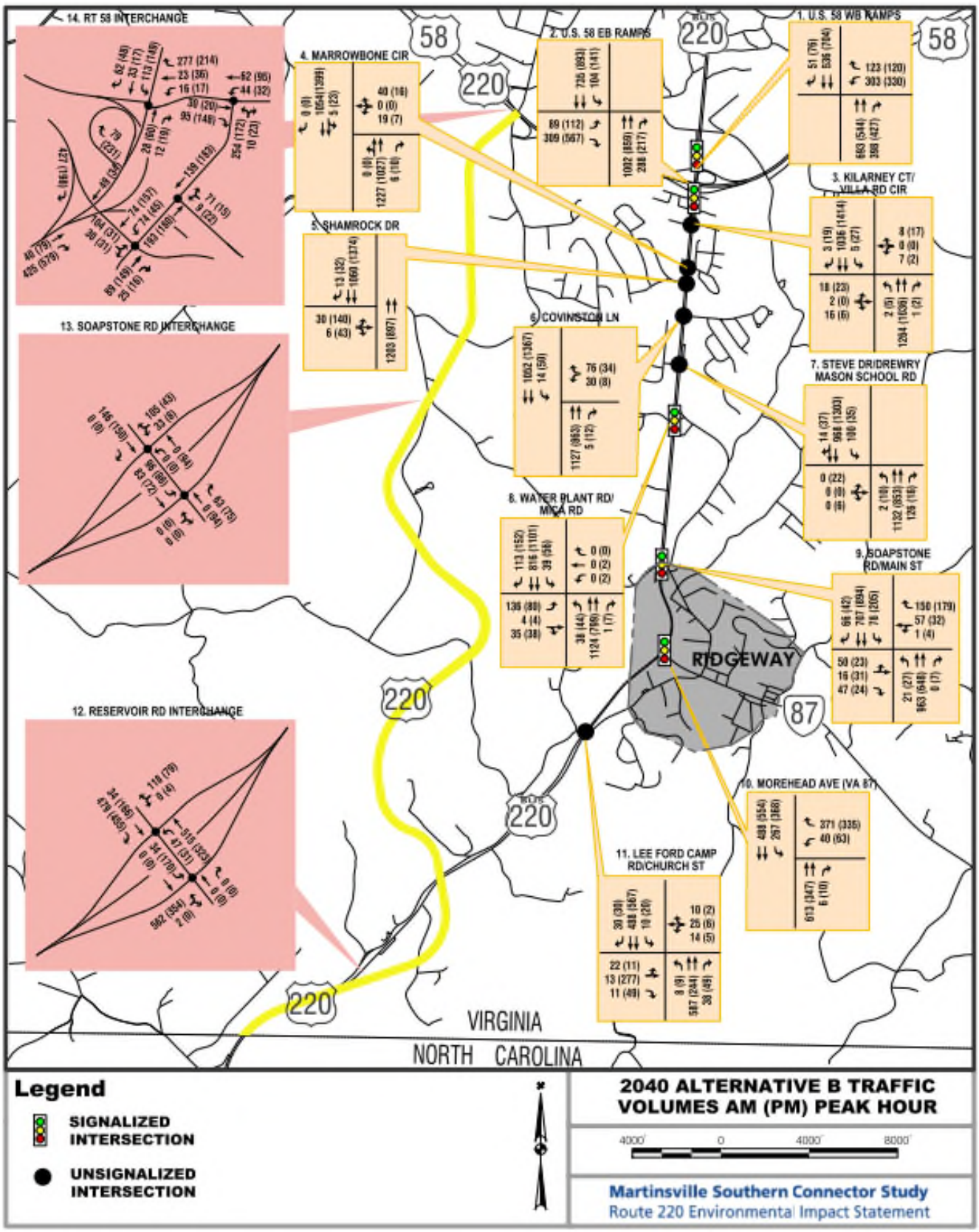


Figure 7-6: Alternative B 2040 Peak Hour Intersection Volumes


14. RT 58 INTERCHANGE
13. SOAPSTONE RD INTERCHANGE
12. RESERVOIR RD INTERCHANGE
4. MARROWBONE CIR
2. U.S. 58 EB RAMPS
1. U.S. 58 WB RAMPS
5. SHAMROCK DR
3. KILARNEY CT/ VILLA RD CIR
6. COVINGTON LN
7. STEVE DR/DREWRY MASON SCHOOL RD
8. WATER PLANT RD/ MICA RD
9. SOAPSTONE RD/MAIN ST
10. MOREHEAD AVE (VA 87)
11. LEE FORD CAMP RD/CHURCH ST
58
220
87
RIDGEWAY
VIRGINIA
NORTH CAROLINA
Legend
SIGNALIZED INTERSECTION
UNSIGNALIZED INTERSECTION
2040 ALTERNATIVE B TRAFFIC VOLUMES AM (PM) PEAK HOUR
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

7.2 OPERATIONAL ANALYSES

7.2.1 Capacity Results

Capacity analysis was again computed using Synchro 10. Signal timings along the corridor were optimized for future conditions. **Table 7-1** and **Table 7-2** summarizes the levels of service, delays, and queues for the no-build condition for 2025, and **Table 7-3** and **Table 7-4** summarizes these values for 2040. Synchro worksheets are included in **Appendix I.**

There are some intersections, approaches and lane groups that operate with excessive delays and/or queues, which are listed below.

Table 7-1: Alternative B 2025 Capacity Analysis Summary (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**A**	**9.1**		**B**	**13.7**	
	WB	**C**	**26.8**	-	**C**	29.4	-
	WBL/T	C	29.1	136.0	C	32.6	208.0
	WBR	C	21.4	28.0	C	**20.3**	29.0
	NB	**A**	**2.3**	**20.0**	**A**	**3.1**	**18.0**
	SB	**A**	**7.6**	-	**B**	12.1	-
	SBT	A	7.7	102.0	B	12.4	207.0
	SBR	A	6.3	10.0	A	**9.1**	23.0
2. Route 58 EB Ramp	**Overall**	**B**	**16.1**		**D**	**35.7**	
	EB	**C**	**29.7**	-	**E**	**61.2**	-
	EBL	C	27.8	73.0	B	19.4	73.0
	EBR	C	30.3	123.0	E	69.5	407.0
	NB	**B**	**16.3**	-	**D**	**37.0**	-
	NBT	B	17.5	263.0	D	40.8	328.0
	NBR	B	11.9	56.0	C	21.7	67.0
	SB	**A**	**8.7**	-	**C**	**20.3**	-
	SBL	D	42.4	88.0	E	61.8	180.0
	SBT	A	3.9	62.0	B	13.8	244.0
3. Kilarney Court/Villa Road	**EB**	**F**	**70.0**	**45.0**	**F**	**297.4**	**80.0**
	WB	**F**	**56.8**	**25.6**	**C**	**22.8**	**10.0**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	10.2	0.0	B	13.2	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	A	0.1	-	A	0.2	-
	SBL	B	11.9	0.0	B	10.8	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**66.7**	**67.5**	**F**	**63.1**	**67.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	-	**A**	**0.2**	-
	SBL/T	B	11.7	0.0	B	10.6	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**421.7**	**367.5**	**F**	**873.2**	**487.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**E**	**35.2**	**60.0**	**C**	**21.9**	**15.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	B	10.5	2.5	A	9.9	5.0
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	**0.0**	**A**	**0.0**	**0.0**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.9	0.0	B	12.6	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.6**	-	**A**	**0.3**	-
	SBL	B	13.0	22.5	A	10.1	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8. Water Plant Road	**Overall**	**B**	**14.4**		**B**	**13.4**	
	EB	**C**	**33.4**	-	**D**	**36.4**	-
	EBL	D	35.9	111.0	D	38.6	83.0
	EBT/R	C	25.6	25.0	C	32.3	30.0
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBL	A	0.0	0.0	A	0.0	0.0
	WBT	A	0.0	0.0	A	0.0	0.0
	WBR	A	0.0	0.0	A	0.0	0.0
	NB	**B**	**13.9**	-	**B**	**11.2**	-
	NBL	C	33.0	41.0	D	38.4	50.0
	NBT	B	13.2	228.0	A	9.7	166.0
	NBR	A	7.7	0.0	A	6.9	0.0
	SB	**B**	**11.6**	-	**B**	**12.5**	-
	SBL	C	31.6	41.0	D	36.8	60.0
	SBT	B	11.0	156.0	B	11.9	261.0
	SBR	A	8.4	0.0	A	7.5	5.0
9. Soapstone Road/Main Street	**Overall**	**B**	**14.0**		**C**	**30.9**	
	EB	**C**	**27.2**	-	**D**	**50.7**	-
	EBL/T	C	27.5	55.0	D	52.1	75.0
	EBR	C	26.9	0.0	D	47.7	0.0
	WB	**A**	**0.0**	-	**E**	**56.8**	-
	WBL/T	A	0.0	0.0	D	38.3	55.0
	WBR	A	0.0	0.0	E	60.5	32.0
	NB	**B**	**14.7**	-	**C**	**27.5**	-
	NBL	C	31.5	34.0	D	53.8	46.0
	NBT	B	14.2	242.0	C	26.5	254.0
	NBR	A	0.0	0.0	B	20.0	0.0
	SB	**B**	**11.3**	-	**C**	**26.5**	-
	SBL	C	30.6	66.0	D	52.6	204.0
	SBT	A	9.4	134.0	C	21.2	314.0
	SBR	A	7.3	0.0	B	13.9	0.0
10. Morehead Avenue (VA 87)	**Overall**	**F**	**123.0**		**C**	**25.0**	
	WB	**F**	**337.8**	-	**D**	**48.7**	-
	WBL	C	20.8	48.0	C	21.3	57.0
	WBR	F	375.4	203.0	D	53.7	59.0
	NB	**C**	**22.8**	-	**C**	**27.3**	-
	NBT	C	22.9	130.0	C	23.3	105.0
	NBR	B	16.4	7.0	C	17.9	11.0
	SB	**A**	**9.9**	-	**B**	**13.5**	-
	SBL	B	14.2	78.0	B	17.9	159.0
	SBT	A	7.6	65.0	B	10.6	108.0
11. Lee Ford Camp Road/Church Street	**EB**	**C**	**21.0**	**20.0**	**C**	**21.3**	**17.5**
	WB	**C**	**19.7**	**15.0**	**A**	**9.1**	**0.0**
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.5	0.0	A	8.8	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.5**	-
	SBL	A	8.5	0.0	A	8.0	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Table 7-2: Alternative B 2025 Capacity Analysis Summary (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
12.1. Resevoir Interchange WB Ramp	**WB**	**B**	**11.7**	**-**	**B**	**10.3**	**-**
	WBL	A	0.0	-	B	14.7	0.0
	WBR	B	11.7	7.5	B	10.1	2.5
	NB	**A**	**0.6**	**-**	**A**	**0.9**	**-**
	NBL	A	0.0	-	A	8.7	2.5
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**0.0**	**-**	**C**	**16.1**	**-**
	EBL	B	14.3	95.0	C	16.1	0.1
	EBT/R	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBL	A	0.0	-	A	0.0	-
	SBT	A	0.0	-	A	0.0	-
13.1. Soapstone Interchange WB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**8.9**	**-**	**A**	**9.1**	**-**
	SBL	A	9.5	2.5	A	9.9	0.0
	SBR	A	8.7	7.5	A	9.0	5.0
13.2. Soapstone Interchange EB Ramp	**EB**	**E**	**4.1**	**-**	**A**	**4.2**	**-**
	EBL	**A**	**7.5**	5.0	**A**	**7.7**	5.0
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
14.1. Route 58 Interchange Southern	**WB**	**B**	**10.1**	**-**	**B**	**10.1**	**-**
	WBL	B	11.0	2.5	B	12.1	2.5
	WBT/R	B	10.0	32.5	B	10.0	27.5
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBT/R	-	-	-	-	-	-
	SB	**A**	**4.1**	**-**	**A**	**5.3**	**-**
	SBL	A	7.5	5.0	A	7.6	7.5
	SBT/R	-	-	-	-	-	-
14.2. Fisher Farm Road/Fisher Farm Road	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WB	**A**	**3.2**	**-**	**A**	**1.8**	**-**
	WBL	A	7.6	2.5	A	7.6	2.5
	WBT/R	A	0.0	-	A	0.0	-
	NB	**B**	**13.1**	**47.5**	**B**	**11.7**	**30.0**
14.3. Fisher Farm Road/Route 58 WB Ramp	**WB**	**B**	**10.0**	**10.0**	**B**	**10.4**	**5.0**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
14.4. Fisher Farm Road/Route 58 EB Ramp	**EB**	**B**	**11.7**	**17.5**	**B**	**10.8**	**7.5**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**3.8**	**-**	**A**	**1.8**	**-**
	SBL	A	7.6	5.0	A	7.7	2.5
	SBT	A	0.0	-	A	0.0	-

Route 58 Eastbound Ramps: The eastbound right-turn and southbound left-turn experience extensive delays during the PM peak hour only.

Kilarney Court/Villa Road: Eastbound Kilarney Court experiences extensive delays during both peak hours, and westbound Villa Road experiences extensive delays during the AM peak hour only.

Marrowbone Circle: The westbound approach of Marrowbone Circle experiences extensive delays during both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive experiences extensive delays and queues during both peak hours.

Covington Lane: Westbound approach experiences extensive delays during the AM peak hour only.

Steve Drive: The eastbound approach of Steve Drive experiences extensive delays during the PM peak hour only.

Soapstone Road/ Main Street: The westbound right-turn experiences extensive delays during the PM peak hour only.

Morehead Avenue: The westbound right-turn experiences extensive delays during the AM peak hour only.

Table 7-3: Alternative B 2040 Capacity Results (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**B**	**15.9**		**B**	**10.7**	
	WB	**D**	**40.4**	-	**C**	25.0	-
	WBL/T	D	44.2	178.0	C	27.3	301.0
	WBR	C	29.6	47.0	B	**19.4**	37.0
	NB	**A**	**1.7**	**21.0**	**A**	**2.7**	**19.0**
	SB	**B**	**11.6**	-	**A**	**9.7**	-
	SBT	B	11.9	128.0	A	9.9	224.0
	SBR	A	9.2	14.0	A	8.0	23.0
2. Route 58 EB Ramp	**Overall**	**D**	**47.7**		**D**	**47.7**	
	EB	**E**	**72.3**	-	**E**	**72.3**	-
	EBL	C	21.0	78.0	C	21.0	96.0
	EBR	F	82.4	205.0	F	82.4	649.0
	NB	**D**	**50.8**	-	**D**	**50.8**	-
	NBT	E	55.7	287.0	E	55.7	468.0
	NBR	C	31.3	66.0	C	31.3	135.0
	SB	**C**	**28.4**	-	**C**	**28.4**	-
	SBL	F	99.4	116.0	F	99.4	238.0
	SBT	B	17.2	115.0	B	17.2	240.0
3. Kilarney Court/Villa Road	**EB**	**F**	**134.6**	**70.0**	**F**	**491.0**	**100.0**
	WB	**F**	**89.1**	**25.0**	**D**	**27.3**	**10.0**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	11.0	0.0	B	14.0	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	A	0.1	-	A	0.2	-
	SBL	B	12.6	0.0	B	11.3	5.0
	SBT	0.0	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**109.4**	**90.0**	**F**	**56.7**	**25.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL/T	B	12.4	0.0	B	11.3	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**102.1**	**60.0**	**F**	**1253.4**	**550.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**F**	**82.5**	**122.5**	**D**	**26.7**	**20.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	B	11.4	2.5	B	10.6	0.3
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	**0.0**	**F**	**150.3**	**2.4**
	NB	**A**	**0.0**	-	**A**	**0.2**	-
	NBL	B	10.7	0.0	B	13.3	0.1
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.4**	-	**A**	**0.3**	-
	SBL	C	15.2	22.5	B	10.5	0.2
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8. Water Plant Road	**Overall**	**B**	**16.6**		**B**	**20.0**	
	EB	**D**	**41.7**	-	**D**	**43.3**	-
	EBL	D	45.4	151.0	D	46.6	112.0
	EBT/R	C	28.9	28.0	D	37.1	34.0
	WB	**A**	**0.0**	**0.0**	**D**	**46.3**	-
	WBL	A	0.0	0.0	D	46.7	8.0
	WBT	A	0.0	0.0	D	46.0	8.0
	WBR	A	0.0	0.0	A	0.0	0.0
	NB	**B**	**16.3**	-	**B**	**17.3**	-
	NBL	D	39.1	48.0	D	44.7	65.0
	NBT	B	15.6	316.0	B	15.9	275.0
	NBR	A	7.8	0.0	B	10.5	0.0
	SB	**B**	**12.3**	-	**B**	**19.4**	-
	SBL	D	37.3	49.0	D	43.1	73.0
	SBT	B	11.7	201.0	B	19.3	404.0
	SBR	A	8.6	0.0	B	11.8	8.0
9. Soapstone Road/Main Street	**Overall**	**C**	**28.7**		**C**	**32.8**	
	EB	**D**	**52.1**	-	**D**	**52.0**	-
	EBL/T	D	53.3	94.0	D	53.6	79.0
	EBR	D	50.3	0.0	D	48.5	0.0
	WB	**D**	**52.8**	-	**E**	**59.7**	-
	WBL/T	D	40.5	85.0	D	38.2	59.0
	WBR	E	57.6	59.0	E	64.0	43.0
	NB	**C**	**26.6**	-	**C**	**30.5**	-
	NBL	D	54.5	44.0	D	54.5	51.0
	NBT	C	26.0	423.0	C	29.5	298.0
	NBR	A	0.0	0.0	C	21.1	0.0
	SB	**C**	**22.2**	-	**C**	**27.9**	-
	SBL	E	65.4	132.0	E	56.9	227.0
	SBT	B	18.2	265.0	C	21.8	341.0
	SBR	B	13.9	0.0	B	14.5	0.0
10. Morehead Avenue (VA 87)	**Overall**	**D**	**42.6**		**C**	**28.1**	
	WB	**F**	**123.3**	-	**E**	**61.4**	-
	WBL	C	23.8	43.0	C	22.6	60.0
	WBR	F	133.9	82.0	E	68.8	6.0
	NB	**C**	**25.7**	-	**C**	**28.2**	-
	NBT	C	25.8	211.0	C	28.4	13.0
	NBR	B	17.9	9.0	C	23.0	12.0
	SB	**B**	**12.6**	-	**B**	**13.7**	-
	SBL	B	19.5	116.0	B	19.4	167.0
	SBT	A	8.8	93.0	A	9.9	111.0
11. Lee Ford Camp Road/Church Street	**EB**	**D**	**27.9**	**25.0**	**F**	**419.6**	**26.7**
	WB	**D**	**30.7**	**27.5**	**A**	**0.0**	-
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.7	0.0	A	9.0	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.3**	-
	SBL	A	9.1	0.0	A	8.3	0.1
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Table 7-4: Alternative B 2040 Capacity Results (2)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
12.1. Resevoir Interchange WB Ramp	**WB**	**B**	**14.5**	**-**	**B**	**11.4**	**-**
	WBL	A	0.0	-	C	17.1	0.0
	WBR	B	14.5	25.0	B	11.1	0.5
	NB	**A**	**0.7**	**-**	**A**	**0.8**	**-**
	NBL	A	8.8	5.0	A	9.2	0.1
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**0.0**	**-**	**C**	**21.1**	**-**
	EBL	C	17.1	145.0	C	21.1	4.8
	EBT/R	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBL	A	0.0	-	A	0.0	-
	SBT	A	0.0	-	A	0.0	-
13.1. Soapstone Interchange WB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**8.9**	**-**	**A**	**9.2**	**-**
	SBL	A	9.6	2.5	B	10.1	0.0
	SBR	A	8.7	10.0	A	9.0	0.2
13.2. Soapstone Interchange EB Ramp	**EB**	**A**	**4.0**	**-**	**A**	**4.2**	**-**
	EBL	**A**	**7.5**	5.0	**A**	**7.8**	0.2
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
14.1. Route 58 Interchange Southern	**WB**	**B**	**10.3**	**-**	**B**	**10.4**	**-**
	WBL	B	11.4	2.5	B	12.6	0.1
	WBT/R	B	10.2	37.5	B	10.2	1.2
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBT/R	A	0.0	-	A	0.0	-
	SB	**A**	**4.1**	**-**	**A**	**5.4**	**-**
	SBL	A	7.5	7.5	A	7.7	0.4
	SBT/R	A	0.0	-	A	0.0	-
14.2. Fisher Farm Road/Fisher Farm Road	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WB	**A**	**3.1**	**-**	**A**	**1.9**	**-**
	WBL	A	7.6	2.5	A	7.7	0.1
	WBT/R	A	0.0	-	A	0.0	-
	NB	**B**	**13.7**	**52.5**	**B**	**12.4**	**1.3**
14.3. Fisher Farm Road/Route 58 WB Ramp	**WB**	**B**	**10.1**	**10.0**	**B**	**10.7**	**0.2**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
14.4. Fisher Farm Road/Route 58 EB Ramp	**EB**	**B**	**12.2**	**22.5**	**B**	**11.1**	**0.4**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**3.8**	**-**	**A**	**1.7**	**-**
	SBL	A	7.6	5.0	A	7.7	0.1
	SBT	A	0.0	-	A	0.0	-

Route 58 Eastbound Ramps: The eastbound right-turn, northbound through and southbound left-turn experience extensive delays during both peak hours.

Kilarney Court/Villa Road: The eastbound approach experience extensive delays during both peak hours and the westbound approach experience extensive delays during the AM peak hour only.

Marrowbone Circle: The westbound approach of Marrowbone Circle experiences extensive delays during both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive experiences extensive delays and queues during both peak hours, especially the PM peak hour.

Figure 8-1: Alternative C AADT (Existing Alignment)

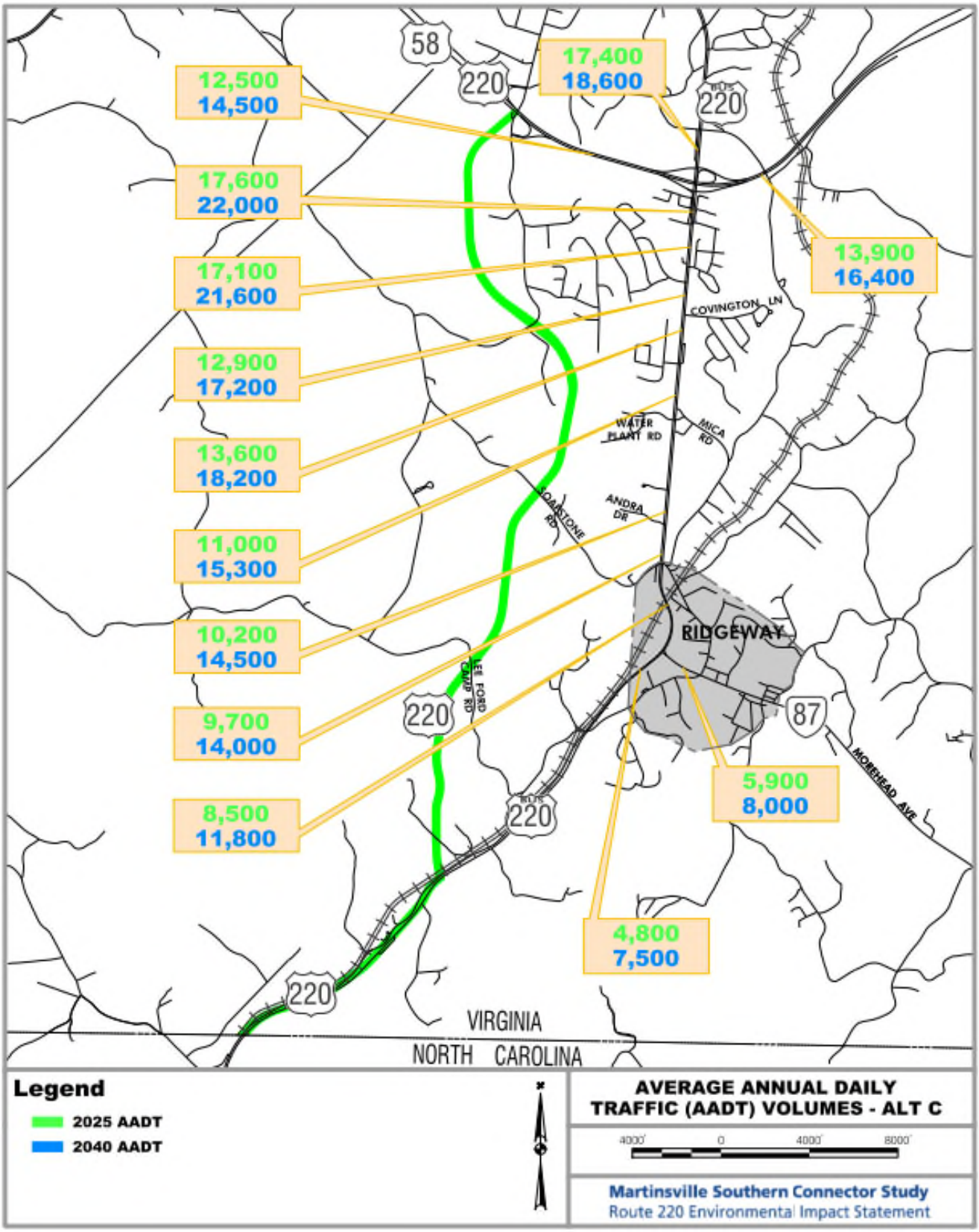


Figure 8-2: Alternative C AADT (New Alignment)

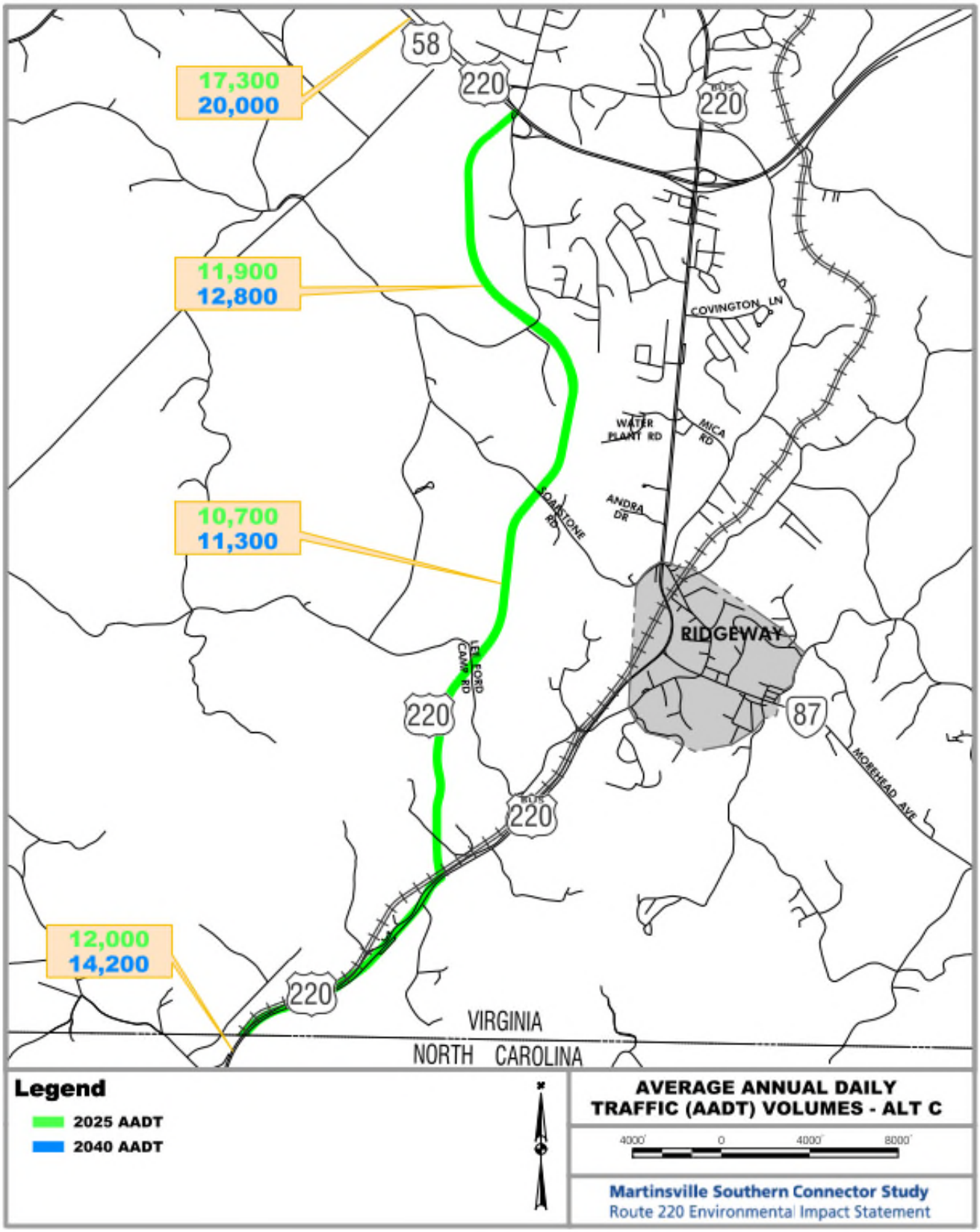


Figure 8-3: Alternative C Truck Percentages (Existing Alignment)

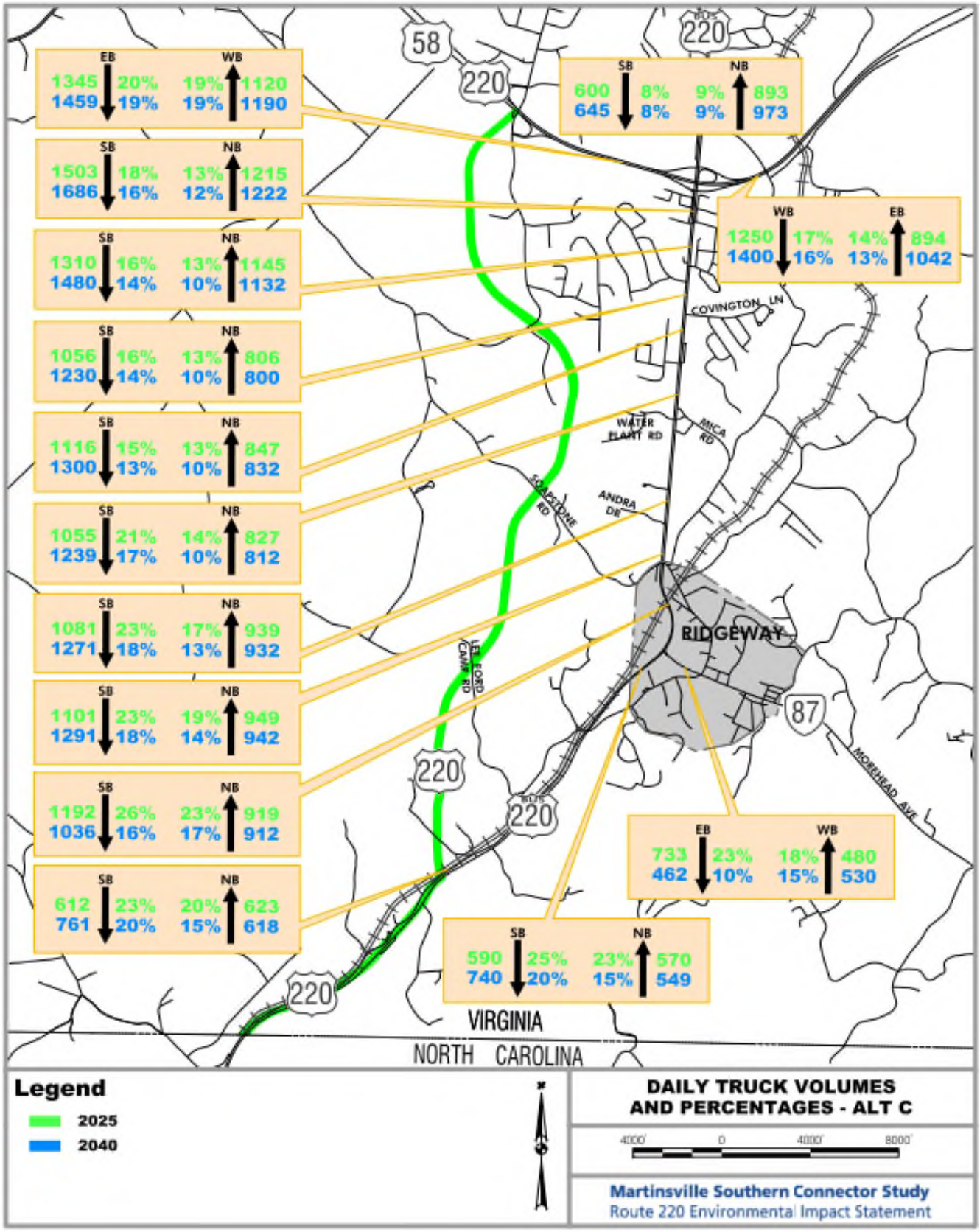

EB WB
1345 20% 19% 1120
1459 19% 19% 1190
SB NB
1503 18% 13% 1215
1686 16% 12% 1222
SB NB
1310 16% 13% 1145
1480 14% 10% 1132
SB NB
1056 16% 13% 806
1230 14% 10% 800
SB NB
1116 15% 13% 847
1300 13% 10% 832
SB NB
1055 21% 14% 827
1239 17% 10% 812
SB NB
1081 23% 17% 939
1271 18% 13% 932
SB NB
1101 23% 19% 949
1291 18% 14% 942
SB NB
1192 26% 23% 919
1036 16% 17% 912
SB NB
612 23% 20% 623
761 20% 15% 618
SB NB
600 8% 9% 893
645 8% 9% 973
WB EB
1250 17% 14% 894
1400 16% 13% 1042
EB WB
733 23% 18% 480
462 10% 15% 530
SB NB
590 25% 23% 570
740 20% 15% 549
58
220
RIDGEWAY
87
COVINGTON LN
WATER PLANT RD
MICA RD
SOAPSTONE RD
ANDRA DR
LEE FORD CAMP RD
MOREHEAD AVE
VIRGINIA
NORTH CAROLINA
Legend
2025
2040
DAILY TRUCK VOLUMES
AND PERCENTAGES - ALT C
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Figure 8-4: Alternative C Truck Percentages (New Alignment)

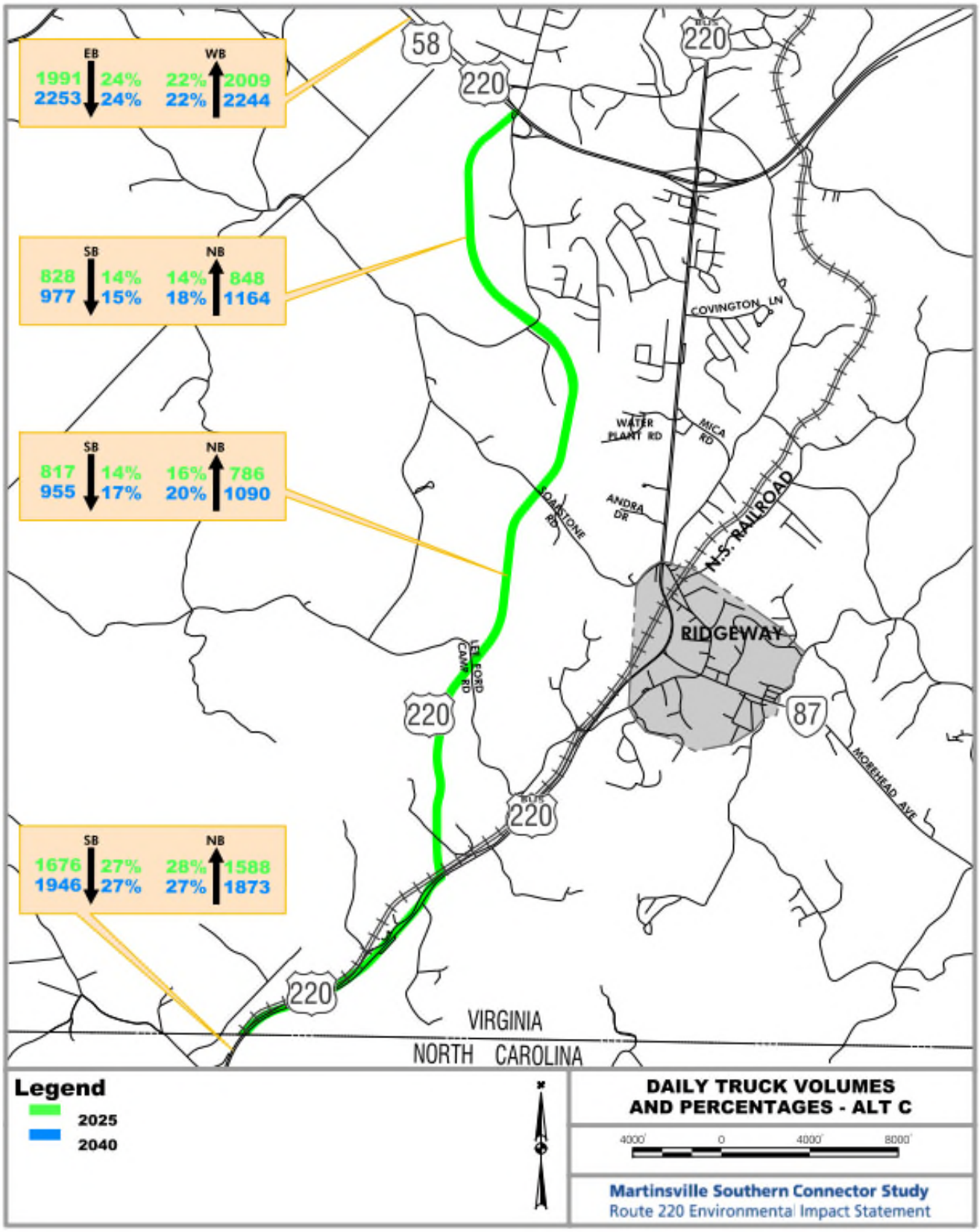


Figure 8-5: Alternative C 2025 Peak Hour Intersection Volumes

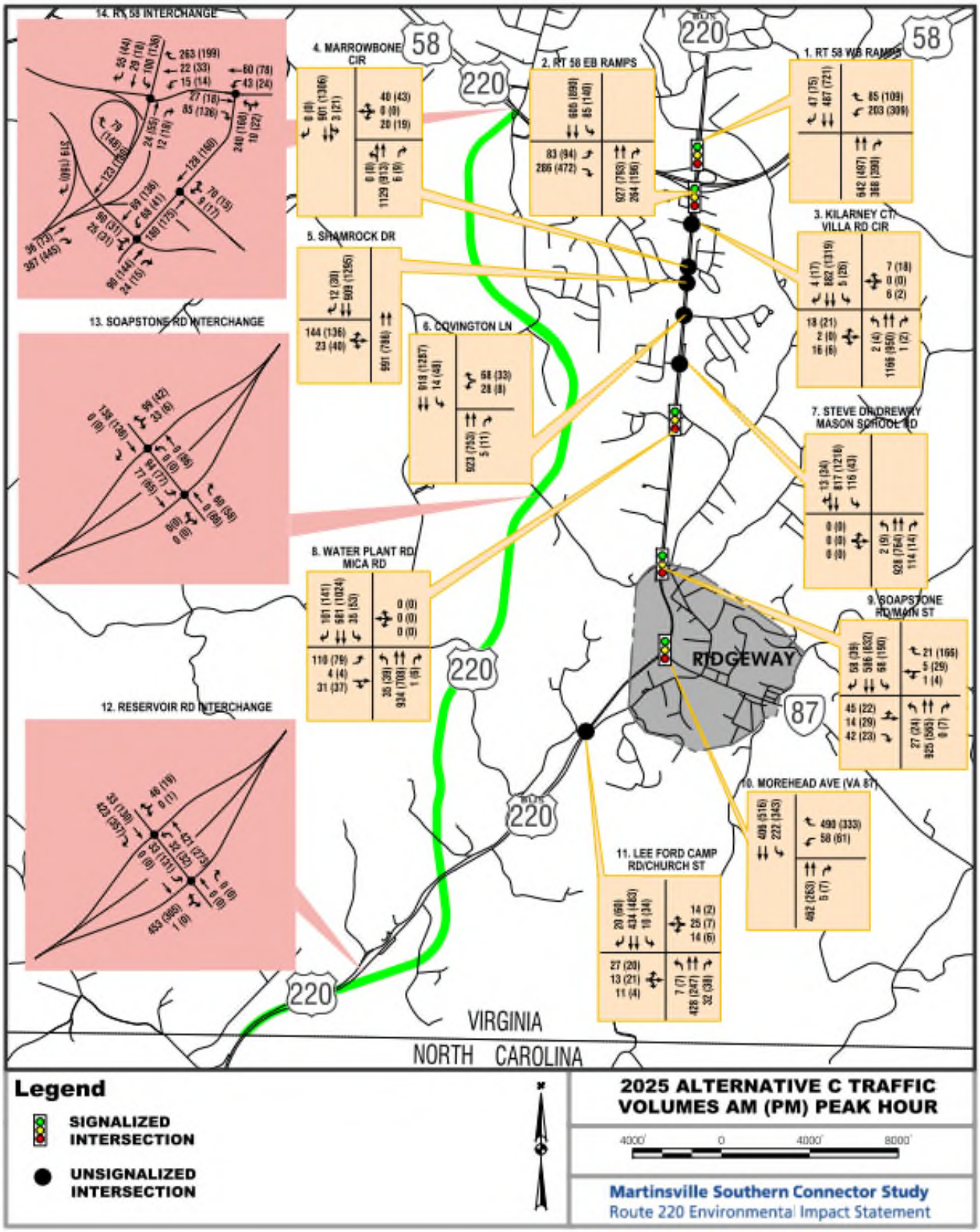
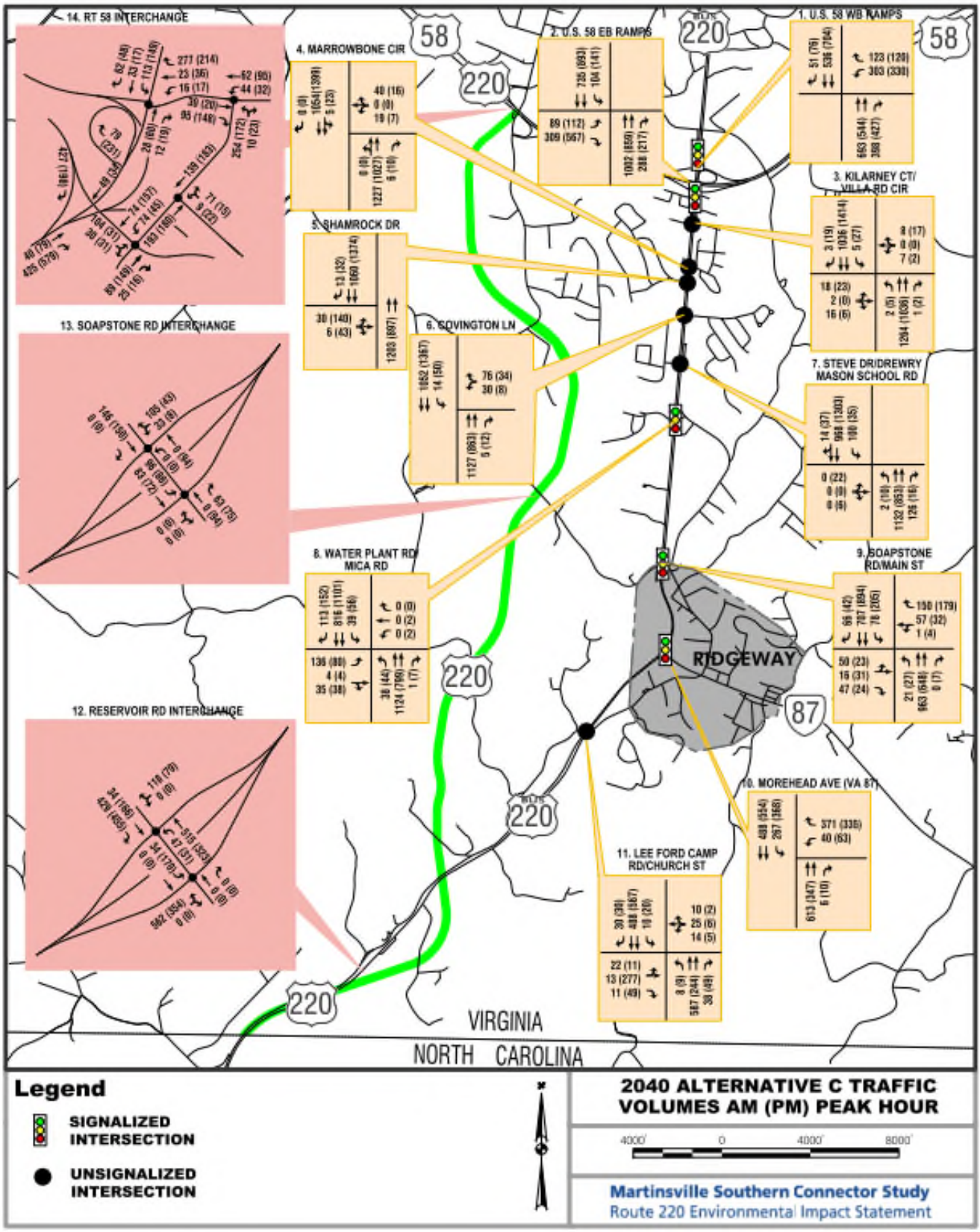


Figure 8-6: Alternative C 2040 Peak Hour Intersection Volumes



8.2 OPERATIONAL ANALYSES

8.2.1 Capacity Results

Capacity analysis was again computed using Synchro 10. Signal timings along the corridor were optimized for future conditions. **Table 8-1** and **Table 8-2** summarize the levels of service, delays, and queues for the no-build condition for 2025, and **Table 8-3** and **Table 8-4** summarize these values for 2040. Synchro worksheets are included in **Appendix J.**

There are some intersections, approaches and lane groups that operate at levels of service under LOS D, which are listed below.

Table 8-1: Alternative C 2025 Capacity Analysis Summary (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**A**	**9.1**		**B**	**13.7**	
	WB	**C**	**26.8**	-	**29.4**	C	-
	WBL/T	C	29.1	136.0	32.6	C	208.0
	WBR	C	21.4	25.0	20.3	**C**	29.0
	NB	**A**	**2.3**	**20.0**	**3.1**	**A**	**21.0**
	SB	**A**	**7.6**	-	**12.1**	B	-
	SBT	A	7.7	102.0	124.0	B	207.0
	SBR	A	6.3	10.0	9.1	**A**	23.0
2. Route 58 EB Ramp	**Overall**	**B**	**16.1**		**D**	**35.7**	
	EB	**C**	**29.7**	-	**E**	**61.2**	-
	EBL	C	27.8	73.0	B	19.4	73.0
	EBR	C	30.3	123.0	E	69.5	407.0
	NB	**B**	**16.3**	-	**D**	**37.0**	-
	NBT	B	17.5	194.0	D	40.8	328.0
	NBR	B	11.9	15.0	C	21.7	67.0
	SB	**A**	**8.7**	-	**C**	**20.3**	-
	SBL	D	42.4	88.0	E	61.8	180.0
	SBT	A	3.9	62.0	B	13.8	244.0
3. Kilarney Court/Villa Road	**EB**	**F**	**70.0**	45.0	**F**	**297.4**	**80.0**
	WB	**F**	**56.8**	15.0	**C**	**22.8**	**7.5**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	10.2	0.0	B	13.2	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL	B	11.9	0.0	B	10.8	10.8
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**66.7**	**67.5**	**F**	**63.1**	**67.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	-	**A**	**0.2**	-
	SBL/T	B	11.7	0.0	B	10.6	2.5
	SBT	-	-	-	-	-	-
5. Shamrock Drive	**EB**	**F**	**421.7**	**367.5**	**F**	**873.2**	**19.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**E**	**35.2**	**60.0**	**C**	**21.9**	**15.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	B	10.5	2.5	A	9.9	5.0
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.9	0.0	B	12.6	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.6**	-	**A**	**0.3**	-
	SBL	B	13.0	22.5	B	10.1	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8. Water Plant Road	**Overall**	**B**	**14.4**		**B**	**13.4**	
	EB	**C**	**33.4**	-	**D**	**36.4**	-
	EBL	D	35.9	111.0	D	38.6	83.0
	EBT/R	C	25.6	25.0	C	32.3	30.0
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**B**	**13.9**	-	**B**	**11.2**	-
	NBL	C	33.0	41.0	D	38.4	50.0
	NBT	B	13.2	156.0	A	9.7	261.0
	NBR	A	7.7	0.0	A	6.9	5.0
	SB	**B**	**11.6**	-	**B**	**12.5**	-
	SBL	C	31.6	41.0	D	36.8	60.0
	SBT	B	11.0	152.0	B	11.9	251.0
	SBR	A	8.4	0.0	A	7.5	5.0
9. Soapstone Road/Main Street	**Overall**	**B**	**14.0**		**C**	**31.6**	
	EB	**C**	**27.2**	-	**E**	**57.2**	-
	EBL/T	C	27.5	55.0	E	59.0	82.0
	EBR	C	26.9	0.0	D	53.2	0.0
	WB	**A**	**0.0**	-	**E**	**64.6**	-
	WBL/T	A	0.0	-	D	42.5	-
	WBR	A	0.0	-	E	69.0	-
	NB	**B**	**14.7**	-	**C**	**26.2**	-
	NBL	C	31.5	34.0	E	55.9	60.0
	NBT	B	14.2	242.0	C	25.5	268.0
	NBR	A	0.0	66.0	B	20.0	0.0
	SB	**B**	**11.3**	-	**C**	**26.2**	-
	SBL	C	30.6	66.0	E	55.9	221.0
	SBT	A	9.4	134.0	B	20.0	321.0
	SBR	A	7.3	0.0	B	13.3	0.0
10. Morehead Avenue (VA 87)	**Overall**	**F**	**123.0**		**C**	**25.0**	
	WB	**F**	**337.8**	-	**D**	48.7	-
	WBL	C	20.8	48.0	C	21.5	58.0
	WBR	F	375.4	203.0	D	53.7	59.0
	NB	**C**	**22.8**	-	**C**	27.2	-
	NBT	C	22.9	130.0	C	27.3	105.0
	NBR	B	16.4	7.0	C	23.3	11.0
	SB	**A**	**9.9**	-	**B**	13.5	-
	SBL	B	14.2	78.0	B	17.9	159.0
	SBT	A	7.6	65.0	B	10.6	108.0
11. Lee Ford Camp Road/Church Street	**EB**	**C**	**21.0**	**20.0**	**C**	**21.3**	**17.5**
	WB	**C**	**19.7**	**15.0**	**A**	**9.1**	**0.0**
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.5	0.0	A	8.8	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.5**	-
	SBL	A	8.5	0.0	A	8.0	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Table 8-2: Alternative C 2025 Capacity Analysis Summary (2)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
12.1. Resevoir Interchange WB Ramp	**WB**	**B**	**11.7**	**-**	**B**	**10.3**	
	WBL	A	0.0	-	B	14.7	0.0
	WBR	B	11.7	7.5	B	10.1	2.5
	NB	A	0.6	-	A	0.9	-
	NBL	**A**	**8.6**	**2.5**	**A**	**8.7**	**2.5**
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**0.0**	**95.0**	**C**	**16.1**	**75.0**
	EBL	**B**	**14.3**	**95.0**	**C**	**16.1**	**75.0**
	EBT/R	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBL	A	0.0	-	A	0.0	-
	SBT	A	0.0	-	A	0.0	-
13.1. Soapstone Interchange WB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	0.0	-	**A**	**0.0**	**-**
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**8.9**	**-**	**A**	**9.1**	**-**
	SBL	A	9.5	2.5	A	9.9	0.0
	SBR	A	8.7	7.5	A	9.0	5.0
13.2. Soapstone Interchange EB Ramp	**EB**	A	4.1	-	A	4.2	-
	EBL	A	7.5	5.0	A	7.7	5.0
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
14.1. Route 58 Interchange Southern	**WB**	**B**	**10.1**	**-**	**B**	**10.1**	**-**
	WBL	B	11.0	2.5	B	12.1	2.5
	WBT/R	B	10.0	32.5	B	10.0	1.1
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**20.0**
	NBL	A	0.0	-	A	0.0	-
	NBT/R	A	0.0	-	A	0.0	-
	SB	**A**	**4.1**	**-**	**A**	**5.3**	**-**
	SBL	A	7.5	5.0	A	7.6	0.8
	SBT/R	A	0.0	-	A	0.0	-
14.2. Fisher Farm Road/Fisher Farm Road	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WB	**A**	**3.2**	**-**	**A**	**1.8**	**-**
	WBL	A	7.6	2.5	A	7.6	2.5
	WBT/R	A	0.0	-	A	0.0	-
	NB	**B**	**13.1**	**47.5**	**B**	**11.8**	**30.0**
14.3. Fisher Farm Road/Route 58 WB Ramp	**WB**	**B**	**10.0**	**10.0**	**B**	**1.4**	**5.0**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
14.4. Fisher Farm Road/Route 58 EB Ramp	**EB**	**B**	**1.1**	**20.0**	**B**	**11.1**	**10.0**
	NB	**A**	**0.0**	**0.0**	**A**	**0.0**	**0.0**
	SB	**A**	**3.8**	**-**	**A**	**1.8**	**-**
	SBL	**A**	**7.6**	**5.0**	**A**	**7.7**	**2.5**
	SBT	**A**	**0.0**	**-**	**A**	**0.0**	**-**

Route 58 Eastbound Ramps: The eastbound right-turn and southbound left-turn experience extensive delays during the PM peak hour only.

Kilarney Court/Villa Road: Eastbound Kilarney Court experiences extensive delays during both peak hours, and westbound Villa Road experiences extensive delays during the AM peak hour only.

Marrowbone Circle: The westbound approach of Marrowbone Circle experiences extensive

delays during both peak hours.

Shamrock Drive: The eastbound approach of Shamrock Drive experiences extensive delays and queues during both peak hours.

Covington Lane: Westbound approach experiences extensive delays during the AM peak hour only.

Soapstone Road/ Main Street: The westbound right-turn, northbound and southbound left-turns experiences extensive delays during the PM peak hour only.

Morehead Avenue: The westbound right-turn experiences extensive delays during the AM peak hour only.

Table 8-3: Alternative C 2040 Capacity Results (1)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**B**	**11.3**		**16.6**	**B**	
	WB	**C**	**25.5**	-	**39.7**	**D**	-
	WBL/T	C	28.4	181.0	44.1	D	298.0
	WBR	B	18.4	46.0	27.5	C	35.0
	NB	**A**	**3.1**	**22.0**	**1.9**	**A**	**18.0**
	SB	**B**	**10.7**	-	**13.5**	**B**	-
	SBT	B	10.9	135.0	13.8	B	245.0
	SBR	A	8.7	14.0	10.4	B	25.0
2. Route 58 EB Ramp	**Overall**	**C**	**21.6**		**D**	**51.8**	
	EB	**D**	**47.4**	-	**E**	**77.5**	-
	EBL	C	26.4	78	C	21.0	96
	EBR	D	53.5	207	G	88.6	656
	NB	**B**	**18.7**	-	**E**	**56.8**	-
	NBT	C	20.4	295	E	63.3	482
	NBR	B	12.9	66	C	31.3	135
	SB	**B**	**13.6**	-	**C**	**29.7**	-
	SBL	E	62.3	117	F	98.4	238
	SBT	A	13.6	139	B	18.9	286
3. Kilarney Court/Villa Road	**EB**	**F**	**134.6**	**70**	**F**	**491.0**	**100**
	WB	**F**	**89.1**	**25**	**D**	**27.3**	**10**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	B	11.0	0	B	14.0	0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL	B	12.6	0.0	B	11.3	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**F**	**109.4**	**90.0**	**F**	**56.7**	**25.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL/T	B	12.4	0	B	11.3	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**102.1**	**60**	**F**	**1253.4**	**550**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**F**	**82.5**	**122.5**	**D**	**26.7**	**20**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.2**	-	**A**	**0.4**	-
	SBL	B	11.8	2.5	B	10.6	0.75
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/Drewry Mason School Road	**EB**	**A**	**0**	**0**	**F**	**150.3**	**60**
	NB	**A**	**0.0**	-	**A**	**0.2**	-
	NBL	B	10.7	0	B	13.3	2.5
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.4**	-	**A**	**0.3**	-
	SBL	C	15.2	22.5	B	10.5	5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
8. Water Plant Road	**Overall**	**B**	**16.6**		**C**	**20.7**	
	EB	**D**	**41.7**	-	**D**	**43.3**	-
	EBL	D	45.4	151	D	46.6	112
	EBT/R	C	28.9	28	D	37.1	34
	WB	**A**	**0.0**	-	**D**	**46.3**	-
	WBL	A	0.0	-	D	46.7	8
	WBT	A	0.0	-	D	46.0	8
	WBR	A	0.0	-	A	0.0	-
	NB	**B**	**16.0**	-	**B**	**17.2**	-
	NBL	D	39.1	48	D	44.7	65
	NBT	B	15.2	312	B	15.7	272
	NBR	A	7.8	0	B	10.5	0
	SB	**B**	**12.7**	-	**B**	**20.7**	-
	SBL	D	37.3	49	D	43.1	73
	SBT	B	12.1	206	B	20.8	461
	SBR	A	8.6	0	B	11.8	8
9. Soapstone Road/Main Street	**Overall**	**C**	**29.1**		**C**	**33.6**	
	EB	**E**	**57.7**	-	**E**	**59.4**	-
	EBL/T	E	59.1	102	E	61.5	87
	EBR	E	55.7	0	D	54.5	0
	WB	**E**	**61.1**	-	**E**	**69.7**	-
	WBL/T	D	45.0	92	D	42.6	64
	WBR	E	67.4	62	E	75.2	57
	NB	**C**	**25.8**	-	**C**	**29.9**	-
	NBL	E	60.2	47	E	60.7	55
	NBT	C	25.0	445	C	28.7	322
	NBR	A	0.0	-	C	20.8	0
	SB	**C**	**22.2**	-	**C**	**28.4**	-
	SBL	E	66.1	123	E	60.6	244
	SBT	B	18.2	275	C	21.7	370
	SBR	B	13.5	0	B	13.9	0
10. Morehead Avenue (VA 87)	**Overall**	**D**	**42.9**		**C**	**28.3**	
	WB	**F**	**123.3**	-	**E**	**61.5**	-
	WBL	C	24.0	43	C	22.9	61
	WBR	F	133.9	82	E	68.8	60
	NB	**C**	**26.2**	-	**C**	**28.5**	-
	NBT	C	26.3	213	C	28.7	134
	NBR	B	17.9	9	C	23.0	12
	SB	**B**	**12.8**	-	**B**	**13.9**	-
	SBL	B	19.9	116	B	19.6	167
	SBT	A	8.9	95	B	10.1	113
11. Lee Ford Camp Road/Chruch Street	**EB**	**D**	**27.9**	-	**F**	**419.6**	-
	EBL/T/R	**D**	**27.9**	25	**F**	**419.6**	667.5
	WB	**D**	**30.7**	**27.5**	**A**	**0.0**	-
	NB	**A**	**0.1**	-	**A**	**0.2**	-
	NBL	A	8.7	0	A	9.0	0
	NBT	A	0	-	A	0	-
	NBR	A	0	-	A	0	-
	SB	**A**	**0.2**	-	**A**	**0.3**	-
	SBL	A	9.1	0	A	8.3	2.5
	SBT	A	0	-	A	0	-
	SBR	A	0	-	A	0	-

Table 8-4: Alternative C 2040 Capacity Results (2)

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
12.1. Resevoir Interchange WB Ramp	**WB**	**B**	**14.5**	**-**	**B**	**11.4**	**-**
	WBL	A	0.0	0	C	17.1	0
	WBR	B	14.5	25	B	11.1	12.5
	NB	**A**	**0.7**	**-**	**A**	**0.8**	**-**
	NBL	A	8.8	5	A	9.1	2.5
	NBR	A	0	-	A	0	-
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**0.0**	**-**	**C**	**23.0**	**-**
	EBL	C	18.4	157.5	C	23.0	130
	EBT/R	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SBL	A	0.0	-	A	0.0	-
	SBT	A	0.0	-	A	0.0	-
13.1. Soapstone Interchange WB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBL	A	0.0	-	A	0.0	-
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**8.9**	**-**	**A**	**9.2**	**-**
	SBL	A	9.6	2.5	B	10.1	0
	SBR	A	8.7	10	A	9	5
13.2. Soapstone Interchange EB Ramp	**EB**	**A**	**4.0**	**-**	**A**	**4.2**	**-**
	EBL	A	7.5	5	A	7.8	5
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NBL	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
14.1. Route 58 Interchange Southern	**WB**	**B**	**10.3**	**-**	**B**	**10.4**	**-**
	WBL	B	11.4	2.5	B	12.6	2.5
	WBT/R	B	10.2	37.5	B	10.2	30
	NB	**A**	**0**	**-**	**A**	**0**	**-**
	NBL	A	0	-	A	0	-
	NBT/R	A	0	-	A	0	-
	SB	**A**	**4.1**	**-**	**A**	**5.4**	**-**
	SBL	A	7.5	7.5	A	5.4	10
	SBT/R	A	0	-	A	0	-
14.2. Fisher Farm Road/Fisher Farm Road	**EB**	**A**	**0**	**-**	**A**	**0**	**-**
	WB	**A**	**3.1**	**-**	**A**	**1.9**	**-**
	WBL	A	7.6	5	A	7.7	2.5
	WBT/R	A	0	-	A	0	-
	NB	**B**	**13.7**	**52.5**	**B**	**12.4**	**32.5**
14.3. Fisher Farm Road/Route 58 WB Ramp	**WB**	**B**	**10.1**	**10**	**B**	**10.7**	**5**
	NB	**A**	**0**	**-**	**A**	**0**	**-**
	SB	**A**	**0**	**-**	**A**	**0**	**-**
14.4. Fisher Farm Road/Route 58 EB Ramp	**EB**	**B**	**12.7**	**0**	**B**	**11.4**	**0**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**A**	**3.8**	**-**	**A**	**1.7**	**-**
	SBL	A	7.6	5	A	7.7	2.5
	SBT	A	0	-	A	0	-

Route 58 Eastbound Ramps: The eastbound right-turn experience extensive delays during both peak hours, and the northbound through and southbound left-turn experience extensive delays during the PM peak hour only.

Kilarney Court/Villa Road: The eastbound approach experience extensive delays during both peak hours and the westbound approach experience extensive delays during the AM peak hour only.

Marrowbone Circle: The westbound approach of Marrowbone Circle experiences extensive delays during both peak hours.

Figure 9-1: Alternative D AADT (Existing Alignment)

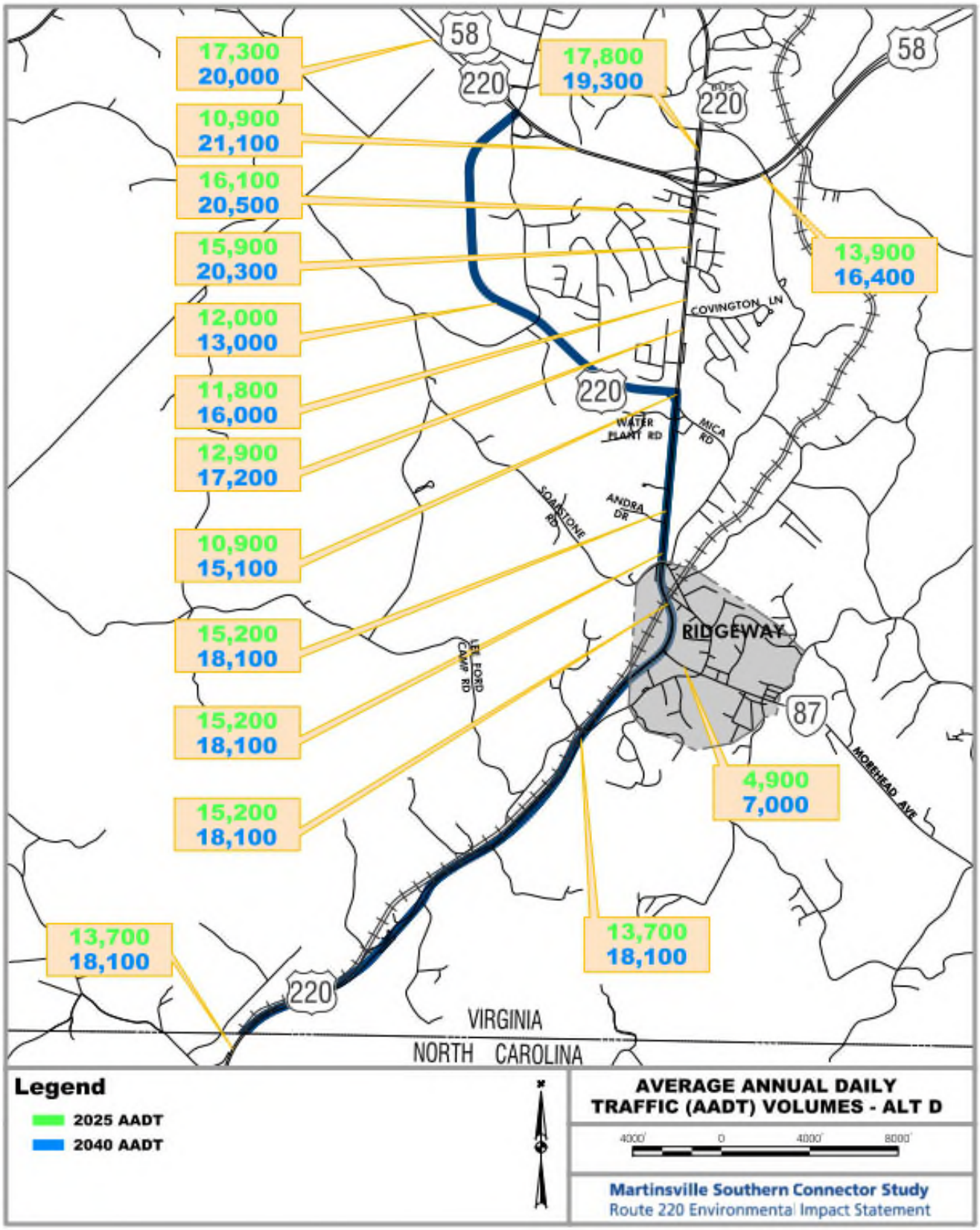


Figure 9-2: Alternative D AADT (New Alignment)

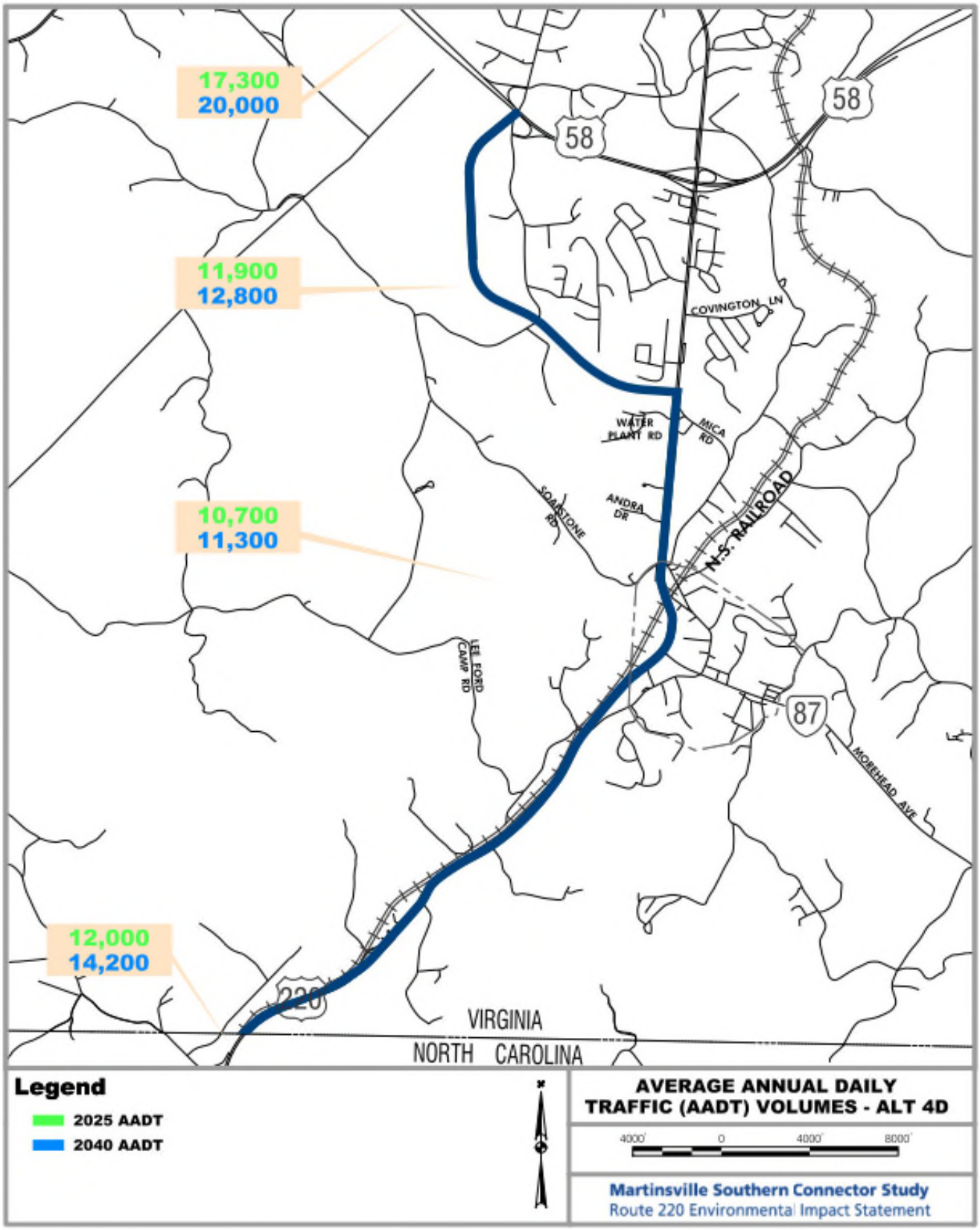


Figure 9-3: Alternative D Truck Percentages (Existing Alignment)

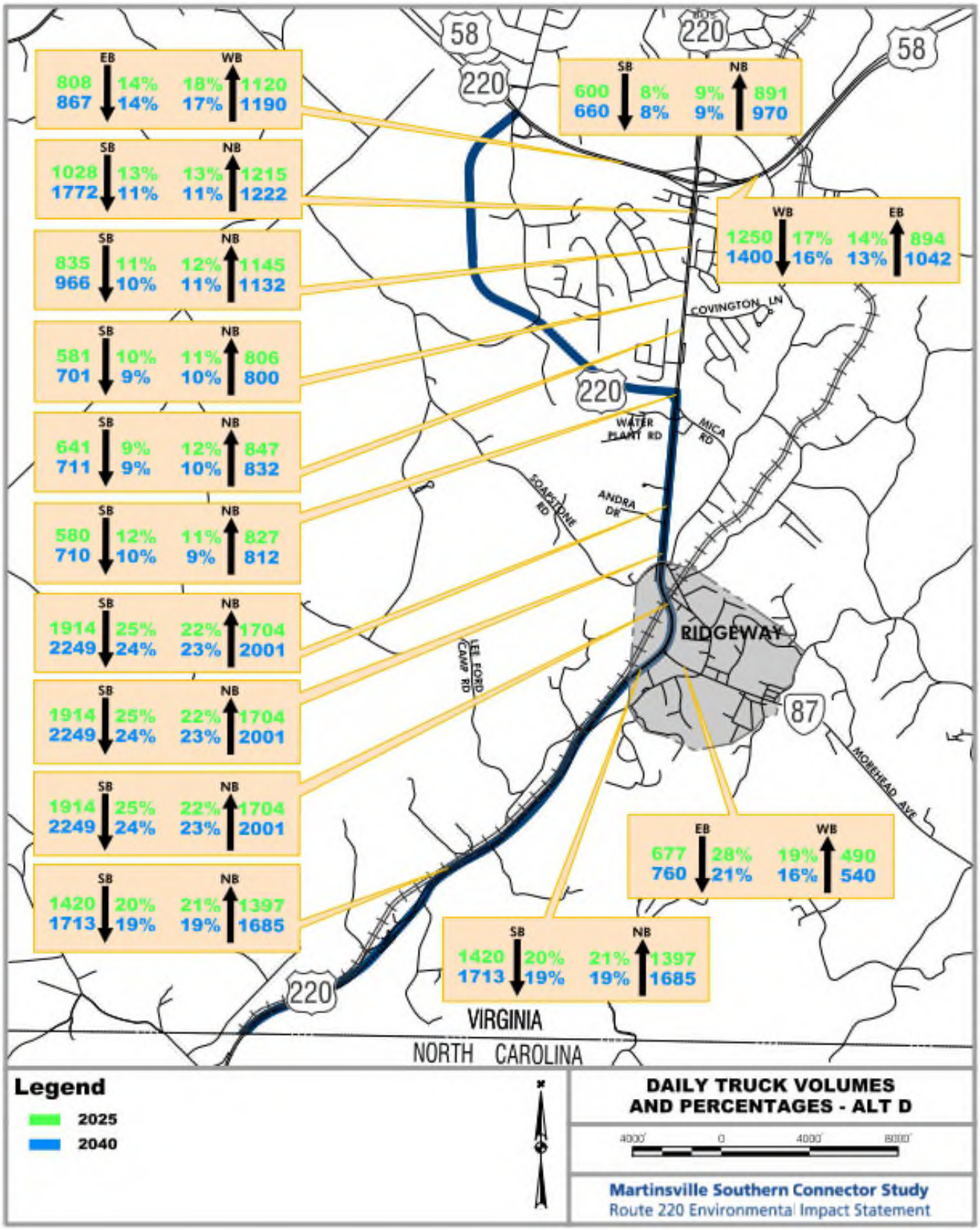


Figure 9-4: Alternative D Truck Percentages (New Alignment)

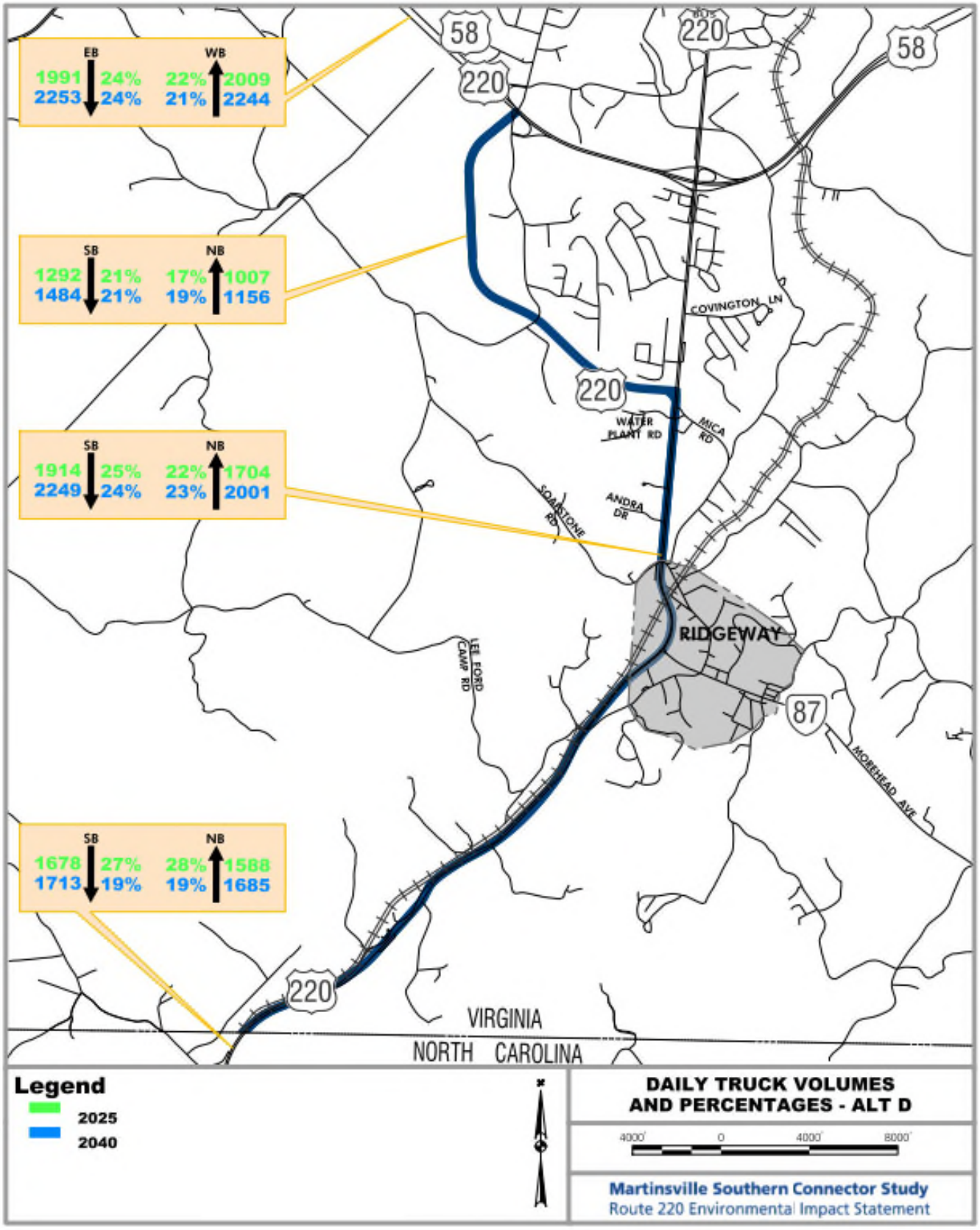

EB
1991 24%
2253 24%
WB
22% 2009
21% 2244
SB
1292 21%
1484 21%
NB
17% 1007
19% 1156
SB
1914 25%
2249 24%
NB
22% 1704
23% 2001
SB
1678 27%
1713 19%
NB
28% 1588
19% 1685
58
220
58
220
220
220
COVINGTON LN
WATER PLANT RD
MICA RD
SOAPSTONE RD
ANDRA DR
RIDGEWAY
LEE FORD CAMP RD
87
MOREHEAD AVE
VIRGINIA
NORTH CAROLINA
Legend
2025
2040
DAILY TRUCK VOLUMES
AND PERCENTAGES - ALT D
4000' 0 4000' 8000'
Martinsville Southern Connector Study
Route 220 Environmental Impact Statement

Figure 9-5: Alternative D 2025 Peak Hour Intersection Volumes

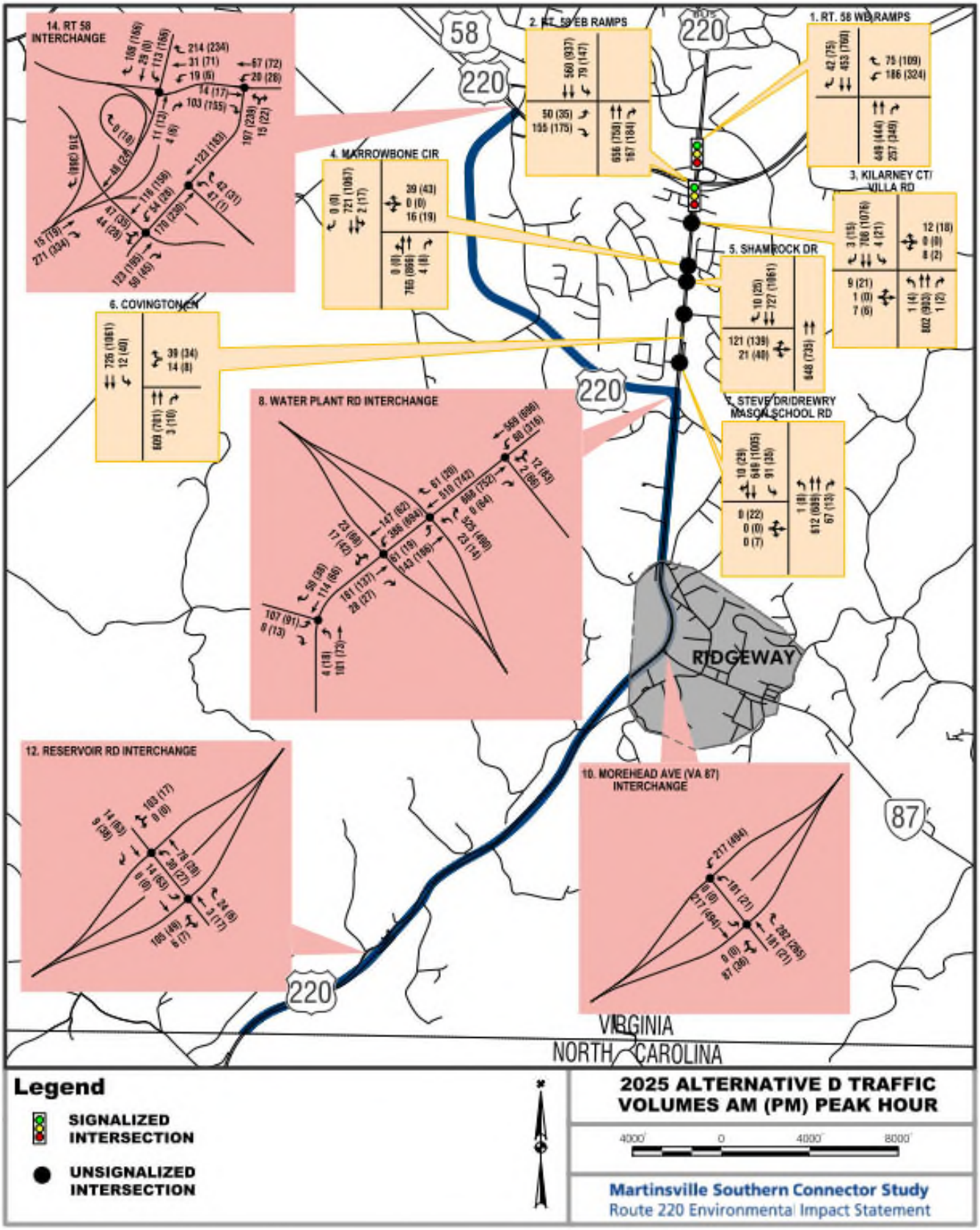
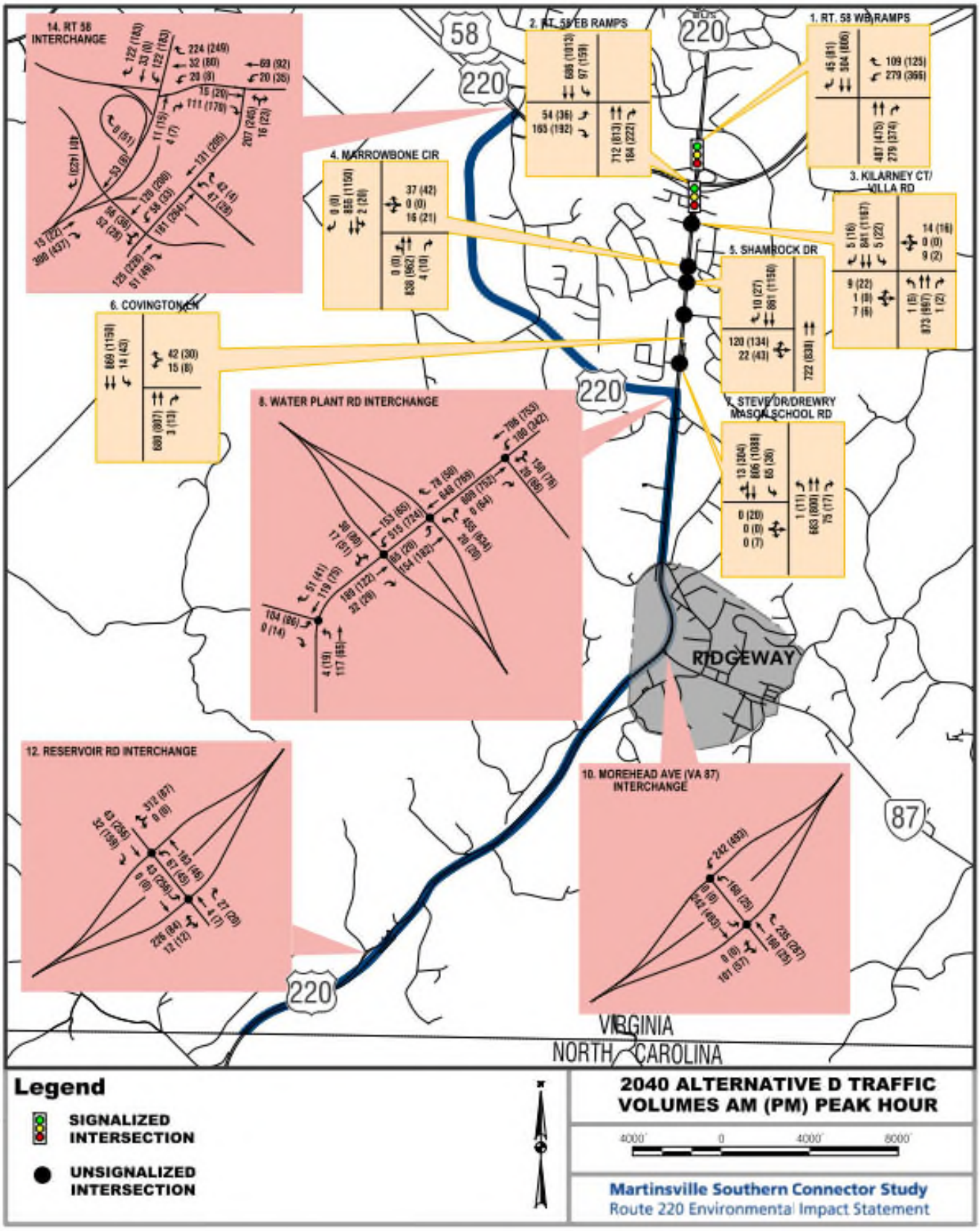


Figure 9-6: Alternative D 2040 Peak Hour Intersection Volumes



9.2 OPERATIONAL ANALYSES

9.2.1 Capacity Results

Capacity analysis was again computed using Synchro 10. Signal timings along the corridor were optimized for future conditions, as it was assumed that VDOT would continue to review timings along the corridor and make necessary adjustments to maximize traffic capacity. **Table 9-2** summarize the levels of service, delays, and queues for the no-build condition for 2025, and **Table 9-3** summarize these values for 2040. Synchro worksheets are included in **Appendix K.**

There are some intersections, approaches and lane groups that operate at or below capacity for both future design years, which are listed below.

Kilarney Court/Villa Road: The eastbound approach of Kilarney Court operates with excessive delay during the PM peak hour only for both design years.

Marrowbone Circle: The westbound approach of Marrowbone Circle operates with excessive delay during the PM peak hour only for both design years.

Shamrock Drive: The eastbound approach of Shamrock Drive operates with excessive delay during both peak hours for both design years.

Water Plant Road Westbound Ramps: The southbound left-turn operates with excessive delay during both peak hours for both design years.

9.2.1 Travel Time Results

Calculated average travel times using SimTraffic along the existing corridor between the North Carolina state line and the Route 58 interchange as well as between the border at the new interchange that the new alignment creates with Route 58 are shown in **Table 9-1**. Travel times generally increase slightly from 2025 to 2040 along both corridors.

Table 9-1: Alternative D Travel Times (Seconds)

Year	Southbound		Northbound	
	AM	PM	AM	PM
Existing Alignment				
2025	387.2	369.4	442.6	453.3
2040	395.3	343.4	458.4	412.9
New Alignment				
2025	435.5	400	473.3	479.7
2040	491.0	439.3	540.2	491.0

Table 9-2: Alternative D 2025 Capacity Analysis Summary

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**A**	**9.0**		**B**	**13.3**	
	WB	**C**	**22.4**	-	**C**	**26.3**	-
	WBL/T	C	24.0	111.0	C	29.2	198.0
	WBR	B	18.6	25.0	B	17.7	27.0
	NB	**A**	**3.1**	**18.0**	**A**	**3.1**	**20.0**
	SB	**A**	**7.2**	-	**B**	**12.1**	-
	SBT	A	7.3	84.0	B	12.4	195.0
	SBR	A	6.1	6.0	A	8.9	22.0
2. Route 58 EB Ramp	**Overall**	**B**	**12.0**		**B**	**14.6**	-
	EB	**C**	**24.5**	-	**C**	**28.8**	-
	EBL	C	25.3	45.0	C	27.5	40.0
	EBR	C	24.3	43.0	C	29.1	73.0
	NB	**B**	**13.2**	-	**B**	**16.9**	-
	NBT	B	13.8	161.0	B	17.9	214.0
	NBR	B	10.5	24.0	B	12.9	41.0
	SB	**A**	**6.5**	-	**A**	**9.9**	-
	SBL	C	28.8	68.0	C	33.0	123.0
	SBT	A	3.3	50.0	A	6.3	170.0
3. Kilarney Court/ Villa Road	**EB**	**D**	**28.0**	**10.0**	**F**	**116.0**	**50.0**
	WB	**C**	**23.8**	**10.0**	**C**	**19.0**	**7.5**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.4	0.0	B	11.4	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL	A	9.8	0.0	B	10.5	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**C**	**21.8**	**22.5**	**E**	**40.4**	**45.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	-	**A**	**0.2**	-
	SBL/T	A	9.6	0.0	B	10.3	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**68.6**	**140.0**	**F**	**443.5**	**397.5**
	NB	**A**	**0.0**	**140.0**	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**C**	**15.5**	**12.5**	**C**	**17.8**	**12.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.3**	-
	SBL	A	9.0	0.0	A	9.6	5.0
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/ Drewry Mason School Road	**EB**	**A**	**0.0**	0.0	**F**	**53.0**	30.0
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.1	0.0	B	11.1	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.2**	-	**A**	**0.3**	-
	SBL	A	9.9	10.0	A	9.7	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8.1. Water Plant Road WB	**EB**	**B**	**11.2**	15.0	**B**	**10.5**	12.5
	NB	A	7.6	0.0	A	7.5	0.0
	SB	A	0.0	-	A	0.0	-
8.2. Water Plant Road WB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**6.6**	-	**A**	**10.1**	-
	WBL	A	9.1	37.5	B	10.6	95.0
	WBT	A	0.0	-	A	0.0	-
	SB	**D**	**28.3**	-	**F**	**477.4**	-
	SBL	E	42.4	20.0	F	766.9	8.5
	SBT/R	A	9.2	2.5	A	8.5	0.1

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
8.3. Water Plant Road EB Ramp	**EB**	**A**	**2.7**		**A**	**0.9**	
	EBL	A	9.2	5.0	A	9.8	2.5
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**C**	**18.0**	-	**C**	**18.7**	-
	NBL	B	14.0	5.0	B	14.5	2.5
	NBT/R	C	18.2	145.0	C	18.8	142.5
8.4. Water Plant Road EB	**WB**	**C**	**31.0**	-	**C**	**32.1**	-
	WBL	C	25.3	5.0	C	28.6	60.0
	WBR	C	31.8	13.0	C	34.9	35.0
	NB	**B**	**11.1**	-	**C**	**22.2**	-
	NBT	B	11.1	56.0	C	22.7	198.0
	NBR	A	0.0	0.0	B	16.2	21.0
	SB	**A**	**6.8**	-	**B**	**17.5**	-
	SBL	C	27.6	64.0	D	43.8	252.0
	SBT	A	3.9	62.0	A	5.5	76.0
9.1. Soapstone Road	**EB**	**A**	**7.4**	**5.0**	**A**	**4.8**	**5.0**
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**9.1**	**10.0**	**B**	**10.8**	**10.0**
9.2. Soapstone Road/ Main Street	**EB**	**A**	**0.0**	**0.0**	**A**	**7.5**	**2.5**
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**B**	**11.3**	**25.0**
10.1. Morehead Avenue Interchange SB Ramp	**WB**	**A**	**10.0**	**30.0**	**A**	**9.1**	**2.5**
	SB	**B**	**12.1**	-	**D**	**26.6**	-
	SBL	B	12.1	47.5	D	26.6	212.5
	SBT	A	7.8	0.0	A	7.3	0.0
10.2. Morehead Avenue Interchange NB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBL	A	0.0	-	A	0.0	-
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**B**	**10.3**	-	**B**	**12.6**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	B	10.3	10.0	B	12.6	212.5
12.1. Resevoir Interchange WB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**2.2**	-	**A**	**3.9**	-
	WBL	A	7.8	2.5	A	8.0	2.5
	WBT	-	-	-	-	-	-
	SB	**A**	**9.5**	**10.0**	**A**	**8.7**	**2.5**
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**7.8**	-	**A**	**7.9**	-
	EBL	A	7.8	0.0	A	7.9	5.0
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	NB	**A**	**0.0**	-	**A**	**0.0**	-
14.1. Route 58 Interchange Southern	**WB**	**A**	**9.7**	-	**B**	**10.1**	-
	WBL	B	11.0	2.5	B	11.9	0.0
	WBT/R	A	9.6	27.5	B	10.0	35.0
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL	A	0.0	0.0	A	0.0	0.0
	NBT/R	A	0.0	-	A	0.0	-
	SB	**A**	**4.9**	-	**A**	**6.5**	-
	SBL	A	7.4	7.5	A	7.6	10.0
	SBT/R	-	-	-	-	-	-
14.2. Fisher Farm Road/Fisher Farm Road	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	WB	**A**	**1.7**	**0.0**	**A**	**2.1**	**2.5**
	NB	**B**	**11.5**	**32.5**	**B**	**13.2**	**50.0**
14.3. Fisher Farm Road/Route 58 WB Ramp	**WB**	**B**	**10.7**	**12.5**	**A**	**9.9**	**2.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
14.4. Fisher Farm Road/Route 58 EB Ramp	**EB**	**B**	**11.2**	**12.5**	**B**	**11.4**	**10.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**2.5**	-	**A**	**1.2**	-

Table 9-3: Alternative D 2040 Capacity Analysis Summary

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
1. Route 58 WB Ramp	**Overall**	**A**	**9.0**		**B**	**13.3**	
	WB	**C**	**22.4**	-	**C**	**26.3**	-
	WBL/T	C	24.0	111.0	C	29.2	198.0
	WBR	B	18.6	25.0	B	17.7	27.0
	NB	**A**	**3.1**	**18.0**	**A**	**3.1**	**20.0**
	SB	**A**	**7.2**	-	**B**	**12.1**	-
	SBT	A	7.3	84.0	B	12.4	195.0
	SBR	A	6.1	6.0	A	8.9	22.0
2. Route 58 EB Ramp	**Overall**	**B**	**12.0**		**B**	**14.6**	-
	EB	**C**	**24.5**	-	**C**	**28.8**	-
	EBL	C	25.3	45.0	C	27.5	40.0
	EBR	C	24.3	43.0	C	29.1	73.0
	NB	**B**	**13.2**	-	**B**	**16.9**	-
	NBT	B	13.8	161.0	B	17.9	214.0
	NBR	B	10.5	24.0	B	12.9	41.0
	SB	**A**	**6.5**	-	**A**	**9.9**	-
	SBL	C	28.8	68.0	C	33.0	123.0
	SBT	A	3.3	50.0	A	6.3	170.0
3. Kilarney Court/ Villa Road	**EB**	**D**	**28.0**	**10.0**	**F**	**116.0**	**50.0**
	WB	**C**	**23.8**	**10.0**	**C**	**19.0**	**7.5**
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.4	0.0	B	11.4	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.2**	-
	SBL	A	9.8	0.0	B	10.5	2.5
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
4. Marrowbone Circle	**WB**	**C**	**21.8**	**22.5**	**E**	**40.4**	**45.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL/T	A	0.0	-	A	0.0	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.0**	-	**A**	**0.2**	-
	SBL/T	A	9.6	0.0	B	10.3	2.5
	SBT	A	0.0	-	A	0.0	-
5. Shamrock Drive	**EB**	**F**	**68.6**	**5.6**	**F**	**443.5**	**397.5**
	NB	**A**	**0.0**	**140.0**	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
6. Covington Lane	**WB**	**C**	**15.5**	**12.5**	**C**	**17.8**	**12.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**0.1**	-	**A**	**0.3**	-
	SBL	A	9.0	0.0	A	9.6	5.0
	SBT	A	0.0	-	A	0.0	-
7. Steve Drive/ Drewry Mason School Road	**EB**	**A**	**0.0**	0.0	**F**	**53.0**	30.0
	NB	**A**	**0.0**	-	**A**	**0.1**	-
	NBL	A	9.1	0.0	B	11.1	0.0
	NBT	A	0.0	-	A	0.0	-
	NBR	A	0.0	-	A	0.0	-
	SB	**A**	**1.2**	-	**A**	**0.3**	-
	SBL	A	9.9	10.0	A	9.7	5.0
	SBT	A	0.0	-	A	0.0	-
	SBR	A	0.0	-	A	0.0	-
8.1. Water Plant Road WB	**EB**	**B**	**11.2**	15.0	**B**	**10.5**	12.5
	NB	A	7.6	0.0	A	7.5	0.0
	SB	A	0.0	-	A	0.0	-
8.2. Water Plant Road WB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**6.6**	-	**A**	**10.1**	-
	WBL	A	9.1	37.5	B	10.6	95.0
	WBT	A	0.0	-	A	0.0	-
	SB	**D**	**28.3**	-	**F**	**477.4**	-
	SBL	E	42.4	20.0	F	766.9	8.5
	SBT/R	A	9.2	2.5	A	8.5	0.1

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
8.3. Water Plant Road EB Ramp	**EB**	**A**	**2.7**		**A**	**0.9**	
	EBL	A	9.2	5.0	A	9.8	0.1
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**C**	**18.0**	-	**C**	**18.7**	-
	NBL	B	14.0	5.0	B	14.5	0.1
	NBT/R	C	18.2	145.0	C	18.8	5.7
8.4. Water Plant Road EB	**WB**	**C**	**31.0**	-	**C**	**32.1**	-
	WBL	C	25.3	5.0	C	28.6	60.0
	WBR	C	31.8	13.0	C	34.9	35.0
	NB	**B**	**11.1**	-	**C**	**22.2**	-
	NBT	B	11.1	56.0	C	22.7	198.0
	NBR	A	0.0	0.0	B	16.2	21.0
	SB	**A**	**6.8**	-	**B**	**17.5**	-
	SBL	C	27.6	64.0	D	43.8	252.0
	SBT	A	3.9	62.0	A	5.5	76.0
9.1. Soapstone Road	**EB**	**A**	**7.4**	**5.0**	**A**	**4.8**	**5.0**
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**9.1**	**10.0**	**B**	**10.8**	**10.0**
9.2. Soapstone Road/ Main Street	**EB**	**A**	**0.0**	**0.0**	**A**	**7.5**	**2.5**
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**B**	**11.3**	**25.0**
10.1. Morehead Avenue Interchange SB Ramp	**WB**	**A**	**10.0**	**30.0**	**A**	**9.1**	**2.5**
	SB	**B**	**12.1**	-	**D**	**26.6**	-
	SBL	B	12.1	47.5	D	26.6	212.5
	SBT	A	7.8	0.0	A	7.3	0.0
10.2. Morehead Avenue Interchange NB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBL	A	0.0	-	A	0.0	-
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**B**	**10.3**	-	**B**	**12.6**	-
	NBT	A	0.0	-	A	0.0	-
	NBR	B	10.3	10.0	B	12.6	212.5
12.1. Resevoir Interchange WB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**2.2**	-	**A**	**3.9**	-
	WBL	A	7.8	2.5	A	8.0	2.5
	WBT	-	-	-	-	-	-
	SB	**A**	**9.5**	**10.0**	**A**	**8.7**	**2.5**
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**7.8**	-	**A**	**7.9**	-
	EBL	A	7.8	0.0	A	7.9	5.0
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	NB	**A**	**0.0**	-	**A**	**0.0**	-
14.1. Route 58 Interchange Southern	**WB**	**A**	**9.7**	-	**B**	**10.1**	-
	WBL	B	11.0	2.5	B	11.9	0.0
	WBT/R	A	9.6	27.5	B	10.0	35.0
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	NBL	A	0.0	0.0	A	0.0	0.0
	NBT/R	A	0.0	-	A	0.0	-
	SB	**A**	**4.9**	-	**A**	**6.5**	-
	SBL	A	7.4	7.5	A	7.6	10.0
	SBT/R	-	-	-	-	-	-
14.2. Fisher Farm Road/Fisher Farm Road	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	WB	**A**	**1.7**	**0.0**	**A**	**2.1**	**2.5**
	NB	**B**	**11.5**	**32.5**	**B**	**13.2**	**50.0**
14.3. Fisher Farm Road/Route 58 WB Ramp	**WB**	**B**	**10.7**	**12.5**	**A**	**9.9**	**2.5**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**0.0**	-	**A**	**0.0**	-
14.4. Fisher Farm Road/Route 58 EB Ramp	**EB**	**B**	**11.2**	**12.5**	**B**	**11.4**	**10.0**
	NB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**A**	**2.5**	-	**A**	**1.2**	-

Figure 10-1: Alternative E AADT

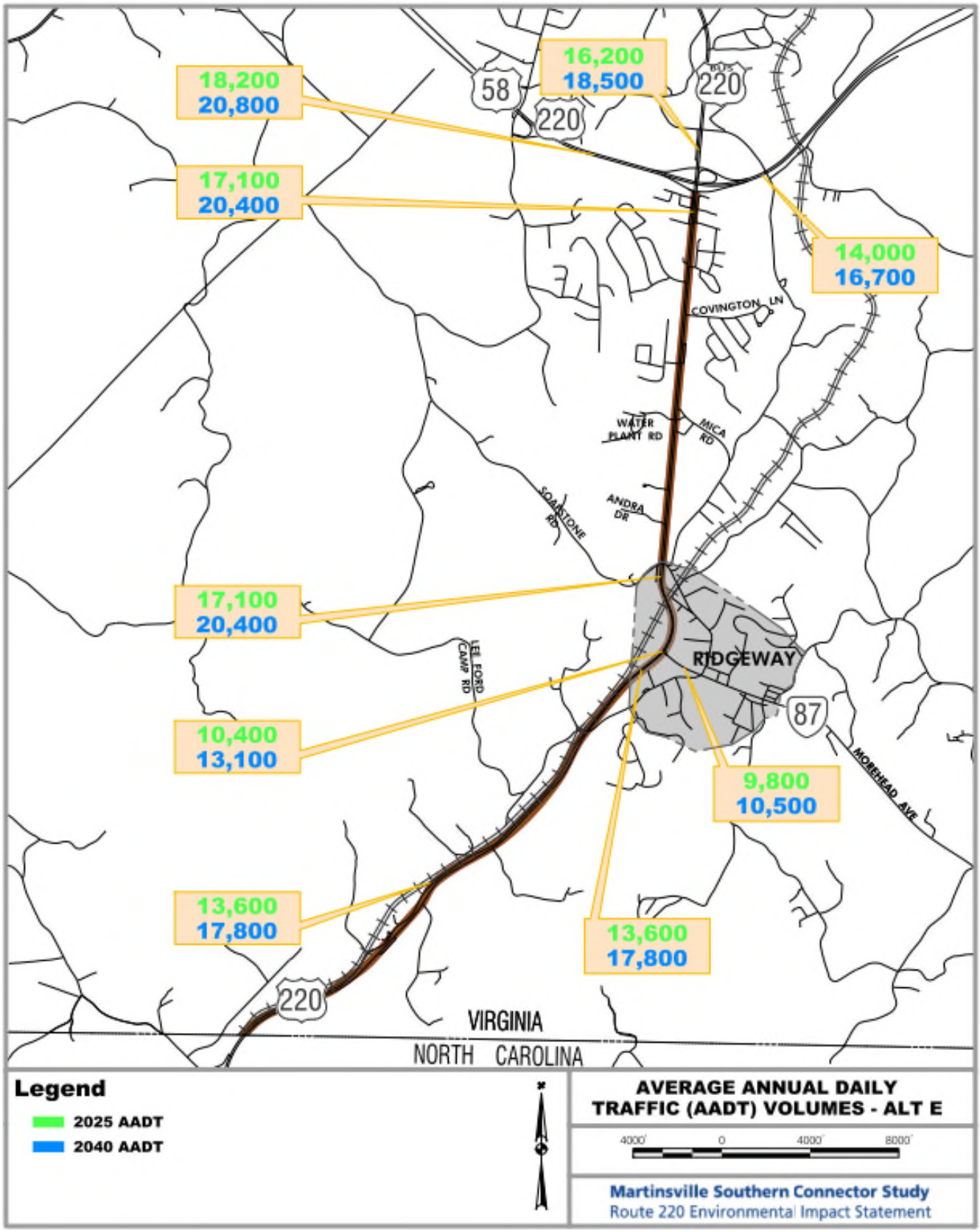


Figure 10-2: Alternative E Truck AADT and Percentages

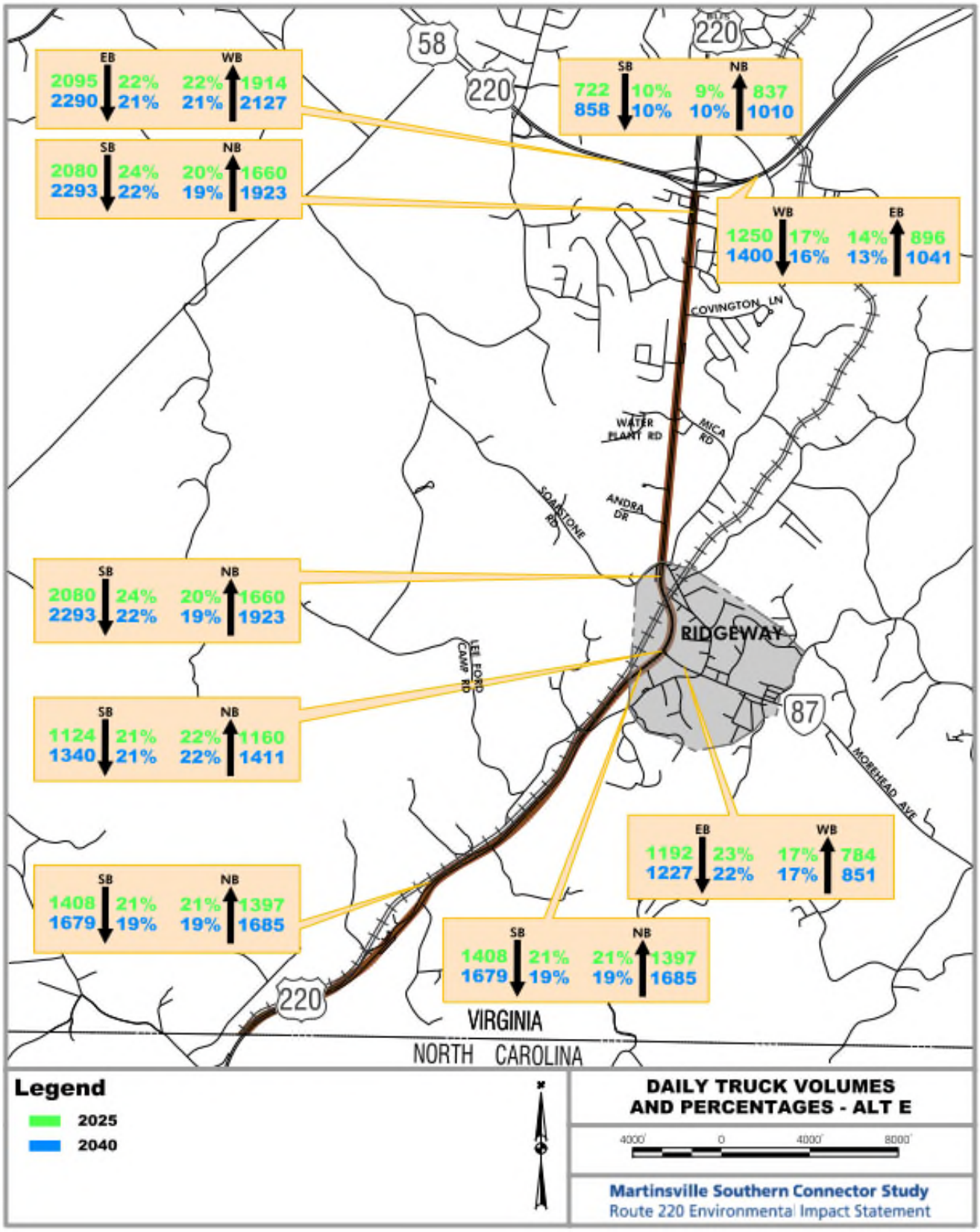


Figure 10-3: Alternative E 2025 Peak Hour Intersection Volumes

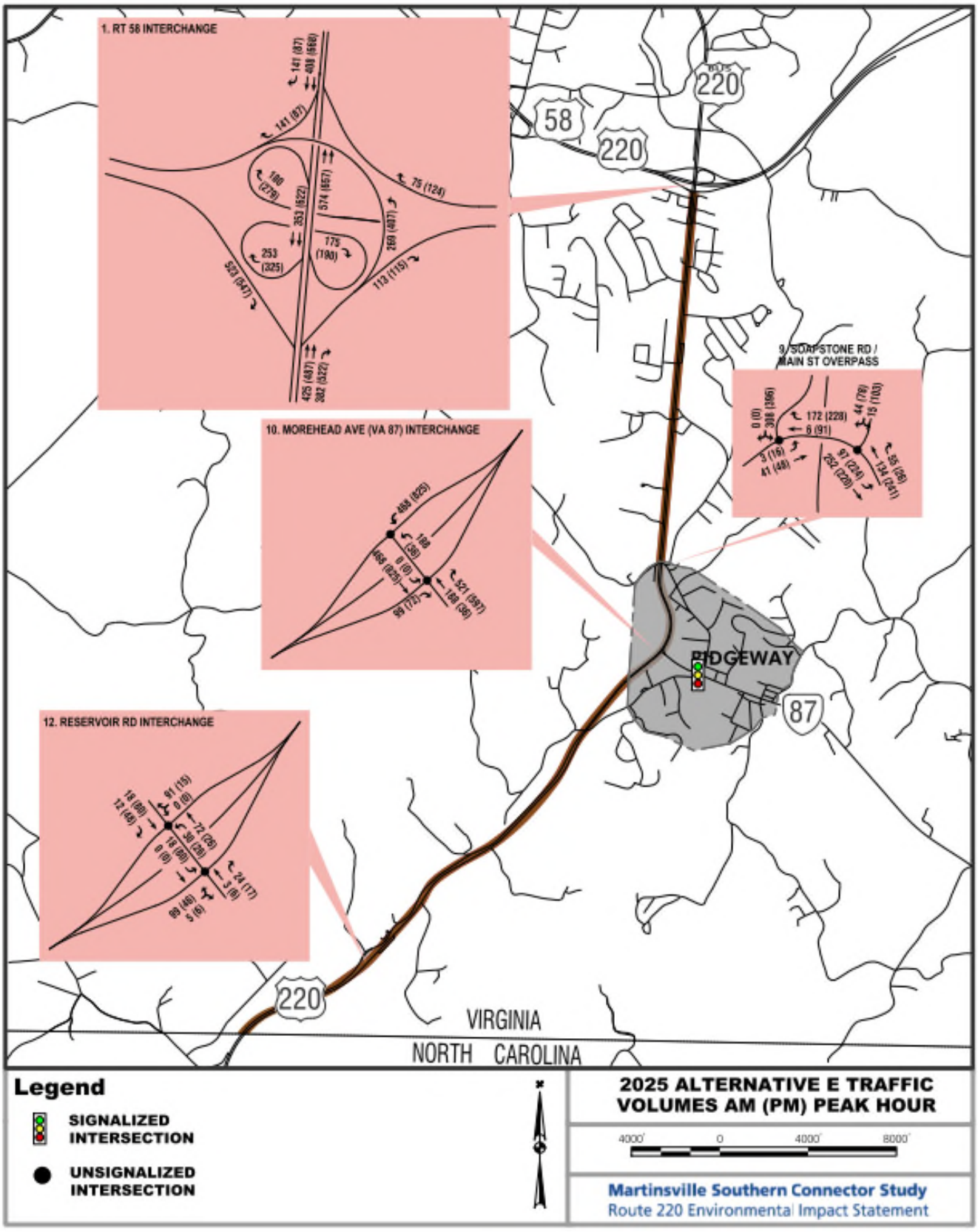
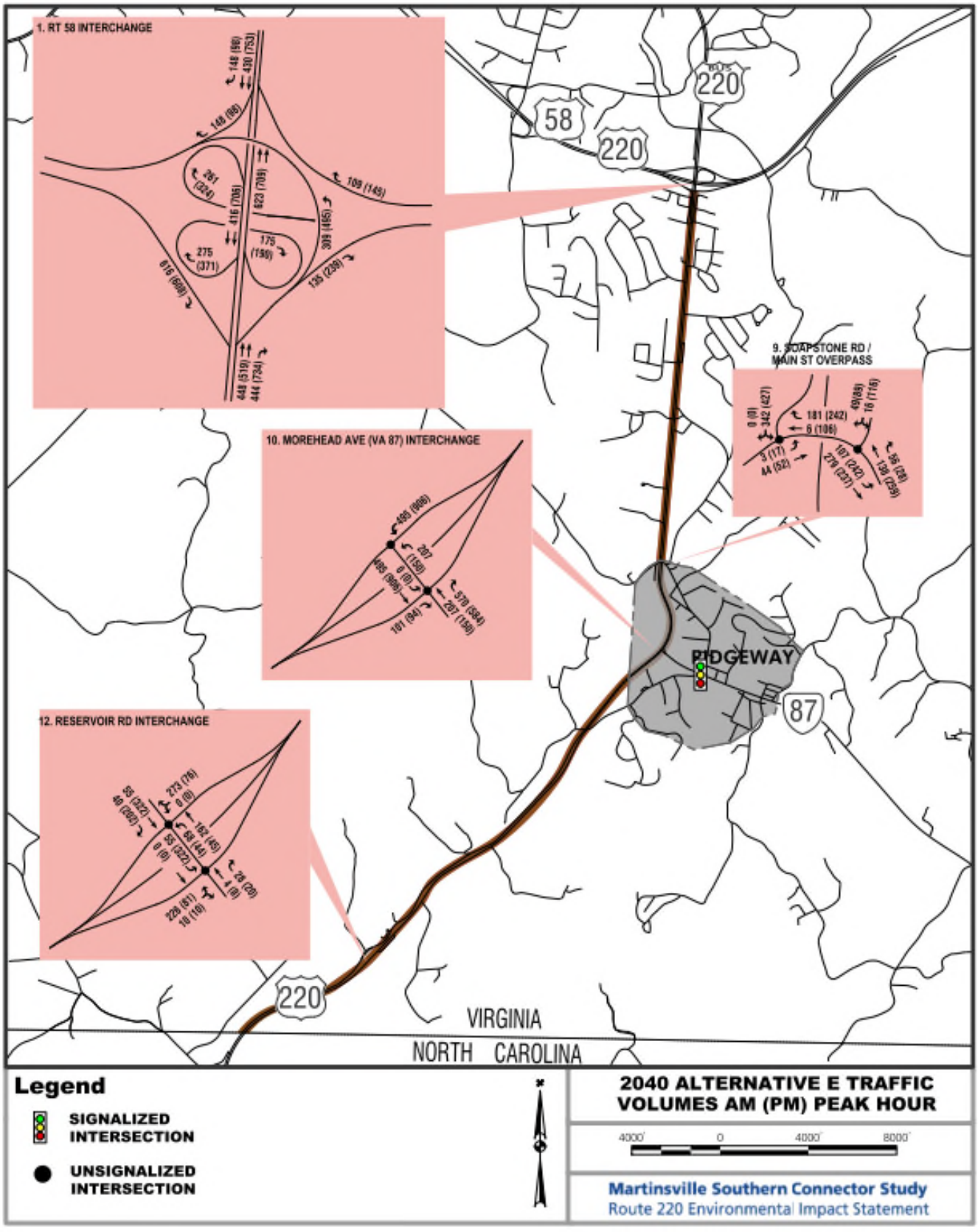


Figure 10-4: Alternative E 2040 Peak Hour Intersection Volumes



10.2 OPERATIONAL ANALYSES

10.2.1 Capacity Results

Capacity analysis was again computed using Synchro 10. **Table 10-1** summarizes the levels of service, delays, and queues for the no-build condition for 2025, and **Table 10-2** summarizes these values for 2040. Synchro worksheets are included in **Appendix L.**

There are some intersections, approaches and lane groups that operate at or below capacity, which are listed below.

Morehead Avenue @ Route 220 SB Ramp: The southbound left-turn experience extensives delays and queues during the PM peak hour in 2025 and both peak hours in 2040.

Table 10-1: 2025 Alternative E Capacity Analysis Summary

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
9.1. Soapstone Road	**EB**	**A**	**7.6**	0.0	**A**	**8.1**	0.0
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**B**	**12.4**	52.5	**C**	**21.4**	135.0
9.2. Soapstone Road/ Main Street	**EB**	**A**	**7.9**	7.5	**A**	**8.1**	0.0
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	SB	**B**	**11.2**	7.5	**C**	**21.4**	135.0
10.1. Morehead Avenue/ Route 220 SB Ramp	**WB**	**B**	**11.7**	**37.5**	**B**	**10.3**	**5.0**
	SB	**D**	**30.3**	-	**F**	**190.1**	-
	SBL	D	30.3	222.5	F	190.1	992.5
	SBT	A	7.9	0.0	A	7.4	**0.0**
10.2. Morehead Avenue/ Route 220 NB Ramp	**EB**	**A**	**0.0**	-	**A**	**0**	-
	EBL	B	13.5	20.0	C	20.6	**25.0**
	EBT	A	0.0	-	A	0	-
	WB	**A**	**0.0**	-	**A**	**0**	-
	WBT	A	0.0	-	A	0	-
	WBR	A	0.0	-	A	0	-
	NB	**B**	**13.5**	-	**C**	**20.6**	-
	NBT	A	0.0	-	A	0	-
	NBR	B	13.5	20.0	C	20.6	**25.0**
12.1. Resevoir Interchange WB Ramp	**EB**	**A**	**0.0**	-	**A**	**0.0**	-
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	A	2.2	-	A	4.1	-
	WBL	**A**	**7.3**	**2.5**	**A**	**8.1**	**2.5**
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**9.1**	**10**	**A**	**8.7**	**2.5**
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**7.3**	-	**A**	**7.9**	-
	EBL	**A**	**7.3**	**0**	**A**	**7.9**	**5**
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	-	**A**	**0.0**	-
	NB	**A**	**0.0**	-	**A**	**0.0**	-

Table 10-2: 2025 Alternative E Capacity Analysis Summary

Intersection	Movement	AM			PM		
		LOS	Delay (sec)	Queue (ft)	LOS	Delay (sec)	Queue (ft)
9.1. Soapstone Road	**EB**	**A**	**8.1**	**2.5**	**A**	**7.7**	**0.0**
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**D**	**27.0**	**177.5**	**B**	**13.2**	**65.0**
9.2. Soapstone Road/ Main Street	**EB**	**A**	**8.8**	**22.5**	**A**	**7.9**	**7.5**
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	SB	**F**	**82.2**	**207.5**	**B**	**11.6**	**10.0**
10.1. Morehead Avenue/ Route 220 SB Ramp	**WB**	**B**	**13.2**	**27.5**	**B**	**12.6**	**45.0**
	SB	**F**	**309.6**	**-**	**E**	**42**	**-**
	SBL	F	309.6	1422.5	E	42	287.5
	SBT	A	7.8	0.0	A	8	0.0
10.2. Morehead Avenue/ Route 220 NB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBL	A	0.0	-	A	0.0	-
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	WBT	A	0.0	-	A	0.0	-
	WBR	A	0.0	-	A	0.0	-
	NB	**D**	**26.0**	**-**	**B**	**14**	**-**
	NBT	A	0.0	-	A	0	-
	NBR	D	26.0	42.5	B	14	20.0
12.1. Resevoir Interchange WB Ramp	**EB**	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	EBT	A	0.0	-	A	0.0	-
	EBR	A	0.0	-	A	0.0	-
	WB	**A**	**4.9**	**-**	**A**	**2.4**	**-**
	WBL	A	9.9	5	A	8.1	5
	WBT	A	0.0	-	A	0.0	-
	SB	**A**	**9.1**	**7.5**	**B**	**12.3**	**45**
12.2. Resevoir Interchange EB Ramp	**EB**	**A**	**8.8**	**-**	**A**	**7.9**	**-**
	EBL	A	8.8	27.5	A	7.9	2.5
	EBT	A	0.0	-	A	0.0	-
	WB	**A**	**0.0**	**-**	**A**	**0.0**	**-**
	NB	**A**	**0.0**	**-**	**A**	**0.0**	**-**

10.2.2 Travel Time Results

Travel times along the existing corridor between the North Carolina state line and the US 58 interchange as well as between the border at the new interchange that the new alignment creates with US 58 are shown in **Table 10-3**. Travel times are extensive southbound during the PM peak hour. The location where traffic queues is north of the ramp to US 220 southbound toward the North Carolina state line.

Table 10-3: Alternative E Travel Times (Seconds)

Year	Southbound		Northbound	
	AM	PM	AM	PM
2025	823.7	2250.6	491.7	494.5
2040	782.5	2938.6	490.3	694.9

11.CONCLUSIONS

Auto and truck volumes were collected and developed for the Route 220 study corridor for existing, future 2025 and 2040 no-build and future 2025 and 2040 build conditions for five alternative alignments. Capacity at the study intersections and corridor travel times were evaluated for each condition and design year. Table 11-1 summarizes the travel time results for each condition compare the effects of each alternative build condition with the no-build conditions.

Table 11-1: Travel Times Summary (Seconds)

Alternative	Year	Southbound		Northbound	
		AM	PM	AM	PM
Existing	2018	495.9	542.5	539.4	576.0
No-Build	2025	478.7	581.0	577.2	582.1
	2040	507.7	457.8	595.3	567.2
A	**Existing Alignment**				
	2025	480.6	517.2	489.2	491.8
	2040	521.6	521.7	519.8	517.3
	New Alignment				
	2025	338.7	336.3	384.1	364.1
	2040	343.6	348.6	363.5	380.5
B	**Existing Alignment**				
	2025	500.3	399.2	493.0	513.8
	2040	509.6	512.4	507.3	506.8
	New Alignment				
	2025	399.2	399.4	385.3	387.1
	2040	412.8	411.4	388.3	388.9
C	**Existing Alignment**				
	2025	429.4	505.7	447.6	508.5
	2040	505.2	510.9	519.6	520.2
	New Alignment				
	2025	378.8	378.1	356.7	333.9
	2040	381.5	381.6	359.7	359.8
D	**Existing Alignment**				
	2025	387.2	369.4	442.6	453.3
	2040	395.3	343.4	458.4	412.9
	New Alignment				
	2025	435.5	400.0	473.3	479.7
	2040	491.0	439.3	540.2	491.0
E	2025	823.7	2250.6	491.7	494.5
	2040	782.5	2938.6	490.3	694.9

No-Build: Though it varies, travel times slightly increase under future conditions compared to existing conditions in both directions.

Alternative A: Compared to no-build conditions, travel times improve along the northbound existing alignment and travel times significantly improve along the new alignment for both future

APPENDIX B

SAMPLE MOVES 2014B INPUT AND OUTPUT FILES
(COMPLETE SET OF FILES AVAILABLE UPON REQUEST)

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1	1	2040	1	5	8	51	51690	516900	4	2	NULL	62	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	64.1116	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	61	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	96.1438	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	54	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.007313	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	53	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.081737	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	52	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.2682	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	51	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.007998	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	43	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.155595	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	42	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.162176	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	41	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.049064	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	32	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.402707	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	31	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.45314	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	21	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.61551	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	4	2	NULL	11	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	35.655	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	62	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	64.3008	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	61	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	96.3113	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	54	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.006761	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	53	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.079639	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	52	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.18433	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	51	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.007963	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	43	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.147715	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	42	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.14166	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	41	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.048926	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	32	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.293442	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	31	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.06153	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	21	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.15948	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	3	2	NULL	11	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	34.7067	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	62	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	54.5256	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	61	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	81.7399	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	54	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.005867	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	53	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.069835	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	52	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.01124	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	51	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.006793	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	43	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.130616	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	42	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.129378	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	41	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.041939	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	32	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.35864	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	31	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.29248	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	21	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.3788	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	2	2	NULL	11	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	35.8192	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	62	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	53.8482	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	61	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	80.3661	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	54	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.006311	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	53	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.072638	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	52	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.08931	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	51	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.006721	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	43	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.137248	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	42	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.14971	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	41	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.041215	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	32	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	0.481585	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	31	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.74189	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	21	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	1.91794	NULL	NULL
1	1	2040	1	5	8	51	51690	516900	1	2	NULL	11	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	36.5065	NULL	NULL

APPENDIX C

CAL3QHC INPUT AND OUTPUT FILES

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and Business 220 2025

DATE : 5/ 6/19
TIME : 11:19:41

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT) X1	Y1	X2	Y2	*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. N Leg App - FreeFlow	*	-17.0	0.0	-17.0	1200.0	*	1200.	360.	AG	7200.	1.7	0.0	52.7		
2. N Leg Dep - FreeFlow	*	11.0	0.0	11.0	1200.0	*	1200.	360.	AG	4800.	1.7	0.0	41.7		
3. S Leg App - FreeFlow	*	11.0	0.0	11.0	-1200.0	*	1200.	180.	AG	4800.	1.7	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-17.0	0.0	-17.0	-1200.0	*	1200.	180.	AG	7200.	1.7	0.0	52.7		
5. E Leg App - FreeFlow	*	2.0	16.0	1193.0	-130.0	*	1200.	97.	AG	7200.	1.5	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-2.0	-16.0	1189.0	-163.0	*	1200.	97.	AG	7200.	1.4	0.0	52.7		
7. W Leg App - FreeFlow	*	-2.0	-16.0	-1193.0	130.0	*	1200.	277.	AG	7200.	1.4	0.0	52.7		
8. W Leg Dep - FreeFlow	*	2.0	16.0	-1189.0	163.0	*	1200.	277.	AG	7200.	1.5	0.0	52.7		

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JOB: Martinsville Soutern Connector RUN: Existing 58 and Business 220 2025

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ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	32.0	39.4	5.9	*
2. N Leg, E Side - 25 m	*	32.0	111.4	5.9	*
3. N Leg, E Side - 50 m	*	32.0	193.4	5.9	*
4. N Leg, E Side-Midblk	*	32.0	629.4	5.9	*
5. N Leg, W Side-Corner	*	-43.0	48.6	5.9	*
6. N Leg, W Side - 25 m	*	-43.0	120.6	5.9	*
7. N Leg, W Side - 50 m	*	-43.0	202.6	5.9	*
8. N Leg, W Side-Midblk	*	-43.0	638.6	5.9	*
9. S Leg, E Side-Corner	*	32.0	-47.3	5.9	*
10. S Leg, E Side - 25 m	*	32.0	-119.3	5.9	*
11. S Leg, E Side - 50 m	*	32.0	-201.3	5.9	*
12. S Leg, E Side-Midblk	*	32.0	-637.3	5.9	*
13. S Leg, W Side-Corner	*	-43.0	-38.0	5.9	*
14. S Leg, W Side - 25 m	*	-43.0	-110.1	5.9	*
15. S Leg, W Side - 50 m	*	-43.0	-192.1	5.9	*

16. S Leg, W Side-Midblk *	-43.0	-628.0	5.9	*	
17. E Leg, N Side - 25 m *	103.5	30.6	5.9	*	
18. E Leg, N Side - 50 m *	184.9	20.6	5.9	*	
19. E Leg, N Side-Midblk *	617.6	-32.5	5.9	*	
20. W Leg, N Side - 25 m *	-114.5	57.4	5.9	*	
21. W Leg, N Side - 50 m *	-195.9	67.4	5.9	*	
22. W Leg, N Side-Midblk *	-628.6	120.5	5.9	*	
23. E Leg, S Side - 25 m *	103.5	-56.0	5.9	*	
24. E Leg, S Side - 50 m *	184.9	-66.0	5.9	*	
25. E Leg, S Side-Midblk *	617.6	-119.2	5.9	*	
26. W Leg, S Side - 25 m *	-114.5	-29.3	5.9	*	
27. W Leg, S Side - 50 m *	-195.9	-19.3	5.9	*	
28. W Leg, S Side-Midblk *	-628.6	33.9	5.9	*	

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.5000	0.5000	0.5000	0.4000	0.9000	0.9000	0.9000	0.7000	1.0000	0.8000	0.6000	0.5000	1.4000	1.1000	1.1000
10.	* 0.3000	0.3000	0.3000	0.3000	0.9000	0.9000	0.9000	0.9000	0.9000	0.6000	0.6000	0.3000	1.4000	1.1000	1.1000
15.	* 0.2000	0.2000	0.1000	0.1000	0.9000	0.9000	0.9000	0.9000	0.7000	0.5000	0.3000	0.1000	1.4000	1.3000	1.1000
20.	* 0.1000	0.1000	0.1000	0.1000	0.8000	0.8000	0.8000	0.8000	0.5000	0.4000	0.3000	0.1000	1.3000	1.3000	1.1000
25.	* 0.1000	0.1000	0.1000	0.1000	0.8000	0.8000	0.8000	0.8000	0.5000	0.3000	0.3000	0.1000	1.3000	1.1000	1.0000
30.	* 0.0000	0.0000	0.0000	0.0000	0.7000	0.7000	0.7000	0.7000	0.5000	0.3000	0.2000	0.0000	1.4000	1.1000	0.9000
35.	* 0.0000	0.0000	0.0000	0.0000	0.7000	0.7000	0.7000	0.7000	0.5000	0.3000	0.2000	0.0000	1.3000	0.9000	0.9000
40.	* 0.0000	0.0000	0.0000	0.0000	0.7000	0.7000	0.7000	0.7000	0.5000	0.3000	0.2000	0.0000	1.2000	0.9000	0.9000
45.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	1.2000	0.8000	0.8000
50.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.3000	0.9000	0.8000
55.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.4000	1.0000	0.8000
60.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.3000	1.0000	0.8000
65.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.2000	1.0000	0.8000
70.	* 0.1000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.8000	0.4000	0.2000	0.0000	1.3000	1.0000	0.8000
75.	* 0.1000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.8000	0.4000	0.2000	0.0000	1.3000	1.0000	0.8000
80.	* 0.1000	0.0000	0.0000	0.0000	0.8000	0.6000	0.6000	0.6000	0.9000	0.4000	0.2000	0.0000	1.5000	1.0000	0.8000
85.	* 0.2000	0.0000	0.0000	0.0000	0.9000	0.6000	0.6000	0.6000	0.9000	0.4000	0.2000	0.0000	1.5000		

```
1.0000  0.8000
  90.  *  0.5000  0.0000  0.0000  0.0000  1.1000  0.6000  0.6000  0.6000  0.9000  0.3000  0.2000  0.0000  1.5000
0.9000  0.8000
  95.  *  0.7000  0.1000  0.0000  0.0000  1.3000  0.8000  0.6000  0.6000  0.7000  0.2000  0.0000  0.0000  1.3000
0.8000  0.6000
 100.  *  0.8000  0.2000  0.1000  0.0000  1.4000  0.8000  0.7000  0.6000  0.6000  0.1000  0.0000  0.0000  1.2000
0.7000  0.6000
 105.  *  1.0000  0.3000  0.2000  0.0000  1.6000  0.9000  0.8000  0.6000  0.4000  0.0000  0.0000  0.0000  1.0000
0.6000  0.6000
 110.  *  0.9000  0.3000  0.2000  0.0000  1.5000  0.9000  0.8000  0.6000  0.2000  0.0000  0.0000  0.0000  0.8000
0.6000  0.6000
 115.  *  0.9000  0.4000  0.2000  0.0000  1.4000  1.0000  0.8000  0.6000  0.1000  0.0000  0.0000  0.0000  0.7000
0.6000  0.6000
 120.  *  0.8000  0.4000  0.2000  0.0000  1.4000  1.0000  0.8000  0.6000  0.1000  0.0000  0.0000  0.0000  0.6000
0.6000  0.6000
 125.  *  0.8000  0.4000  0.2000  0.0000  1.3000  1.0000  0.8000  0.6000  0.1000  0.0000  0.0000  0.0000  0.6000
0.6000  0.6000
 130.  *  0.8000  0.4000  0.2000  0.0000  1.5000  1.0000  0.8000  0.6000  0.0000  0.0000  0.0000  0.0000  0.6000
0.6000  0.6000
 135.  *  0.7000  0.3000  0.2000  0.0000  1.4000  0.9000  0.8000  0.6000  0.0000  0.0000  0.0000  0.0000  0.6000
0.6000  0.6000
 140.  *  0.6000  0.3000  0.2000  0.1000  1.3000  1.0000  0.9000  0.8000  0.0000  0.0000  0.0000  0.0000  0.7000
0.7000  0.7000
 145.  *  0.6000  0.3000  0.2000  0.1000  1.3000  0.9000  0.9000  0.8000  0.0000  0.0000  0.0000  0.0000  0.7000
0.7000  0.7000
 150.  *  0.6000  0.3000  0.2000  0.0000  1.2000  1.1000  0.9000  0.7000  0.0000  0.0000  0.0000  0.0000  0.7000
0.7000  0.7000
 155.  *  0.6000  0.3000  0.3000  0.1000  1.4000  1.1000  0.9000  0.8000  0.1000  0.1000  0.1000  0.1000  0.8000
0.8000  0.8000
 160.  *  0.6000  0.4000  0.3000  0.1000  1.4000  1.3000  1.2000  0.8000  0.1000  0.1000  0.1000  0.1000  0.8000
0.8000  0.8000
 165.  *  0.7000  0.5000  0.3000  0.1000  1.4000  1.3000  1.2000  0.9000  0.2000  0.1000  0.1000  0.1000  0.9000
0.9000  0.9000
 170.  *  0.9000  0.6000  0.6000  0.3000  1.4000  1.1000  1.0000  1.0000  0.3000  0.3000  0.3000  0.3000  0.9000
0.9000  0.9000
 175.  *  1.1000  0.9000  0.6000  0.5000  1.4000  1.2000  1.1000  1.1000  0.5000  0.5000  0.5000  0.4000  0.9000
0.9000  0.9000
 180.  *  1.2000  0.9000  0.9000  0.8000  1.2000  1.0000  0.9000  0.9000  0.7000  0.7000  0.7000  0.6000  0.7000
0.7000  0.7000
 185.  *  1.5000  1.1000  1.0000  1.0000  1.1000  0.9000  0.8000  0.6000  0.8000  0.8000  0.8000  0.8000  0.6000
0.6000  0.6000
 190.  *  1.6000  1.2000  1.1000  0.9000  1.0000  0.8000  0.5000  0.3000  0.9000  0.9000  0.9000  0.8000  0.4000
0.3000  0.3000
 195.  *  1.4000  1.3000  1.1000  0.9000  0.7000  0.5000  0.4000  0.2000  0.9000  0.9000  0.9000  0.9000  0.2000
0.2000  0.2000
 200.  *  1.5000  1.2000  1.1000  0.8000  0.7000  0.4000  0.3000  0.1000  0.8000  0.8000  0.8000  0.8000  0.1000
0.1000  0.1000
 205.  *  1.2000  1.1000  1.0000  0.8000  0.6000  0.4000  0.3000  0.1000  0.8000  0.8000  0.8000  0.8000  0.1000
0.1000  0.1000
 210.  *  1.4000  0.9000  0.9000  0.8000  0.5000  0.4000  0.3000  0.1000  0.8000  0.8000  0.8000  0.8000  0.1000
0.1000  0.1000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Existing 58 and Business 220 2025

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  1.3000  0.9000  0.9000  0.8000  0.5000  0.3000  0.2000  0.0000  0.8000  0.8000  0.8000  0.8000  0.0000
0.0000  0.0000
 220.  *  1.3000  0.9000  0.8000  0.6000  0.6000  0.3000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.0000
```

```
0.0000  0.0000
 225.  *  1.4000  0.9000  0.8000  0.6000  0.6000  0.3000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.0000
0.0000  0.0000
 230.  *  1.2000  0.9000  0.8000  0.6000  0.6000  0.3000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.0000
0.0000  0.0000
 235.  *  1.2000  0.9000  0.8000  0.6000  0.6000  0.3000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.0000
0.0000  0.0000
 240.  *  1.3000  0.9000  0.8000  0.6000  0.7000  0.3000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.0000
0.0000  0.0000
 245.  *  1.3000  1.0000  0.8000  0.6000  0.8000  0.4000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.0000
0.0000  0.0000
 250.  *  1.2000  0.9000  0.7000  0.6000  0.8000  0.4000  0.2000  0.0000  0.6000  0.6000  0.6000  0.6000  0.1000
0.0000  0.0000
 255.  *  1.4000  0.9000  0.7000  0.5000  0.9000  0.4000  0.2000  0.0000  0.5000  0.5000  0.5000  0.5000  0.1000
0.0000  0.0000
 260.  *  1.6000  1.0000  0.8000  0.6000  0.9000  0.4000  0.2000  0.0000  0.7000  0.6000  0.6000  0.6000  0.1000
0.0000  0.0000
 265.  *  1.5000  0.9000  0.8000  0.6000  1.0000  0.3000  0.2000  0.0000  0.9000  0.6000  0.6000  0.6000  0.2000
0.0000  0.0000
 270.  *  1.5000  0.9000  0.8000  0.6000  1.0000  0.3000  0.2000  0.0000  1.1000  0.6000  0.6000  0.6000  0.4000
0.0000  0.0000
 275.  *  1.4000  0.8000  0.6000  0.6000  0.8000  0.2000  0.0000  0.0000  1.3000  0.8000  0.6000  0.6000  0.7000
0.2000  0.0000
 280.  *  1.2000  0.7000  0.6000  0.6000  0.6000  0.1000  0.0000  0.0000  1.3000  0.8000  0.7000  0.6000  0.8000
0.2000  0.0000
 285.  *  1.0000  0.5000  0.5000  0.5000  0.4000  0.0000  0.0000  0.0000  1.5000  0.8000  0.7000  0.5000  0.9000
0.3000  0.2000
 290.  *  0.8000  0.6000  0.6000  0.6000  0.2000  0.0000  0.0000  0.0000  1.4000  0.9000  0.8000  0.6000  0.9000
0.4000  0.2000
 295.  *  0.7000  0.6000  0.6000  0.6000  0.1000  0.0000  0.0000  0.0000  1.4000  1.0000  0.8000  0.6000  0.9000
0.4000  0.2000
 300.  *  0.6000  0.6000  0.6000  0.6000  0.1000  0.0000  0.0000  0.0000  1.4000  1.0000  0.8000  0.6000  0.8000
0.4000  0.2000
 305.  *  0.6000  0.6000  0.6000  0.6000  0.1000  0.0000  0.0000  0.0000  1.4000  1.0000  0.8000  0.6000  0.8000
0.4000  0.2000
 310.  *  0.6000  0.6000  0.6000  0.6000  0.0000  0.0000  0.0000  0.0000  1.2000  1.0000  0.8000  0.6000  0.7000
0.4000  0.2000
 315.  *  0.6000  0.6000  0.6000  0.6000  0.0000  0.0000  0.0000  0.0000  1.3000  1.0000  0.8000  0.6000  0.7000
0.4000  0.2000
 320.  *  0.6000  0.6000  0.6000  0.6000  0.0000  0.0000  0.0000  0.0000  1.4000  1.0000  0.8000  0.6000  0.7000
0.4000  0.2000
 325.  *  0.8000  0.8000  0.8000  0.8000  0.0000  0.0000  0.0000  0.0000  1.4000  0.9000  0.9000  0.8000  0.7000
0.4000  0.2000
 330.  *  0.8000  0.8000  0.8000  0.8000  0.1000  0.1000  0.1000  0.1000  1.4000  1.0000  0.9000  0.8000  0.5000
0.4000  0.3000
 335.  *  0.8000  0.8000  0.8000  0.8000  0.1000  0.1000  0.1000  0.1000  1.3000  1.2000  1.0000  0.8000  0.5000
0.4000  0.3000
 340.  *  0.8000  0.8000  0.8000  0.8000  0.1000  0.1000  0.1000  0.1000  1.4000  1.2000  1.0000  0.8000  0.6000
0.4000  0.3000
 345.  *  0.9000  0.9000  0.9000  0.9000  0.2000  0.2000  0.2000  0.2000  1.5000  1.4000  1.2000  0.9000  0.7000
0.5000  0.4000
 350.  *  0.9000  0.9000  0.9000  0.8000  0.4000  0.3000  0.3000  0.3000  1.4000  1.2000  1.1000  1.0000  0.9000
0.8000  0.5000
 355.  *  0.8000  0.8000  0.8000  0.8000  0.6000  0.6000  0.6000  0.5000  1.3000  1.1000  1.0000  1.0000  1.1000
0.8000  0.8000
 360.  *  0.7000  0.7000  0.7000  0.6000  0.7000  0.7000  0.7000  0.7000  1.2000  0.9000  0.9000  0.8000  1.3000
0.9000  0.9000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  1.6000  1.3000  1.1000  1.0000  1.6000  1.3000  1.2000  1.1000  1.5000  1.4000  1.2000  1.0000  1.5000
1.3000  1.1000
 DEGR. *    190     195     200     185     105     160     165     175     345     345     345     350      80
15       5


PAGE  5
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MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first
angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	1.1000	0.0000	0.0000	0.0000	0.3000	0.1000	0.0000	0.5000	0.5000	0.5000	0.8000	0.6000	0.5000
10.	1.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
15.	0.9000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
20.	0.8000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
25.	0.8000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
30.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
35.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
40.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.6000
45.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.6000	0.6000	0.6000	0.8000	0.7000	0.7000
50.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	0.9000	0.9000	0.8000
55.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	0.9000	0.9000	0.8000
60.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	0.9000	0.9000	0.8000
65.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	1.0000	0.9000	0.8000
70.	0.6000	0.1000	0.1000	0.1000	0.3000	0.3000	0.2000	0.8000	0.8000	0.8000	1.2000	0.9000	0.8000
75.	0.6000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000	0.8000	0.8000	0.8000	1.1000	1.1000	0.8000
80.	0.6000	0.1000	0.1000	0.1000	0.5000	0.3000	0.2000	0.9000	0.9000	0.9000	1.2000	1.1000	0.9000
85.	0.6000	0.2000	0.2000	0.2000	0.5000	0.5000	0.2000	0.9000	0.9000	0.9000	1.3000	1.2000	1.0000
90.	0.6000	0.5000	0.5000	0.4000	0.8000	0.6000	0.5000	0.9000	0.9000	0.8000	1.2000	1.0000	1.0000
95.	0.6000	0.7000	0.6000	0.6000	1.1000	0.8000	0.8000	0.7000	0.7000	0.7000	1.1000	1.1000	0.9000
100.	0.6000	0.8000	0.8000	0.8000	1.1000	1.1000	1.0000	0.6000	0.5000	0.5000	0.9000	0.8000	0.7000
105.	0.6000	1.0000	0.9000	0.8000	1.2000	1.1000	1.0000	0.4000	0.4000	0.4000	0.8000	0.6000	0.4000
110.	0.6000	0.9000	0.9000	0.9000	1.1000	1.2000	0.9000	0.2000	0.2000	0.2000	0.5000	0.4000	0.2000
115.	0.6000	0.9000	0.9000	0.9000	1.2000	1.0000	0.9000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000
120.	0.6000	0.8000	0.8000	0.8000	1.1000	1.1000	0.9000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000
125.	0.6000	0.8000	0.8000	0.8000	1.1000	1.0000	0.9000	0.1000	0.1000	0.1000	0.3000	0.2000	0.2000
130.	0.6000	0.8000	0.8000	0.8000	1.0000	0.9000	0.9000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000
135.	0.6000	0.7000	0.7000	0.7000	1.0000	0.8000	0.8000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000
140.	0.7000	0.6000	0.6000	0.6000	0.9000	0.8000	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000
145.	0.7000	0.6000	0.6000	0.6000	0.9000	0.8000	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
150.	0.7000	0.6000	0.6000	0.6000	0.9000	0.8000	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
155.	0.8000	0.6000	0.6000	0.6000	0.9000	0.8000	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
160.	0.8000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
165.	0.9000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
170.	0.9000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
175.	0.8000	0.5000	0.5000	0.5000	0.8000	0.6000	0.5000	0.0000	0.0000	0.0000	0.3000	0.1000	0.0000
180.	0.7000	0.7000	0.5000	0.5000	0.7000	0.5000	0.5000	0.2000	0.0000	0.0000	0.1000	0.0000	0.0000
185.	0.5000	0.8000	0.7000	0.6000	0.7000	0.6000	0.6000	0.2000	0.1000	0.0000	0.1000	0.0000	0.0000
190.	0.3000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
195.	0.2000	0.9000	0.7000	0.5000	0.5000	0.5000	0.5000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000
200.	0.1000	0.9000	0.7000	0.5000	0.5000	0.5000	0.5000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000
205.	0.1000	0.9000	0.7000	0.5000	0.5000	0.5000	0.5000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000
210.	0.1000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR) * CONCENTRATION (PPM) 16 17 18 19 20 21 22 23 24 25 26 27 28

215.	*	0.0000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.9000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
230.	*	0.0000	0.9000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
235.	*	0.0000	1.0000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
240.	*	0.0000	0.9000	0.8000	0.8000	0.7000	0.7000	0.8000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
245.	*	0.0000	1.0000	0.9000	0.9000	0.8000	0.8000	0.8000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
250.	*	0.0000	1.2000	1.0000	0.8000	0.8000	0.8000	0.8000	0.3000	0.2000	0.1000	0.1000	0.1000	0.1000
255.	*	0.0000	1.2000	1.1000	0.9000	0.9000	0.9000	0.9000	0.4000	0.3000	0.1000	0.1000	0.1000	0.1000
260.	*	0.0000	1.2000	1.1000	0.9000	0.9000	0.9000	0.9000	0.5000	0.3000	0.1000	0.1000	0.1000	0.1000
265.	*	0.0000	1.2000	1.2000	1.0000	1.0000	0.9000	0.8000	0.6000	0.4000	0.2000	0.2000	0.2000	0.2000
270.	*	0.0000	1.0000	1.1000	1.0000	0.9000	0.9000	0.8000	0.8000	0.6000	0.5000	0.4000	0.4000	0.4000
275.	*	0.0000	1.0000	1.0000	0.9000	0.8000	0.8000	0.7000	0.8000	0.8000	0.7000	0.7000	0.7000	0.5000
280.	*	0.0000	0.9000	0.8000	0.7000	0.6000	0.6000	0.5000	1.0000	1.1000	0.9000	0.8000	0.8000	0.7000
285.	*	0.0000	0.8000	0.6000	0.5000	0.4000	0.4000	0.4000	1.1000	1.1000	1.0000	0.9000	0.9000	0.8000
290.	*	0.0000	0.5000	0.4000	0.2000	0.2000	0.2000	0.2000	1.3000	1.0000	1.0000	0.9000	0.9000	0.9000
295.	*	0.0000	0.5000	0.3000	0.1000	0.1000	0.1000	0.1000	1.2000	1.0000	0.9000	0.9000	0.9000	0.8000
300.	*	0.0000	0.4000	0.3000	0.2000	0.1000	0.1000	0.1000	1.2000	1.1000	0.8000	0.8000	0.8000	0.8000
305.	*	0.0000	0.3000	0.3000	0.2000	0.1000	0.1000	0.1000	1.1000	0.9000	0.9000	0.8000	0.8000	0.8000
310.	*	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.9000	0.9000	0.8000	0.7000	0.7000	0.7000
315.	*	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	1.0000	0.9000	0.8000	0.7000	0.7000	0.7000
320.	*	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.9000	0.9000	0.8000	0.7000	0.7000	0.7000
325.	*	0.0000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	0.9000	0.9000	0.7000	0.7000	0.7000	0.7000
330.	*	0.1000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000
335.	*	0.1000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000
340.	*	0.1000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000	0.9000	0.7000	0.5000	0.5000	0.5000	0.5000
345.	*	0.2000	0.4000	0.2000	0.0000	0.0000	0.0000	0.0000	0.9000	0.7000	0.5000	0.5000	0.5000	0.5000
350.	*	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000
355.	*	0.6000	0.2000	0.1000	0.0000	0.1000	0.0000	0.0000	0.7000	0.7000	0.5000	0.6000	0.5000	0.5000
360.	*	0.9000	0.2000	0.0000	0.0000	0.1000	0.0000	0.0000	0.7000	0.5000	0.5000	0.7000	0.5000	0.5000
MAX	*	1.1000	1.2000	1.2000	1.0000	1.2000	1.2000	1.0000	1.3000	1.1000	1.0000	1.3000	1.2000	1.0000
DEGR.	*	5	255	265	265	105	110	100	290	280	285	85	85	85

THE HIGHEST CONCENTRATION OF 1.6000 PPM OCCURRED AT RECEPTOR 5.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and Business 220 2040

DATE : 5/ 6/19
TIME : 11: 5:59

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT) X1	Y1	X2	Y2	*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. N Leg App - FreeFlow	*	-17.0	0.0	-17.0	1200.0	*	1200.	360.	AG	7200.	0.4	0.0	52.7		
2. N Leg Dep - FreeFlow	*	11.0	0.0	11.0	1200.0	*	1200.	360.	AG	4800.	0.4	0.0	41.7		
3. S Leg App - FreeFlow	*	11.0	0.0	11.0	-1200.0	*	1200.	180.	AG	4800.	0.4	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-17.0	0.0	-17.0	-1200.0	*	1200.	180.	AG	7200.	0.4	0.0	52.7		
5. E Leg App - FreeFlow	*	2.0	16.0	1193.0	-130.0	*	1200.	97.	AG	7200.	0.3	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-2.0	-16.0	1189.0	-163.0	*	1200.	97.	AG	7200.	0.3	0.0	52.7		
7. W Leg App - FreeFlow	*	-2.0	-16.0	-1193.0	130.0	*	1200.	277.	AG	7200.	0.3	0.0	52.7		
8. W Leg Dep - FreeFlow	*	2.0	16.0	-1189.0	163.0	*	1200.	277.	AG	7200.	0.3	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Existing 58 and Business 220 2040

DATE : 5/ 6/19
TIME : 11: 5:59

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	32.0	39.4	5.9	*
2. N Leg, E Side - 25 m	*	32.0	111.4	5.9	*
3. N Leg, E Side - 50 m	*	32.0	193.4	5.9	*
4. N Leg, E Side-Midblk	*	32.0	629.4	5.9	*
5. N Leg, W Side-Corner	*	-43.0	48.6	5.9	*
6. N Leg, W Side - 25 m	*	-43.0	120.6	5.9	*
7. N Leg, W Side - 50 m	*	-43.0	202.6	5.9	*
8. N Leg, W Side-Midblk	*	-43.0	638.6	5.9	*
9. S Leg, E Side-Corner	*	32.0	-47.3	5.9	*
10. S Leg, E Side - 25 m	*	32.0	-119.3	5.9	*
11. S Leg, E Side - 50 m	*	32.0	-201.3	5.9	*
12. S Leg, E Side-Midblk	*	32.0	-637.3	5.9	*
13. S Leg, W Side-Corner	*	-43.0	-38.0	5.9	*
14. S Leg, W Side - 25 m	*	-43.0	-110.1	5.9	*
15. S Leg, W Side - 50 m	*	-43.0	-192.1	5.9	*

16.	S Leg, W Side-Midblk *	-43.0	-628.0	5.9	*
17.	E Leg, N Side - 25 m *	103.5	30.6	5.9	*
18.	E Leg, N Side - 50 m *	184.9	20.6	5.9	*
19.	E Leg, N Side-Midblk *	617.6	-32.5	5.9	*
20.	W Leg, N Side - 25 m *	-114.5	57.4	5.9	*
21.	W Leg, N Side - 50 m *	-195.9	67.4	5.9	*
22.	W Leg, N Side-Midblk *	-628.6	120.5	5.9	*
23.	E Leg, S Side - 25 m *	103.5	-56.0	5.9	*
24.	E Leg, S Side - 50 m *	184.9	-66.0	5.9	*
25.	E Leg, S Side-Midblk *	617.6	-119.2	5.9	*
26.	W Leg, S Side - 25 m *	-114.5	-29.3	5.9	*
27.	W Leg, S Side - 50 m *	-195.9	-19.3	5.9	*
28.	W Leg, S Side-Midblk *	-628.6	33.9	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.1000	0.1000	0.1000	0.1000	0.3000	0.2000	0.2000	0.2000	0.3000	0.1000	0.1000	0.1000	0.5000	0.2000	0.2000
10.	*	0.1000	0.1000	0.1000	0.1000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.1000	0.5000	0.3000	0.2000
15.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.5000	0.2000	0.1000
20.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000
25.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000
30.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000
35.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.1000	0.1000
40.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
45.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
50.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
55.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
60.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.3000	0.1000	0.1000
65.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000
70.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000
75.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000
80.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.3000	0.1000	0.1000
85.	*	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.3000		

0.1000 0.1000
  90. * 0.1000 0.0000 0.0000 0.0000 0.2000 0.1000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.3000
0.1000 0.1000
  95. * 0.1000 0.0000 0.0000 0.0000 0.2000 0.1000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.3000
0.1000 0.1000
 100. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.1000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.2000
0.1000 0.1000
 105. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.1000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.2000
0.1000 0.1000
 110. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.1000
 115. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.2000 0.1000 0.1000 0.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.1000
 120. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.1000
 125. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.1000
 130. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.1000
 135. * 0.2000 0.0000 0.0000 0.0000 0.2000 0.1000 0.1000 0.1000 0.0000 0.0000 0.0000 0.0000 0.1000
0.1000 0.1000
 140. * 0.2000 0.0000 0.0000 0.0000 0.2000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 145. * 0.2000 0.0000 0.0000 0.0000 0.2000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 150. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 155. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.1000 0.1000 0.3000 0.0000 0.0000 0.0000 0.0000 0.3000
0.3000 0.3000
 160. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.1000 0.1000 0.3000 0.0000 0.0000 0.0000 0.0000 0.3000
0.3000 0.3000
 165. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.2000 0.1000 0.3000 0.0000 0.0000 0.0000 0.0000 0.3000
0.3000 0.3000
 170. * 0.2000 0.0000 0.0000 0.1000 0.4000 0.2000 0.2000 0.3000 0.1000 0.1000 0.1000 0.1000 0.3000
0.3000 0.3000
 175. * 0.3000 0.0000 0.1000 0.1000 0.5000 0.2000 0.2000 0.2000 0.1000 0.1000 0.1000 0.1000 0.3000
0.2000 0.2000
 180. * 0.4000 0.3000 0.2000 0.2000 0.4000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000 0.2000
0.2000 0.2000
 185. * 0.4000 0.3000 0.2000 0.2000 0.3000 0.2000 0.1000 0.1000 0.2000 0.2000 0.2000 0.2000 0.1000
0.1000 0.1000
 190. * 0.3000 0.3000 0.2000 0.2000 0.3000 0.0000 0.1000 0.1000 0.2000 0.2000 0.2000 0.2000 0.1000
0.1000 0.1000
 195. * 0.3000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.1000 0.2000 0.2000 0.2000 0.2000 0.1000
0.1000 0.1000
 200. * 0.4000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.0000
0.0000 0.0000
 205. * 0.4000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.0000
0.0000 0.0000
 210. * 0.3000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.0000
0.0000 0.0000

PAGE 4
      JOB: Martinsville Soutern Connector   RUN: Existing 58 and Business 220 2040

 WIND ANGLE RANGE: 5.-360.

 WIND * CONCENTRATION
 ANGLE *   (PPM)
 (DEGR)*   1   2   3   4   5   6   7   8   9   10   11   12   13
 14   15

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 215. * 0.3000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.0000
0.0000 0.0000
 220. * 0.3000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.0000

```
0.0000  0.0000
 225.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 230.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 235.  *  0.3000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 240.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 245.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 250.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 255.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 260.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 265.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.1000
0.0000  0.0000
 270.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.1000
0.0000  0.0000
 275.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.1000
0.0000  0.0000
 280.  *  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 285.  *  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 290.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 295.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.3000  0.2000  0.2000  0.2000
0.0000  0.0000
 300.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 305.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 310.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 315.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 320.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 325.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 330.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 335.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 340.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.3000  0.2000  0.2000  0.2000
0.0000  0.0000
 345.  *  0.2000  0.2000  0.2000  0.2000  0.1000  0.1000  0.1000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 350.  *  0.2000  0.2000  0.2000  0.2000  0.1000  0.1000  0.1000  0.1000  0.4000  0.2000  0.3000  0.2000  0.3000
0.0000  0.1000
 355.  *  0.2000  0.2000  0.2000  0.2000  0.1000  0.1000  0.1000  0.1000  0.3000  0.3000  0.2000  0.2000  0.3000
0.2000  0.1000
 360.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.1000  0.4000  0.3000  0.2000  0.2000  0.3000
0.2000  0.2000

------*-----------------------------------------------------------------------------------------------------------
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 MAX   *  0.4000  0.3000  0.2000  0.2000  0.5000  0.3000  0.3000  0.3000  0.5000  0.3000  0.3000  0.2000  0.5000
0.3000  0.3000
 DEGR. *    180     180     180     180     175      10      10      15     300     295     350     180       5
10     155


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JOB: Martinsville Soutern Connector RUN: Existing 58 and Business 220 2040

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
10.	0.3000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
15.	0.3000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
20.	0.3000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
25.	0.3000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
30.	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
35.	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
40.	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
45.	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
50.	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
55.	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
60.	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
65.	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
70.	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
75.	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.1000	0.2000
80.	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000
85.	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.3000	0.1000	0.2000
90.	0.1000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000	0.2000	0.2000	0.2000	0.3000	0.1000	0.2000
95.	0.1000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.2000	0.1000	0.1000	0.2000	0.1000	0.1000
100.	0.1000	0.2000	0.2000	0.1000	0.3000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000
105.	0.1000	0.2000	0.2000	0.2000	0.3000	0.1000	0.2000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
110.	0.1000	0.2000	0.2000	0.2000	0.3000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	0.1000	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	0.1000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	0.1000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	0.1000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
135.	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
140.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
145.	0.2000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
150.	0.2000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
155.	0.3000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
160.	0.3000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
165.	0.3000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
170.	0.2000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
175.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Existing 58 and Business 220 2040

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.1000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
270.	*	0.0000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
275.	*	0.0000	0.3000	0.2000	0.1000	0.2000	0.1000	0.1000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
280.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.3000	0.1000	0.1000	0.2000	0.2000	0.1000
285.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000
290.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000
295.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.2000	0.2000	0.2000	0.2000
300.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
305.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
315.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
330.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
335.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
340.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
345.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
350.	*	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
355.	*	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
360.	*	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
MAX	*	0.3000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000
DEGR.	*	10	195	100	105	100	120	105	280	5	5	10	5	5

THE HIGHEST CONCENTRATION OF 0.5000 PPM OCCURRED AT RECEPTOR 13.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 Exist 2018

DATE : 5/ 7/19
TIME : 14:18:22

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-11.0	0.0	-11.0	1200.0	*	1200.	360.	AG	1.	1.7	0.0	52.7		
2. N Leg Dep - FreeFlow	*	17.0	0.0	17.0	1200.0	*	1200.	360.	AG	1.	1.5	0.0	41.7		
3. S Leg App - FreeFlow	*	17.0	0.0	17.0	-1200.0	*	1200.	180.	AG	1.	1.5	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-11.0	0.0	-11.0	-1200.0	*	1200.	180.	AG	1.	1.7	0.0	52.7		
5. E Leg App - FreeFlow	*	7.0	15.0	1095.0	-492.0	*	1200.	115.	AG	1580.	3.3	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-7.0	-15.0	1081.0	-522.0	*	1200.	115.	AG	1580.	2.8	0.0	52.7		
7. W Leg App - FreeFlow	*	-7.0	-15.0	-1095.0	492.0	*	1200.	295.	AG	1660.	2.8	0.0	52.7		
8. W Leg Dep - FreeFlow	*	7.0	15.0	-1081.0	522.0	*	1200.	295.	AG	1660.	3.3	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 Exist 2018

DATE : 5/ 7/19
TIME : 14:18:22

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	43.0	27.4	5.9	*
2. N Leg, E Side - 25 m	*	43.0	99.4	5.9	*
3. N Leg, E Side - 50 m	*	43.0	181.4	5.9	*
4. N Leg, E Side-Midblk	*	43.0	617.4	5.9	*
5. N Leg, W Side-Corner	*	-32.0	62.4	5.9	*
6. N Leg, W Side - 25 m	*	-32.0	134.4	5.9	*
7. N Leg, W Side - 50 m	*	-32.0	216.4	5.9	*
8. N Leg, W Side-Midblk	*	-32.0	652.4	5.9	*
9. S Leg, E Side-Corner	*	43.0	-67.5	5.9	*
10. S Leg, E Side - 25 m	*	43.0	-139.5	5.9	*
11. S Leg, E Side - 50 m	*	43.0	-221.5	5.9	*
12. S Leg, E Side-Midblk	*	43.0	-657.5	5.9	*
13. S Leg, W Side-Corner	*	-32.0	-32.5	5.9	*
14. S Leg, W Side - 25 m	*	-32.0	-104.5	5.9	*
15. S Leg, W Side - 50 m	*	-32.0	-186.6	5.9	*

16.	S Leg, W Side-Midblk *	-32.0	-622.5	5.9	*
17.	E Leg, N Side - 25 m *	108.3	-3.0	5.9	*
18.	E Leg, N Side - 50 m *	182.6	-37.7	5.9	*
19.	E Leg, N Side-Midblk *	577.7	-222.0	5.9	*
20.	W Leg, N Side - 25 m *	-97.3	92.8	5.9	*
21.	W Leg, N Side - 50 m *	-171.6	127.5	5.9	*
22.	W Leg, N Side-Midblk *	-566.7	311.7	5.9	*
23.	E Leg, S Side - 25 m *	108.3	-97.9	5.9	*
24.	E Leg, S Side - 50 m *	182.6	-132.6	5.9	*
25.	E Leg, S Side-Midblk *	577.7	-316.8	5.9	*
26.	W Leg, S Side - 25 m *	-97.3	-2.1	5.9	*
27.	W Leg, S Side - 50 m *	-171.6	32.6	5.9	*
28.	W Leg, S Side-Midblk *	-566.7	216.8	5.9	*

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 Exist 2018

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.2000	0.0000
10.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.1000	0.0000
15.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.0000	0.0000
20.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.0000	0.0000
25.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.3000	0.1000	0.0000
30.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.2000	0.0000
35.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.2000	0.0000
40.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.3000	0.2000	0.0000
45.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.2000	0.2000	0.0000
50.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.0000	0.3000	0.2000	0.0000
55.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.1000	0.0000	0.3000	0.2000	0.1000
60.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.1000	0.0000	0.3000	0.2000	0.1000
65.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.0000	0.3000	0.2000	0.2000
70.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.0000	0.3000	0.2000	0.2000
75.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.0000	0.3000	0.2000	0.2000
80.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.0000	0.3000	0.2000	0.2000
85.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.0000	0.4000		

0.2000 0.2000
  90. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.3000 0.2000 0.2000 0.0000 0.3000
0.2000 0.2000
  95. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.4000 0.2000 0.2000 0.0000 0.4000
0.2000 0.2000
 100. * 0.1000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.5000 0.2000 0.1000 0.0000 0.4000
0.2000 0.1000
 105. * 0.1000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.4000 0.2000 0.0000 0.0000 0.3000
0.2000 0.0000
 110. * 0.3000 0.0000 0.0000 0.0000 0.3000 0.0000 0.0000 0.0000 0.4000 0.2000 0.0000 0.0000 0.3000
0.2000 0.0000
 115. * 0.4000 0.1000 0.0000 0.0000 0.4000 0.1000 0.0000 0.0000 0.3000 0.0000 0.0000 0.0000 0.3000
0.0000 0.0000
 120. * 0.4000 0.1000 0.0000 0.0000 0.4000 0.1000 0.0000 0.0000 0.3000 0.0000 0.0000 0.0000 0.3000
0.0000 0.0000
 125. * 0.4000 0.2000 0.1000 0.0000 0.4000 0.2000 0.1000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 130. * 0.4000 0.2000 0.1000 0.0000 0.4000 0.2000 0.1000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 135. * 0.4000 0.2000 0.1000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 140. * 0.4000 0.2000 0.2000 0.0000 0.4000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 145. * 0.3000 0.2000 0.1000 0.0000 0.4000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 150. * 0.3000 0.2000 0.1000 0.0000 0.4000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 155. * 0.3000 0.2000 0.1000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 160. * 0.3000 0.2000 0.1000 0.0000 0.4000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 165. * 0.3000 0.2000 0.1000 0.0000 0.3000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 170. * 0.3000 0.2000 0.1000 0.0000 0.3000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 175. * 0.3000 0.2000 0.1000 0.0000 0.3000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 180. * 0.3000 0.2000 0.0000 0.0000 0.3000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 185. * 0.3000 0.2000 0.0000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 190. * 0.3000 0.1000 0.0000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 195. * 0.3000 0.1000 0.0000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 200. * 0.3000 0.0000 0.0000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 205. * 0.3000 0.0000 0.0000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 210. * 0.3000 0.1000 0.1000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000

PAGE 4
      JOB: Martinsville Soutern Connector   RUN: Existing 58 and 220 Exist 2018

 WIND ANGLE RANGE: 5.-360.

 WIND * CONCENTRATION
 ANGLE *   (PPM)
 (DEGR)*   1   2   3   4   5   6   7   8   9   10   11   12   13
 14   15

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----
 215. * 0.3000 0.1000 0.1000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 220. * 0.3000 0.2000 0.1000 0.0000 0.3000 0.2000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000

```
0.0000  0.0000
 225.  *  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 230.  *  0.2000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 235.  *  0.2000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 240.  *  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 245.  *  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.3000  0.2000  0.2000  0.0000  0.3000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.4000  0.2000  0.2000  0.0000  0.3000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.4000  0.2000  0.2000  0.0000  0.4000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.4000  0.2000  0.2000  0.0000  0.4000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.4000  0.2000  0.1000  0.0000  0.4000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 285.  *  0.5000  0.2000  0.1000  0.0000  0.4000  0.2000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 290.  *  0.5000  0.1000  0.0000  0.0000  0.4000  0.1000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.3000
0.0000  0.0000
 295.  *  0.4000  0.1000  0.0000  0.0000  0.4000  0.1000  0.0000  0.0000  0.4000  0.1000  0.0000  0.0000  0.3000
0.0000  0.0000
 300.  *  0.3000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.4000  0.2000  0.0000  0.0000  0.4000
0.2000  0.0000
 305.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.0000  0.0000  0.5000
0.2000  0.0000
 310.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.0000  0.5000
0.2000  0.2000
 315.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.0000  0.4000
0.2000  0.2000
 320.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.0000  0.4000
0.2000  0.2000
 325.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.0000  0.3000
0.2000  0.2000
 330.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.0000  0.3000
0.2000  0.2000
 335.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.4000  0.1000  0.1000  0.0000  0.3000
0.2000  0.2000
 340.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.4000  0.1000  0.0000  0.0000  0.3000
0.2000  0.2000
 345.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.3000
0.2000  0.2000
 350.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.3000
0.2000  0.1000
 355.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.3000
0.2000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.2000
0.2000  0.0000

------*-----------------------------------------------------------------------------------------------------------
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 MAX   *  0.5000  0.2000  0.2000  0.0000  0.4000  0.2000  0.2000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000
0.2000  0.2000
 DEGR. *    285     125     140       5     115     125     140       5     100       5      65       5     305
 5      65


PAGE  5
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JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 Exist 2018

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
10.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
15.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
20.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
25.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000
30.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
35.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
40.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
45.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
50.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
55.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
60.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000
65.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
70.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
75.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
80.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000
85.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000
90.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000
95.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000	0.4000	0.4000	0.3000	0.4000	0.4000	0.4000
100.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.5000	0.5000	0.3000	0.4000	0.5000	0.4000
105.	0.0000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.4000	0.4000	0.3000	0.3000	0.4000	0.4000
110.	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.4000	0.4000	0.3000	0.3000	0.4000	0.4000
115.	0.0000	0.4000	0.4000	0.3000	0.4000	0.4000	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
120.	0.0000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.3000	0.3000	0.2000	0.3000	0.3000	0.2000
125.	0.0000	0.4000	0.4000	0.4000	0.4000	0.5000	0.4000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000
130.	0.0000	0.4000	0.4000	0.4000	0.4000	0.6000	0.4000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
135.	0.0000	0.4000	0.4000	0.4000	0.5000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	0.0000	0.4000	0.4000	0.4000	0.4000	0.3000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 Exist 2018

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR) * CONCENTRATION (PPM) 16 17 18 19 20 21 22 23 24 25 26 27 28

215.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.4000	0.3000	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
275.	*	0.0000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
280.	*	0.0000	0.4000	0.5000	0.4000	0.4000	0.4000	0.4000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
285.	*	0.0000	0.5000	0.4000	0.4000	0.4000	0.4000	0.4000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
290.	*	0.0000	0.5000	0.4000	0.4000	0.4000	0.4000	0.4000	0.3000	0.3000	0.2000	0.3000	0.3000	0.2000
295.	*	0.0000	0.4000	0.4000	0.3000	0.4000	0.4000	0.3000	0.3000	0.4000	0.3000	0.3000	0.3000	0.3000
300.	*	0.0000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000	0.4000	0.4000	0.3000	0.4000	0.4000	0.3000
305.	*	0.0000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.4000	0.5000	0.4000	0.5000	0.4000	0.4000
310.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000	0.3000	0.5000	0.5000	0.4000
315.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.5000	0.4000	0.3000	0.4000	0.4000	0.3000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4000	0.3000	0.3000	0.4000	0.4000	0.3000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
330.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
335.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
340.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
345.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
350.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000
355.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
360.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
MAX	*	0.0000	0.5000	0.5000	0.4000	0.5000	0.6000	0.4000	0.5000	0.5000	0.4000	0.5000	0.5000	0.4000
DEGR.	*	5	285	280	120	135	130	115	100	100	305	305	100	95

THE HIGHEST CONCENTRATION OF 0.6000 PPM OCCURRED AT RECEPTOR 21.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2025

DATE : 5/ 6/19
TIME : 14: 9: 9

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT) X1	Y1	X2	Y2	*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. N Leg App - FreeFlow	*	-11.0	0.0	-11.0	1200.0	*	1200.	360.	AG	1.	1.7	0.0	52.7		
2. N Leg Dep - FreeFlow	*	17.0	0.0	17.0	1200.0	*	1200.	360.	AG	1.	1.5	0.0	41.7		
3. S Leg App - FreeFlow	*	17.0	0.0	17.0	-1200.0	*	1200.	180.	AG	1.	1.5	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-11.0	0.0	-11.0	-1200.0	*	1200.	180.	AG	1.	1.7	0.0	52.7		
5. E Leg App - FreeFlow	*	7.0	15.0	1095.0	-492.0	*	1200.	115.	AG	1640.	1.6	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-7.0	-15.0	1081.0	-522.0	*	1200.	115.	AG	1640.	1.4	0.0	52.7		
7. W Leg App - FreeFlow	*	-7.0	-15.0	-1095.0	492.0	*	1200.	295.	AG	1770.	1.4	0.0	52.7		
8. W Leg Dep - FreeFlow	*	7.0	15.0	-1081.0	522.0	*	1200.	295.	AG	1700.	1.6	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2025

DATE : 5/ 6/19
TIME : 14: 9: 9

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	43.0	27.4	5.9	*
2. N Leg, E Side - 25 m	*	43.0	99.4	5.9	*
3. N Leg, E Side - 50 m	*	43.0	181.4	5.9	*
4. N Leg, E Side-Midblk	*	43.0	617.4	5.9	*
5. N Leg, W Side-Corner	*	-32.0	62.4	5.9	*
6. N Leg, W Side - 25 m	*	-32.0	134.4	5.9	*
7. N Leg, W Side - 50 m	*	-32.0	216.4	5.9	*
8. N Leg, W Side-Midblk	*	-32.0	652.4	5.9	*
9. S Leg, E Side-Corner	*	43.0	-67.5	5.9	*
10. S Leg, E Side - 25 m	*	43.0	-139.5	5.9	*
11. S Leg, E Side - 50 m	*	43.0	-221.5	5.9	*
12. S Leg, E Side-Midblk	*	43.0	-657.5	5.9	*
13. S Leg, W Side-Corner	*	-32.0	-32.5	5.9	*
14. S Leg, W Side - 25 m	*	-32.0	-104.5	5.9	*
15. S Leg, W Side - 50 m	*	-32.0	-186.6	5.9	*

16.	S Leg, W Side-Midblk *	-32.0	-622.5	5.9	*
17.	E Leg, N Side - 25 m *	108.3	-3.0	5.9	*
18.	E Leg, N Side - 50 m *	182.6	-37.7	5.9	*
19.	E Leg, N Side-Midblk *	577.7	-222.0	5.9	*
20.	W Leg, N Side - 25 m *	-97.3	92.8	5.9	*
21.	W Leg, N Side - 50 m *	-171.6	127.5	5.9	*
22.	W Leg, N Side-Midblk *	-566.7	311.7	5.9	*
23.	E Leg, S Side - 25 m *	108.3	-97.9	5.9	*
24.	E Leg, S Side - 50 m *	182.6	-132.6	5.9	*
25.	E Leg, S Side-Midblk *	577.7	-316.8	5.9	*
26.	W Leg, S Side - 25 m *	-97.3	-2.1	5.9	*
27.	W Leg, S Side - 50 m *	-171.6	32.6	5.9	*
28.	W Leg, S Side-Midblk *	-566.7	216.8	5.9	*

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2025

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
10.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
15.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
20.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
25.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
30.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
35.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
40.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
45.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
50.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
55.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
65.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
70.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
75.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
80.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
85.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.2000		

```
0.0000  0.0000
  90.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
  95.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 100.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 105.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 110.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 115.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 120.  *  0.3000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 125.  *  0.3000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 130.  *  0.3000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 135.  *  0.2000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 140.  *  0.2000  0.1000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 145.  *  0.2000  0.1000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 150.  *  0.2000  0.1000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 155.  *  0.2000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 160.  *  0.2000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 165.  *  0.2000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 170.  *  0.2000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 175.  *  0.2000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 180.  *  0.2000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 185.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 190.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 195.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 200.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 205.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 210.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Existing 58 and  220 No Build 2025

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 220.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
```

```
0.0000  0.0000
 225.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 230.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 235.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 240.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 245.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.3000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.3000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.2000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.2000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.2000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.2000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.2000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 290.  *  0.2000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 295.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 300.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 305.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.3000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.2000
0.1000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.2000
0.1000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.1000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.3000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.3000
0.1000  0.0000
 DEGR. *    120     125       5       5     120     125       5       5     300     310       5       5     305
310       5


PAGE  5
```

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
10.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
15.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
20.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
25.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
30.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
35.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
40.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
45.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
50.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
55.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
60.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
65.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
70.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
75.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
80.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
85.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
90.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
95.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000
100.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.1000	0.2000
105.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
110.	0.0000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.2000	0.2000	0.1000	0.3000	0.2000	0.2000
115.	0.0000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000
120.	0.0000	0.3000	0.3000	0.1000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
125.	0.0000	0.3000	0.3000	0.3000	0.3000	0.1000	0.3000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
130.	0.0000	0.3000	0.3000	0.2000	0.3000	0.1000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	0.0000	0.2000	0.2000	0.2000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.1000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
275.	*	0.0000	0.2000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
280.	*	0.0000	0.3000	0.1000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
285.	*	0.0000	0.3000	0.1000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
290.	*	0.0000	0.3000	0.2000	0.1000	0.3000	0.3000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
295.	*	0.0000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
300.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000
305.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.3000	0.1000	0.2000	0.3000	0.2000	0.2000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.2000	0.2000	0.2000	0.2000
315.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
330.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
335.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
340.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
345.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
350.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
355.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
360.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
MAX	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000
DEGR.	*	5	120	120	125	125	280	125	300	5	5	100	5	5

THE HIGHEST CONCENTRATION OF 0.3000 PPM OCCURRED AT RECEPTOR 26.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2040

DATE : 5/ 6/19
TIME : 14:15:50

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-11.0	0.0	-11.0	1200.0	*	1200.	360.	AG	1.	0.4	0.0	52.7		
2. N Leg Dep - FreeFlow	*	17.0	0.0	17.0	1200.0	*	1200.	360.	AG	1.	0.4	0.0	41.7		
3. S Leg App - FreeFlow	*	17.0	0.0	17.0	-1200.0	*	1200.	180.	AG	1.	0.4	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-11.0	0.0	-11.0	-1200.0	*	1200.	180.	AG	1.	0.4	0.0	52.7		
5. E Leg App - FreeFlow	*	7.0	15.0	1095.0	-492.0	*	1200.	115.	AG	3670.	0.4	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-7.0	-15.0	1081.0	-522.0	*	1200.	115.	AG	3670.	0.3	0.0	52.7		
7. W Leg App - FreeFlow	*	-7.0	-15.0	-1095.0	492.0	*	1200.	295.	AG	4080.	0.3	0.0	52.7		
8. W Leg Dep - FreeFlow	*	7.0	15.0	-1081.0	522.0	*	1200.	295.	AG	4080.	0.4	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2040

DATE : 5/ 6/19
TIME : 14:15:50

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	43.0	27.4	5.9	*
2. N Leg, E Side - 25 m	*	43.0	99.4	5.9	*
3. N Leg, E Side - 50 m	*	43.0	181.4	5.9	*
4. N Leg, E Side-Midblk	*	43.0	617.4	5.9	*
5. N Leg, W Side-Corner	*	-32.0	62.4	5.9	*
6. N Leg, W Side - 25 m	*	-32.0	134.4	5.9	*
7. N Leg, W Side - 50 m	*	-32.0	216.4	5.9	*
8. N Leg, W Side-Midblk	*	-32.0	652.4	5.9	*
9. S Leg, E Side-Corner	*	43.0	-67.5	5.9	*
10. S Leg, E Side - 25 m	*	43.0	-139.5	5.9	*
11. S Leg, E Side - 50 m	*	43.0	-221.5	5.9	*
12. S Leg, E Side-Midblk	*	43.0	-657.5	5.9	*
13. S Leg, W Side-Corner	*	-32.0	-32.5	5.9	*
14. S Leg, W Side - 25 m	*	-32.0	-104.5	5.9	*
15. S Leg, W Side - 50 m	*	-32.0	-186.6	5.9	*

16.	S Leg, W Side-Midblk *	-32.0	-622.5	5.9	*
17.	E Leg, N Side - 25 m *	108.3	-3.0	5.9	*
18.	E Leg, N Side - 50 m *	182.6	-37.7	5.9	*
19.	E Leg, N Side-Midblk *	577.7	-222.0	5.9	*
20.	W Leg, N Side - 25 m *	-97.3	92.8	5.9	*
21.	W Leg, N Side - 50 m *	-171.6	127.5	5.9	*
22.	W Leg, N Side-Midblk *	-566.7	311.7	5.9	*
23.	E Leg, S Side - 25 m *	108.3	-97.9	5.9	*
24.	E Leg, S Side - 50 m *	182.6	-132.6	5.9	*
25.	E Leg, S Side-Midblk *	577.7	-316.8	5.9	*
26.	W Leg, S Side - 25 m *	-97.3	-2.1	5.9	*
27.	W Leg, S Side - 50 m *	-171.6	32.6	5.9	*
28.	W Leg, S Side-Midblk *	-566.7	216.8	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
75.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000		

0.0000 0.0000
  90. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
  95. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 100. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 105. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 110. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 115. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.1000
0.0000 0.0000
 120. * 0.1000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 125. * 0.1000 0.0000 0.0000 0.0000 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 130. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 135. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 140. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 145. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 150. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 155. * 0.1000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 160. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 165. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 170. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 175. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 180. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 185. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 190. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 195. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 200. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 205. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 210. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000

PAGE 4
      JOB: Martinsville Soutern Connector   RUN: Existing 58 and 220 No Build 2040

 WIND ANGLE RANGE: 5.-360.

 WIND * CONCENTRATION
 ANGLE *   (PPM)
 (DEGR)*   1   2   3   4   5   6   7   8   9   10   11   12   13
 14   15

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----
 215. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000
 220. * 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000

```
0.0000  0.0000
 225.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 230.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 235.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 240.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 245.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 295.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 DEGR. *    110       5       5       5     120       5       5       5      75       5       5       5      90
 5       5


PAGE  5
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JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2040

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000
70.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
75.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
80.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
85.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
90.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
95.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
100.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
105.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
110.	0.0000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
115.	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
120.	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000
125.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Existing 58 and 220 No Build 2040

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
275.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
280.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
285.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
290.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
295.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
300.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
305.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
315.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
330.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
335.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
340.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
345.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
350.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
355.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
360.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAX	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
DEGR.	*	5	110	110	115	125	115	110	75	75	75	70	70	65

THE HIGHEST CONCENTRATION OF 0.1000 PPM OCCURRED AT RECEPTOR 28.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 Exist 2018

DATE : 5/ 7/19
TIME : 14:21:23

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-17.0	0.0	-17.0	1200.0	*	1200.	360.	AG	1570.	3.3	0.0	52.7		
2. N Leg Dep - FreeFlow	*	11.0	0.0	11.0	1200.0	*	1200.	360.	AG	1570.	3.3	0.0	41.7		
3. S Leg App - FreeFlow	*	11.0	0.0	11.0	-1200.0	*	1200.	180.	AG	1650.	3.3	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-17.0	0.0	-17.0	-1200.0	*	1200.	180.	AG	1650.	3.3	0.0	52.7		
5. E Leg App - FreeFlow	*	2.0	16.0	1193.0	-130.0	*	1200.	97.	AG	1130.	3.1	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-2.0	-16.0	1189.0	-163.0	*	1200.	97.	AG	1130.	2.8	0.0	52.7		
7. W Leg App - FreeFlow	*	-2.0	-16.0	-1193.0	130.0	*	1200.	277.	AG	1470.	2.8	0.0	52.7		
8. W Leg Dep - FreeFlow	*	2.0	16.0	-1189.0	163.0	*	1200.	277.	AG	1470.	3.1	0.0	52.7		

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JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 Exist 2018

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ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	32.0	39.4	5.9	*
2. N Leg, E Side - 25 m	*	32.0	111.4	5.9	*
3. N Leg, E Side - 50 m	*	32.0	193.4	5.9	*
4. N Leg, E Side-Midblk	*	32.0	629.4	5.9	*
5. N Leg, W Side-Corner	*	-43.0	48.6	5.9	*
6. N Leg, W Side - 25 m	*	-43.0	120.6	5.9	*
7. N Leg, W Side - 50 m	*	-43.0	202.6	5.9	*
8. N Leg, W Side-Midblk	*	-43.0	638.6	5.9	*
9. S Leg, E Side-Corner	*	32.0	-47.3	5.9	*
10. S Leg, E Side - 25 m	*	32.0	-119.3	5.9	*
11. S Leg, E Side - 50 m	*	32.0	-201.3	5.9	*
12. S Leg, E Side-Midblk	*	32.0	-637.3	5.9	*
13. S Leg, W Side-Corner	*	-43.0	-38.0	5.9	*
14. S Leg, W Side - 25 m	*	-43.0	-110.1	5.9	*
15. S Leg, W Side - 50 m	*	-43.0	-192.1	5.9	*

16. S Leg, W Side-Midblk *	-43.0	-628.0	5.9	*
17. E Leg, N Side - 25 m *	103.5	30.6	5.9	*
18. E Leg, N Side - 50 m *	184.9	20.6	5.9	*
19. E Leg, N Side-Midblk *	617.6	-32.5	5.9	*
20. W Leg, N Side - 25 m *	-114.5	57.4	5.9	*
21. W Leg, N Side - 50 m *	-195.9	67.4	5.9	*
22. W Leg, N Side-Midblk *	-628.6	120.5	5.9	*
23. E Leg, S Side - 25 m *	103.5	-56.0	5.9	*
24. E Leg, S Side - 50 m *	184.9	-66.0	5.9	*
25. E Leg, S Side-Midblk *	617.6	-119.2	5.9	*
26. W Leg, S Side - 25 m *	-114.5	-29.3	5.9	*
27. W Leg, S Side - 50 m *	-195.9	-19.3	5.9	*
28. W Leg, S Side-Midblk *	-628.6	33.9	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.3000	0.3000	0.3000	0.3000	0.4000	0.4000	0.4000	0.4000	0.6000	0.3000	0.4000	0.3000	0.6000	0.5000	0.4000
10.	*	0.2000	0.2000	0.2000	0.1000	0.4000	0.4000	0.4000	0.4000	0.4000	0.2000	0.2000	0.2000	0.6000	0.5000	0.5000
15.	*	0.1000	0.1000	0.1000	0.1000	0.5000	0.4000	0.4000	0.4000	0.3000	0.1000	0.1000	0.1000	0.7000	0.4000	0.6000
20.	*	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000	0.4000	0.4000	0.2000	0.0000	0.1000	0.1000	0.6000	0.5000	0.4000
25.	*	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.4000	0.3000	0.2000	0.0000	0.0000	0.0000	0.5000	0.5000	0.3000
30.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.5000	0.4000	0.3000
35.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.5000	0.3000	0.3000
40.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.5000	0.3000	0.3000
45.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.5000	0.3000	0.3000
50.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.6000	0.3000	0.3000
55.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.6000	0.4000	0.3000
60.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.6000	0.5000	0.3000
65.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.6000	0.5000	0.3000
70.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.6000	0.5000	0.3000
75.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.6000	0.5000	0.3000
80.	*	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.6000	0.5000	0.3000
85.	*	0.1000	0.0000	0.0000	0.0000	0.4000	0.3000	0.3000	0.3000	0.3000	0.1000	0.0000	0.0000	0.6000		

```
0.4000  0.3000
  90.  *  0.1000  0.0000  0.0000  0.0000  0.4000  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.6000
0.3000  0.3000
  95.  *  0.2000  0.0000  0.0000  0.0000  0.5000  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.6000
0.3000  0.3000
 100.  *  0.3000  0.0000  0.0000  0.0000  0.6000  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.5000
0.3000  0.3000
 105.  *  0.3000  0.1000  0.0000  0.0000  0.6000  0.4000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.4000
0.3000  0.3000
 110.  *  0.3000  0.1000  0.0000  0.0000  0.6000  0.4000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 115.  *  0.3000  0.1000  0.0000  0.0000  0.6000  0.5000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 120.  *  0.3000  0.1000  0.0000  0.0000  0.6000  0.5000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 125.  *  0.3000  0.1000  0.0000  0.0000  0.6000  0.4000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 130.  *  0.2000  0.1000  0.0000  0.0000  0.6000  0.4000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 135.  *  0.2000  0.1000  0.0000  0.0000  0.6000  0.4000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 140.  *  0.2000  0.1000  0.0000  0.0000  0.5000  0.4000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 145.  *  0.2000  0.1000  0.0000  0.0000  0.5000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 150.  *  0.2000  0.1000  0.0000  0.0000  0.5000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000
0.3000  0.3000
 155.  *  0.2000  0.1000  0.0000  0.0000  0.5000  0.4000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.4000
0.4000  0.4000
 160.  *  0.2000  0.1000  0.0000  0.1000  0.6000  0.5000  0.4000  0.4000  0.1000  0.1000  0.1000  0.1000  0.5000
0.5000  0.5000
 165.  *  0.3000  0.2000  0.1000  0.1000  0.7000  0.5000  0.5000  0.4000  0.1000  0.1000  0.1000  0.1000  0.5000
0.5000  0.5000
 170.  *  0.3000  0.3000  0.2000  0.1000  0.7000  0.5000  0.5000  0.4000  0.2000  0.2000  0.2000  0.1000  0.5000
0.4000  0.4000
 175.  *  0.6000  0.4000  0.4000  0.3000  0.6000  0.5000  0.4000  0.4000  0.3000  0.3000  0.3000  0.3000  0.4000
0.4000  0.4000
 180.  *  0.6000  0.4000  0.4000  0.4000  0.6000  0.4000  0.4000  0.3000  0.4000  0.4000  0.4000  0.4000  0.4000
0.4000  0.4000
 185.  *  0.7000  0.4000  0.5000  0.4000  0.6000  0.4000  0.3000  0.2000  0.5000  0.5000  0.4000  0.4000  0.3000
0.3000  0.3000
 190.  *  0.7000  0.4000  0.6000  0.4000  0.3000  0.4000  0.2000  0.1000  0.6000  0.5000  0.5000  0.5000  0.1000
0.1000  0.1000
 195.  *  0.7000  0.5000  0.6000  0.5000  0.3000  0.3000  0.1000  0.1000  0.5000  0.5000  0.5000  0.5000  0.1000
0.1000  0.1000
 200.  *  0.7000  0.5000  0.5000  0.5000  0.2000  0.2000  0.0000  0.1000  0.5000  0.5000  0.5000  0.5000  0.1000
0.1000  0.1000
 205.  *  0.5000  0.4000  0.3000  0.5000  0.2000  0.2000  0.0000  0.0000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 210.  *  0.4000  0.5000  0.3000  0.4000  0.2000  0.2000  0.0000  0.0000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000

PAGE  4
      JOB: Martinsville Soutern Connector                     RUN: Exist 58 and Business 220 Exist 2018

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.6000  0.4000  0.3000  0.4000  0.2000  0.2000  0.0000  0.0000  0.4000  0.4000  0.4000  0.4000  0.0000
0.0000  0.0000
 220.  *  0.6000  0.5000  0.3000  0.3000  0.2000  0.2000  0.0000  0.0000  0.4000  0.4000  0.4000  0.4000  0.0000
```

```
0.0000  0.0000
 225.  *  0.7000  0.5000  0.3000  0.3000  0.3000  0.2000  0.0000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 230.  *  0.7000  0.5000  0.3000  0.3000  0.3000  0.2000  0.0000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 235.  *  0.7000  0.5000  0.4000  0.3000  0.3000  0.2000  0.1000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 240.  *  0.6000  0.5000  0.4000  0.3000  0.3000  0.2000  0.1000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 245.  *  0.6000  0.5000  0.4000  0.3000  0.3000  0.2000  0.1000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 250.  *  0.6000  0.5000  0.4000  0.3000  0.3000  0.2000  0.1000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 255.  *  0.7000  0.5000  0.4000  0.3000  0.3000  0.2000  0.1000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 260.  *  0.6000  0.5000  0.4000  0.3000  0.4000  0.2000  0.1000  0.0000  0.3000  0.3000  0.3000  0.3000  0.1000
0.0000  0.0000
 265.  *  0.6000  0.5000  0.3000  0.3000  0.4000  0.2000  0.0000  0.0000  0.4000  0.3000  0.3000  0.3000  0.1000
0.0000  0.0000
 270.  *  0.6000  0.4000  0.3000  0.3000  0.4000  0.1000  0.0000  0.0000  0.4000  0.3000  0.3000  0.3000  0.1000
0.0000  0.0000
 275.  *  0.6000  0.4000  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.5000  0.3000  0.3000  0.3000  0.3000
0.0000  0.0000
 280.  *  0.6000  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.6000  0.4000  0.3000  0.3000  0.3000
0.0000  0.0000
 285.  *  0.4000  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.6000  0.5000  0.3000  0.3000  0.3000
0.2000  0.0000
 290.  *  0.4000  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.7000  0.5000  0.3000  0.3000  0.3000
0.2000  0.0000
 295.  *  0.3000  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.7000  0.5000  0.3000  0.3000  0.3000
0.2000  0.0000
 300.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.6000  0.5000  0.4000  0.3000  0.3000
0.2000  0.1000
 305.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.6000  0.5000  0.4000  0.3000  0.3000
0.2000  0.1000
 310.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.6000  0.5000  0.3000  0.3000  0.3000
0.2000  0.0000
 315.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.7000  0.5000  0.3000  0.3000  0.3000
0.2000  0.0000
 320.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.7000  0.5000  0.3000  0.4000  0.3000
0.2000  0.0000
 325.  *  0.4000  0.4000  0.4000  0.4000  0.0000  0.0000  0.0000  0.0000  0.7000  0.5000  0.4000  0.4000  0.2000
0.2000  0.0000
 330.  *  0.4000  0.4000  0.4000  0.4000  0.0000  0.0000  0.0000  0.0000  0.6000  0.4000  0.5000  0.5000  0.2000
0.2000  0.0000
 335.  *  0.5000  0.5000  0.5000  0.5000  0.0000  0.0000  0.0000  0.0000  0.5000  0.4000  0.4000  0.5000  0.2000
0.2000  0.0000
 340.  *  0.5000  0.5000  0.5000  0.5000  0.1000  0.1000  0.1000  0.1000  0.6000  0.5000  0.4000  0.5000  0.2000
0.2000  0.0000
 345.  *  0.5000  0.5000  0.5000  0.5000  0.1000  0.1000  0.1000  0.1000  0.7000  0.5000  0.6000  0.5000  0.3000
0.3000  0.1000
 350.  *  0.5000  0.5000  0.5000  0.4000  0.1000  0.1000  0.1000  0.1000  0.7000  0.4000  0.6000  0.5000  0.3000
0.4000  0.2000
 355.  *  0.4000  0.4000  0.4000  0.4000  0.3000  0.3000  0.3000  0.2000  0.6000  0.4000  0.5000  0.4000  0.6000
0.5000  0.3000
 360.  *  0.4000  0.4000  0.4000  0.4000  0.4000  0.4000  0.4000  0.3000  0.6000  0.4000  0.4000  0.4000  0.6000
0.5000  0.4000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.7000  0.5000  0.6000  0.5000  0.7000  0.5000  0.5000  0.4000  0.7000  0.5000  0.6000  0.5000  0.7000
0.5000  0.6000
 DEGR. *    185     195     190     195     165     115     165       5     290     185     345     190      15
 5      15


PAGE  5
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JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 Exist 2018

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.4000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000	0.4000	0.2000	0.2000
10.	0.4000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.2000	0.2000	0.2000	0.4000	0.2000	0.2000
15.	0.4000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.4000	0.3000	0.2000
20.	0.4000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000
25.	0.4000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000
30.	0.3000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000
35.	0.3000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000
40.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.4000	0.3000	0.2000
45.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.4000	0.3000	0.2000
50.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.4000	0.3000	0.2000
55.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.5000	0.4000	0.3000
60.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.5000	0.4000	0.3000
65.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.2000	0.2000	0.2000	0.5000	0.3000	0.3000
70.	0.3000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000
75.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
80.	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000	0.3000	0.3000	0.3000	0.5000	0.3000	0.3000
85.	0.3000	0.1000	0.1000	0.1000	0.3000	0.2000	0.1000	0.3000	0.3000	0.3000	0.4000	0.4000	0.3000
90.	0.3000	0.1000	0.1000	0.1000	0.4000	0.1000	0.1000	0.3000	0.3000	0.3000	0.5000	0.4000	0.3000
95.	0.3000	0.2000	0.2000	0.1000	0.4000	0.2000	0.2000	0.3000	0.3000	0.3000	0.5000	0.3000	0.3000
100.	0.3000	0.3000	0.3000	0.3000	0.5000	0.4000	0.3000	0.1000	0.1000	0.1000	0.4000	0.2000	0.2000
105.	0.3000	0.3000	0.3000	0.3000	0.5000	0.4000	0.4000	0.1000	0.1000	0.1000	0.4000	0.2000	0.1000
110.	0.3000	0.3000	0.3000	0.3000	0.5000	0.4000	0.4000	0.1000	0.1000	0.1000	0.2000	0.2000	0.1000
115.	0.3000	0.3000	0.3000	0.3000	0.5000	0.3000	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000
120.	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000
125.	0.3000	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000
130.	0.3000	0.2000	0.2000	0.2000	0.5000	0.4000	0.3000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000
135.	0.3000	0.2000	0.2000	0.2000	0.5000	0.5000	0.3000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
140.	0.3000	0.2000	0.2000	0.2000	0.5000	0.5000	0.3000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
145.	0.3000	0.2000	0.2000	0.2000	0.5000	0.5000	0.3000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
150.	0.3000	0.2000	0.2000	0.2000	0.5000	0.5000	0.3000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
155.	0.4000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
160.	0.4000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
165.	0.4000	0.2000	0.2000	0.2000	0.4000	0.3000	0.2000	0.0000	0.0000	0.0000	0.2000	0.1000	0.0000
170.	0.4000	0.2000	0.2000	0.2000	0.4000	0.2000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
175.	0.4000	0.2000	0.2000	0.2000	0.4000	0.2000	0.2000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
180.	0.4000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000	0.1000	0.0000	0.0000	0.1000	0.0000	0.0000
185.	0.2000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.1000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.1000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000
200.	0.1000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 Exist 2018

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.4000	0.4000	0.2000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.4000	0.4000	0.2000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.4000	0.4000	0.2000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.4000	0.4000	0.2000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.3000	0.2000	0.3000	0.3000	0.3000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.2000	0.3000	0.3000	0.3000	0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.4000	0.4000	0.3000	0.4000	0.4000	0.3000	0.2000	0.1000	0.0000	0.1000	0.1000	0.0000
265.	*	0.0000	0.5000	0.4000	0.3000	0.4000	0.4000	0.4000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
270.	*	0.0000	0.5000	0.3000	0.3000	0.4000	0.4000	0.3000	0.4000	0.2000	0.1000	0.1000	0.1000	0.1000
275.	*	0.0000	0.5000	0.3000	0.2000	0.3000	0.3000	0.3000	0.5000	0.3000	0.1000	0.3000	0.3000	0.2000
280.	*	0.0000	0.5000	0.3000	0.1000	0.3000	0.3000	0.2000	0.5000	0.3000	0.3000	0.3000	0.3000	0.3000
285.	*	0.0000	0.3000	0.2000	0.1000	0.1000	0.1000	0.1000	0.5000	0.3000	0.3000	0.3000	0.3000	0.3000
290.	*	0.0000	0.2000	0.0000	0.1000	0.1000	0.1000	0.1000	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000
295.	*	0.0000	0.2000	0.1000	0.0000	0.1000	0.1000	0.1000	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000
300.	*	0.0000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.3000	0.3000	0.3000	0.3000
305.	*	0.0000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000	0.3000	0.3000	0.3000
310.	*	0.0000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000	0.3000	0.3000	0.3000
315.	*	0.0000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.3000	0.3000	0.3000
320.	*	0.0000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.3000	0.3000	0.3000
325.	*	0.0000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000
330.	*	0.0000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000
335.	*	0.0000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000
340.	*	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000
345.	*	0.1000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000
350.	*	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000
355.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000	0.2000	0.2000	0.2000
360.	*	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000
MAX	*	0.4000	0.5000	0.4000	0.3000	0.5000	0.5000	0.4000	0.5000	0.4000	0.3000	0.5000	0.4000	0.3000
DEGR.	*	5	265	195	100	100	135	105	275	315	75	55	20	55

THE HIGHEST CONCENTRATION OF 0.7000 PPM OCCURRED AT RECEPTOR 13.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2025

DATE : 5/ 6/19
TIME : 13:31:57

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-17.0	0.0	-17.0	1200.0	*	1200.	360.	AG	1670.	1.7	0.0	52.7		
2. N Leg Dep - FreeFlow	*	11.0	0.0	11.0	1200.0	*	1200.	360.	AG	1670.	1.7	0.0	41.7		
3. S Leg App - FreeFlow	*	11.0	0.0	11.0	-1200.0	*	1200.	180.	AG	1700.	1.7	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-17.0	0.0	-17.0	-1200.0	*	1200.	180.	AG	1700.	1.7	0.0	52.7		
5. E Leg App - FreeFlow	*	2.0	16.0	1193.0	-130.0	*	1200.	97.	AG	1120.	1.5	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-2.0	-16.0	1189.0	-163.0	*	1200.	97.	AG	1120.	1.4	0.0	52.7		
7. W Leg App - FreeFlow	*	-2.0	-16.0	-1193.0	130.0	*	1200.	277.	AG	1510.	1.4	0.0	52.7		
8. W Leg Dep - FreeFlow	*	2.0	16.0	-1189.0	163.0	*	1200.	277.	AG	1510.	1.5	0.0	52.7		

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JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2025

DATE : 5/ 6/19
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ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	32.0	39.4	5.9	*
2. N Leg, E Side - 25 m	*	32.0	111.4	5.9	*
3. N Leg, E Side - 50 m	*	32.0	193.4	5.9	*
4. N Leg, E Side-Midblk	*	32.0	629.4	5.9	*
5. N Leg, W Side-Corner	*	-43.0	48.6	5.9	*
6. N Leg, W Side - 25 m	*	-43.0	120.6	5.9	*
7. N Leg, W Side - 50 m	*	-43.0	202.6	5.9	*
8. N Leg, W Side-Midblk	*	-43.0	638.6	5.9	*
9. S Leg, E Side-Corner	*	32.0	-47.3	5.9	*
10. S Leg, E Side - 25 m	*	32.0	-119.3	5.9	*
11. S Leg, E Side - 50 m	*	32.0	-201.3	5.9	*
12. S Leg, E Side-Midblk	*	32.0	-637.3	5.9	*
13. S Leg, W Side-Corner	*	-43.0	-38.0	5.9	*
14. S Leg, W Side - 25 m	*	-43.0	-110.1	5.9	*
15. S Leg, W Side - 50 m	*	-43.0	-192.1	5.9	*

16.	S Leg, W Side-Midblk *	-43.0	-628.0	5.9	*
17.	E Leg, N Side - 25 m *	103.5	30.6	5.9	*
18.	E Leg, N Side - 50 m *	184.9	20.6	5.9	*
19.	E Leg, N Side-Midblk *	617.6	-32.5	5.9	*
20.	W Leg, N Side - 25 m *	-114.5	57.4	5.9	*
21.	W Leg, N Side - 50 m *	-195.9	67.4	5.9	*
22.	W Leg, N Side-Midblk *	-628.6	120.5	5.9	*
23.	E Leg, S Side - 25 m *	103.5	-56.0	5.9	*
24.	E Leg, S Side - 50 m *	184.9	-66.0	5.9	*
25.	E Leg, S Side-Midblk *	617.6	-119.2	5.9	*
26.	W Leg, S Side - 25 m *	-114.5	-29.3	5.9	*
27.	W Leg, S Side - 50 m *	-195.9	-19.3	5.9	*
28.	W Leg, S Side-Midblk *	-628.6	33.9	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.1000	0.1000	0.1000	0.1000	0.3000	0.3000	0.3000	0.2000	0.2000	0.2000	0.1000	0.1000	0.3000	0.3000	0.2000
10.	*	0.1000	0.1000	0.1000	0.1000	0.3000	0.3000	0.3000	0.3000	0.2000	0.0000	0.1000	0.1000	0.3000	0.3000	0.1000
15.	*	0.1000	0.1000	0.1000	0.0000	0.3000	0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.1000	0.4000	0.3000	0.1000
20.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
25.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.1000	0.2000
30.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.1000	0.2000
35.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
40.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
45.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
50.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
55.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
60.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
65.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000
70.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000
75.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
80.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
85.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.4000		

```
0.2000  0.2000
  90.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.3000
0.2000  0.2000
  95.  *  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.3000
0.2000  0.2000
 100.  *  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.3000
0.2000  0.2000
 105.  *  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 110.  *  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 115.  *  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 120.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 125.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 130.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 135.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 140.  *  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 145.  *  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 150.  *  0.1000  0.0000  0.0000  0.0000  0.4000  0.1000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 155.  *  0.1000  0.0000  0.0000  0.0000  0.4000  0.1000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 160.  *  0.1000  0.0000  0.0000  0.0000  0.4000  0.1000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000
0.2000  0.2000
 165.  *  0.1000  0.0000  0.0000  0.0000  0.4000  0.3000  0.1000  0.3000  0.1000  0.1000  0.1000  0.0000  0.3000
0.3000  0.3000
 170.  *  0.2000  0.0000  0.1000  0.1000  0.4000  0.3000  0.1000  0.3000  0.1000  0.1000  0.1000  0.1000  0.3000
0.3000  0.3000
 175.  *  0.2000  0.2000  0.1000  0.1000  0.4000  0.3000  0.2000  0.3000  0.1000  0.1000  0.1000  0.1000  0.3000
0.3000  0.3000
 180.  *  0.3000  0.3000  0.2000  0.1000  0.3000  0.2000  0.2000  0.1000  0.3000  0.3000  0.3000  0.1000  0.2000
0.2000  0.1000
 185.  *  0.4000  0.3000  0.3000  0.3000  0.2000  0.2000  0.1000  0.1000  0.3000  0.3000  0.3000  0.3000  0.1000
0.1000  0.1000
 190.  *  0.4000  0.3000  0.2000  0.3000  0.2000  0.0000  0.1000  0.1000  0.3000  0.3000  0.3000  0.3000  0.1000
0.1000  0.1000
 195.  *  0.4000  0.3000  0.2000  0.3000  0.1000  0.0000  0.0000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 200.  *  0.4000  0.2000  0.2000  0.3000  0.1000  0.0000  0.0000  0.0000  0.3000  0.3000  0.3000  0.3000  0.0000
0.0000  0.0000
 205.  *  0.4000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 210.  *  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Exist 58 and Business 220 No Build 2025

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.2000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 220.  *  0.2000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
```

```
0.0000  0.0000
 225.  *  0.1000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 230.  *  0.1000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 235.  *  0.1000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 240.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 245.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 250.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 255.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 260.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 265.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000
0.0000  0.0000
 270.  *  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.1000
0.0000  0.0000
 275.  *  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.1000
0.0000  0.0000
 280.  *  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 285.  *  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 290.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 295.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 300.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 305.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 310.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 315.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.1000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 320.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.1000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 325.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 330.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 335.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.2000
0.0000  0.0000
 340.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000  0.1000  0.2000  0.3000  0.2000
0.0000  0.0000
 345.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000  0.3000  0.2000  0.3000  0.1000
0.0000  0.0000
 350.  *  0.3000  0.3000  0.3000  0.3000  0.1000  0.1000  0.1000  0.1000  0.3000  0.3000  0.1000  0.3000  0.2000
0.0000  0.1000
 355.  *  0.3000  0.3000  0.3000  0.3000  0.1000  0.1000  0.1000  0.1000  0.3000  0.3000  0.3000  0.3000  0.2000
0.2000  0.1000
 360.  *  0.3000  0.3000  0.3000  0.1000  0.2000  0.1000  0.1000  0.1000  0.3000  0.3000  0.1000  0.2000  0.3000
0.2000  0.2000

------*-------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.4000  0.3000  0.3000  0.3000  0.4000  0.3000  0.3000  0.3000  0.4000  0.3000  0.3000  0.3000  0.4000
0.3000  0.3000
 DEGR. *    185     180     185     185     115       5       5      10     280     180     180     185      15
 5     165
```

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2025

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
10.	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
15.	0.3000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
20.	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
25.	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
30.	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000
35.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
40.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
45.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
50.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
55.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000
60.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000
65.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000
70.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000
75.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000
80.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.1000	0.1000	0.1000	0.2000
85.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000
90.	0.2000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
95.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
100.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
105.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000
110.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	0.2000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	0.2000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	0.2000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
150.	0.2000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
155.	0.2000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
160.	0.2000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
165.	0.3000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
170.	0.3000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	0.3000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2025

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR) * CONCENTRATION (PPM) 16 17 18 19 20 21 22 23 24 25 26 27 28

215.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.2000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.3000	0.1000	0.1000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.3000	0.1000	0.1000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
275.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000	0.1000	0.1000
280.	*	0.0000	0.1000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
285.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.3000	0.1000	0.1000	0.2000	0.2000	0.1000
290.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.1000	0.1000	0.2000	0.2000	0.2000
295.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000	0.2000	0.2000	0.2000
300.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
305.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
315.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
330.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000
335.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000	0.2000	0.2000	0.2000
340.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.2000	0.2000	0.2000
345.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.1000	0.1000	0.1000
350.	*	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
355.	*	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
360.	*	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000
MAX	*	0.3000	0.3000	0.1000	0.1000	0.2000	0.2000	0.2000	0.3000	0.2000	0.1000	0.2000	0.2000	0.2000
DEGR.	*	5	265	90	90	150	130	110	285	80	5	15	35	35

THE HIGHEST CONCENTRATION OF 0.4000 PPM OCCURRED AT RECEPTOR 13.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2040

DATE : 5/ 6/19
TIME : 13:35: 6

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-17.0	0.0	-17.0	1200.0	*	1200.	360.	AG	1820.	0.4	0.0	52.7		
2. N Leg Dep - FreeFlow	*	11.0	0.0	11.0	1200.0	*	1200.	360.	AG	1820.	0.4	0.0	41.7		
3. S Leg App - FreeFlow	*	11.0	0.0	11.0	-1200.0	*	1200.	180.	AG	1850.	0.4	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-17.0	0.0	-17.0	-1200.0	*	1200.	180.	AG	1850.	0.4	0.0	52.7		
5. E Leg App - FreeFlow	*	2.0	16.0	1193.0	-130.0	*	1200.	97.	AG	3875.	0.3	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-2.0	-16.0	1189.0	-163.0	*	1200.	97.	AG	3875.	0.3	0.0	52.7		
7. W Leg App - FreeFlow	*	-2.0	-16.0	-1193.0	130.0	*	1200.	277.	AG	1630.	0.3	0.0	52.7		
8. W Leg Dep - FreeFlow	*	2.0	16.0	-1189.0	163.0	*	1200.	277.	AG	1630.	0.3	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2040

DATE : 5/ 6/19
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ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	32.0	39.4	5.9	*
2. N Leg, E Side - 25 m	*	32.0	111.4	5.9	*
3. N Leg, E Side - 50 m	*	32.0	193.4	5.9	*
4. N Leg, E Side-Midblk	*	32.0	629.4	5.9	*
5. N Leg, W Side-Corner	*	-43.0	48.6	5.9	*
6. N Leg, W Side - 25 m	*	-43.0	120.6	5.9	*
7. N Leg, W Side - 50 m	*	-43.0	202.6	5.9	*
8. N Leg, W Side-Midblk	*	-43.0	638.6	5.9	*
9. S Leg, E Side-Corner	*	32.0	-47.3	5.9	*
10. S Leg, E Side - 25 m	*	32.0	-119.3	5.9	*
11. S Leg, E Side - 50 m	*	32.0	-201.3	5.9	*
12. S Leg, E Side-Midblk	*	32.0	-637.3	5.9	*
13. S Leg, W Side-Corner	*	-43.0	-38.0	5.9	*
14. S Leg, W Side - 25 m	*	-43.0	-110.1	5.9	*
15. S Leg, W Side - 50 m	*	-43.0	-192.1	5.9	*

16.	S Leg, W Side-Midblk *	-43.0	-628.0	5.9	*
17.	E Leg, N Side - 25 m *	103.5	30.6	5.9	*
18.	E Leg, N Side - 50 m *	184.9	20.6	5.9	*
19.	E Leg, N Side-Midblk *	617.6	-32.5	5.9	*
20.	W Leg, N Side - 25 m *	-114.5	57.4	5.9	*
21.	W Leg, N Side - 50 m *	-195.9	67.4	5.9	*
22.	W Leg, N Side-Midblk *	-628.6	120.5	5.9	*
23.	E Leg, S Side - 25 m *	103.5	-56.0	5.9	*
24.	E Leg, S Side - 50 m *	184.9	-66.0	5.9	*
25.	E Leg, S Side-Midblk *	617.6	-119.2	5.9	*
26.	W Leg, S Side - 25 m *	-114.5	-29.3	5.9	*
27.	W Leg, S Side - 50 m *	-195.9	-19.3	5.9	*
28.	W Leg, S Side-Midblk *	-628.6	33.9	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
75.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
85.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000		

```
0.0000  0.0000
  90.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
  95.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000
0.0000  0.0000
 100.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 105.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 110.  *  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 115.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 120.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 125.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 130.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 135.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 140.  *  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 145.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 150.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 155.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 160.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 165.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 170.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 175.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 180.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 185.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 190.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 195.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 200.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 205.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 210.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Exist 58 and Business 220 No Build 2040

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 220.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
```

```
0.0000  0.0000
 225.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 230.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 235.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 240.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 245.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 295.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 350.  *  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000
0.0000  0.0000
 355.  *  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.1000  0.1000  0.1000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.1000
0.0000  0.0000
 DEGR. *     95     350     350       5     100       5       5       5      55     185     185     350      80
 5       5
```

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JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2040

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
60.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
65.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
70.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
75.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
80.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
85.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
90.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
95.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
100.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
105.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
110.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Exist 58 and Business 220 No Build 2040

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.0000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.0000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.0000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
275.	*	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
280.	*	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000
285.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.0000	0.0000
290.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.0000	0.0000
295.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000
300.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000
305.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000
315.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
330.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
335.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
340.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
345.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
350.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
355.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
360.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MAX	*	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
DEGR.	*	5	95	95	95	5	5	5	55	55	55	5	5	5

THE HIGHEST CONCENTRATION OF 0.1000 PPM OCCURRED AT RECEPTOR 9.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2025

DATE : 5/ 6/19
TIME : 11:29:20

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-11.0	0.0	-11.0	1200.0	*	1200.	360.	AG	7200.	1.7	0.0	52.7		
2. N Leg Dep - FreeFlow	*	17.0	0.0	17.0	1200.0	*	1200.	360.	AG	4800.	1.5	0.0	41.7		
3. S Leg App - FreeFlow	*	17.0	0.0	17.0	-1200.0	*	1200.	180.	AG	4800.	1.5	0.0	41.7		
4. S Leg Dep - FreeFlow	*	-11.0	0.0	-11.0	-1200.0	*	1200.	180.	AG	7200.	1.7	0.0	52.7		
5. E Leg App - FreeFlow	*	7.0	15.0	1095.0	-492.0	*	1200.	115.	AG	7200.	1.6	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-7.0	-15.0	1081.0	-522.0	*	1200.	115.	AG	7200.	1.4	0.0	52.7		
7. W Leg App - FreeFlow	*	-7.0	-15.0	-1095.0	492.0	*	1200.	295.	AG	7200.	1.4	0.0	52.7		
8. W Leg Dep - FreeFlow	*	7.0	15.0	-1081.0	522.0	*	1200.	295.	AG	7200.	1.6	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2025

DATE : 5/ 6/19
TIME : 11:29:20

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	43.0	27.4	5.9	*
2. N Leg, E Side - 25 m	*	43.0	99.4	5.9	*
3. N Leg, E Side - 50 m	*	43.0	181.4	5.9	*
4. N Leg, E Side-Midblk	*	43.0	617.4	5.9	*
5. N Leg, W Side-Corner	*	-32.0	62.4	5.9	*
6. N Leg, W Side - 25 m	*	-32.0	134.4	5.9	*
7. N Leg, W Side - 50 m	*	-32.0	216.4	5.9	*
8. N Leg, W Side-Midblk	*	-32.0	652.4	5.9	*
9. S Leg, E Side-Corner	*	43.0	-67.5	5.9	*
10. S Leg, E Side - 25 m	*	43.0	-139.5	5.9	*
11. S Leg, E Side - 50 m	*	43.0	-221.5	5.9	*
12. S Leg, E Side-Midblk	*	43.0	-657.5	5.9	*
13. S Leg, W Side-Corner	*	-32.0	-32.5	5.9	*
14. S Leg, W Side - 25 m	*	-32.0	-104.5	5.9	*
15. S Leg, W Side - 50 m	*	-32.0	-186.6	5.9	*

16.	S Leg, W Side-Midblk *	-32.0	-622.5	5.9	*
17.	E Leg, N Side - 25 m *	108.3	-3.0	5.9	*
18.	E Leg, N Side - 50 m *	182.6	-37.7	5.9	*
19.	E Leg, N Side-Midblk *	577.7	-222.0	5.9	*
20.	W Leg, N Side - 25 m *	-97.3	92.8	5.9	*
21.	W Leg, N Side - 50 m *	-171.6	127.5	5.9	*
22.	W Leg, N Side-Midblk *	-566.7	311.7	5.9	*
23.	E Leg, S Side - 25 m *	108.3	-97.9	5.9	*
24.	E Leg, S Side - 50 m *	182.6	-132.6	5.9	*
25.	E Leg, S Side-Midblk *	577.7	-316.8	5.9	*
26.	W Leg, S Side - 25 m *	-97.3	-2.1	5.9	*
27.	W Leg, S Side - 50 m *	-171.6	32.6	5.9	*
28.	W Leg, S Side-Midblk *	-566.7	216.8	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) * 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.4000	0.4000	0.3000	0.3000	1.0000	1.0000	1.0000	0.8000	1.0000	0.6000	0.5000	0.4000	1.7000	1.3000	1.2000
10.	* 0.2000	0.2000	0.2000	0.2000	1.0000	1.0000	1.0000	1.0000	0.7000	0.6000	0.5000	0.2000	1.6000	1.3000	1.3000
15.	* 0.1000	0.1000	0.1000	0.1000	1.0000	1.0000	1.0000	0.9000	0.6000	0.3000	0.3000	0.1000	1.5000	1.5000	1.1000
20.	* 0.0000	0.0000	0.0000	0.0000	0.9000	0.9000	0.9000	0.9000	0.5000	0.4000	0.2000	0.1000	1.4000	1.3000	1.2000
25.	* 0.0000	0.0000	0.0000	0.0000	0.8000	0.8000	0.8000	0.8000	0.5000	0.4000	0.2000	0.1000	1.4000	1.0000	1.0000
30.	* 0.0000	0.0000	0.0000	0.0000	0.8000	0.8000	0.8000	0.8000	0.5000	0.4000	0.2000	0.1000	1.4000	1.0000	1.0000
35.	* 0.0000	0.0000	0.0000	0.0000	0.7000	0.7000	0.7000	0.7000	0.5000	0.4000	0.2000	0.1000	1.3000	0.8000	0.9000
40.	* 0.0000	0.0000	0.0000	0.0000	0.7000	0.7000	0.7000	0.7000	0.5000	0.4000	0.2000	0.1000	1.2000	1.0000	0.9000
45.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.5000	0.4000	0.2000	0.1000	1.4000	0.9000	0.8000
50.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.4000	0.2000	0.1000	1.3000	1.0000	0.8000
55.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.4000	0.2000	0.1000	1.3000	1.0000	0.8000
60.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.4000	0.2000	0.1000	1.2000	1.0000	0.8000
65.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.1000	1.1000	1.0000	0.8000
70.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.2000	1.0000	0.8000
75.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.2000	1.0000	0.8000
80.	* 0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.4000	0.2000	0.0000	1.2000	1.0000	0.8000
85.	* 0.1000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.8000	0.4000	0.2000	0.0000	1.4000		

```
1.0000  0.8000
  90.  *  0.1000  0.0000  0.0000  0.0000  0.6000  0.6000  0.6000  0.6000  0.8000  0.4000  0.2000  0.0000  1.4000
1.0000  0.8000
  95.  *  0.1000  0.0000  0.0000  0.0000  0.8000  0.6000  0.6000  0.6000  0.9000  0.4000  0.2000  0.0000  1.5000
1.0000  0.8000
 100.  *  0.2000  0.0000  0.0000  0.0000  0.8000  0.6000  0.6000  0.6000  0.9000  0.4000  0.2000  0.0000  1.5000
1.0000  0.8000
 105.  *  0.4000  0.0000  0.0000  0.0000  1.0000  0.6000  0.6000  0.6000  0.9000  0.4000  0.2000  0.0000  1.5000
1.0000  0.8000
 110.  *  0.6000  0.1000  0.0000  0.0000  1.1000  0.7000  0.6000  0.6000  0.9000  0.2000  0.2000  0.0000  1.5000
0.9000  0.8000
 115.  *  0.8000  0.2000  0.0000  0.0000  1.4000  0.8000  0.7000  0.6000  0.7000  0.2000  0.0000  0.0000  1.4000
0.8000  0.6000
 120.  *  0.9000  0.3000  0.2000  0.0000  1.5000  0.9000  0.8000  0.6000  0.5000  0.1000  0.0000  0.0000  1.1000
0.7000  0.6000
 125.  *  1.0000  0.3000  0.2000  0.0000  1.7000  0.9000  0.8000  0.6000  0.4000  0.0000  0.0000  0.0000  0.9000
0.6000  0.6000
 130.  *  1.0000  0.4000  0.2000  0.0000  1.5000  1.0000  0.8000  0.6000  0.2000  0.0000  0.0000  0.0000  0.7000
0.6000  0.6000
 135.  *  0.9000  0.4000  0.3000  0.0000  1.5000  1.0000  0.9000  0.6000  0.1000  0.0000  0.0000  0.0000  0.7000
0.6000  0.6000
 140.  *  0.9000  0.4000  0.3000  0.0000  1.4000  1.1000  1.0000  0.7000  0.1000  0.0000  0.0000  0.0000  0.7000
0.7000  0.7000
 145.  *  0.8000  0.4000  0.3000  0.1000  1.6000  1.1000  0.9000  0.8000  0.0000  0.0000  0.0000  0.0000  0.7000
0.7000  0.7000
 150.  *  0.8000  0.4000  0.2000  0.1000  1.5000  1.0000  1.0000  0.9000  0.0000  0.0000  0.0000  0.0000  0.8000
0.8000  0.8000
 155.  *  0.7000  0.3000  0.2000  0.1000  1.6000  1.1000  1.0000  0.9000  0.0000  0.0000  0.0000  0.0000  0.8000
0.8000  0.8000
 160.  *  0.6000  0.3000  0.2000  0.1000  1.6000  1.2000  1.2000  1.0000  0.0000  0.0000  0.0000  0.0000  0.9000
0.9000  0.9000
 165.  *  0.7000  0.4000  0.2000  0.2000  1.6000  1.3000  1.2000  0.9000  0.1000  0.1000  0.1000  0.1000  1.0000
1.0000  1.0000
 170.  *  0.8000  0.5000  0.5000  0.2000  1.7000  1.5000  1.3000  1.1000  0.2000  0.2000  0.2000  0.2000  1.0000
1.0000  1.0000
 175.  *  1.0000  0.7000  0.5000  0.4000  1.7000  1.4000  1.2000  1.1000  0.4000  0.4000  0.3000  0.3000  1.0000
1.0000  1.0000
 180.  *  1.1000  0.8000  0.8000  0.6000  1.3000  1.2000  1.1000  0.9000  0.5000  0.5000  0.5000  0.5000  0.9000
0.9000  0.8000
 185.  *  1.2000  1.0000  0.8000  0.7000  1.3000  1.0000  1.0000  0.8000  0.7000  0.7000  0.7000  0.5000  0.7000
0.7000  0.7000
 190.  *  1.4000  1.1000  1.0000  0.8000  1.0000  0.9000  0.7000  0.4000  0.8000  0.8000  0.8000  0.7000  0.6000
0.6000  0.5000
 195.  *  1.4000  1.1000  1.0000  0.8000  0.9000  0.6000  0.6000  0.4000  0.8000  0.8000  0.8000  0.7000  0.3000
0.3000  0.3000
 200.  *  1.4000  1.2000  0.9000  0.9000  0.8000  0.5000  0.4000  0.3000  0.8000  0.8000  0.8000  0.8000  0.2000
0.2000  0.2000
 205.  *  1.2000  1.2000  0.9000  0.8000  0.7000  0.4000  0.3000  0.2000  0.7000  0.7000  0.7000  0.7000  0.1000
0.1000  0.1000
 210.  *  1.2000  1.0000  0.9000  0.7000  0.7000  0.4000  0.3000  0.2000  0.6000  0.6000  0.6000  0.6000  0.1000
0.1000  0.1000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Existing 58 and New 220 2025

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  1.2000  0.9000  0.8000  0.7000  0.7000  0.4000  0.3000  0.2000  0.6000  0.6000  0.6000  0.6000  0.1000
0.1000  0.1000
 220.  *  1.2000  1.0000  0.8000  0.7000  0.6000  0.4000  0.3000  0.2000  0.6000  0.6000  0.6000  0.6000  0.1000
```

```
0.1000  0.1000
 225.  *  1.1000  0.9000  0.8000  0.7000  0.6000  0.4000  0.3000  0.2000  0.6000  0.6000  0.6000  0.6000  0.1000
0.1000  0.1000
 230.  *  1.2000  0.8000  0.7000  0.6000  0.7000  0.4000  0.3000  0.2000  0.5000  0.5000  0.5000  0.5000  0.1000
0.1000  0.1000
 235.  *  1.2000  0.8000  0.7000  0.6000  0.7000  0.4000  0.3000  0.2000  0.5000  0.5000  0.5000  0.5000  0.1000
0.1000  0.1000
 240.  *  1.3000  0.8000  0.7000  0.6000  0.6000  0.3000  0.2000  0.1000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 245.  *  1.2000  0.8000  0.7000  0.6000  0.6000  0.3000  0.2000  0.1000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 250.  *  1.2000  0.8000  0.7000  0.6000  0.6000  0.3000  0.2000  0.1000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 255.  *  1.1000  0.8000  0.7000  0.6000  0.7000  0.3000  0.2000  0.0000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 260.  *  1.1000  0.9000  0.7000  0.5000  0.8000  0.4000  0.2000  0.0000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 265.  *  1.3000  0.9000  0.7000  0.5000  0.8000  0.4000  0.2000  0.0000  0.5000  0.5000  0.5000  0.5000  0.0000
0.0000  0.0000
 270.  *  1.4000  0.9000  0.8000  0.5000  0.9000  0.4000  0.3000  0.0000  0.5000  0.5000  0.5000  0.5000  0.1000
0.0000  0.0000
 275.  *  1.5000  0.9000  0.8000  0.5000  0.9000  0.4000  0.2000  0.0000  0.6000  0.5000  0.5000  0.5000  0.1000
0.0000  0.0000
 280.  *  1.5000  0.9000  0.7000  0.5000  1.0000  0.4000  0.2000  0.0000  0.7000  0.5000  0.5000  0.5000  0.2000
0.0000  0.0000
 285.  *  1.6000  0.8000  0.7000  0.5000  1.0000  0.3000  0.2000  0.0000  0.9000  0.5000  0.5000  0.5000  0.4000
0.0000  0.0000
 290.  *  1.4000  0.8000  0.6000  0.5000  0.9000  0.3000  0.1000  0.0000  1.0000  0.6000  0.5000  0.5000  0.5000
0.1000  0.0000
 295.  *  1.3000  0.7000  0.5000  0.5000  0.8000  0.2000  0.0000  0.0000  1.2000  0.7000  0.5000  0.5000  0.7000
0.2000  0.0000
 300.  *  1.1000  0.6000  0.5000  0.5000  0.6000  0.1000  0.0000  0.0000  1.4000  0.8000  0.7000  0.5000  0.9000
0.3000  0.2000
 305.  *  1.0000  0.5000  0.5000  0.5000  0.5000  0.1000  0.1000  0.1000  1.5000  0.9000  0.7000  0.5000  0.9000
0.5000  0.3000
 310.  *  0.6000  0.5000  0.5000  0.5000  0.3000  0.1000  0.1000  0.1000  1.4000  0.9000  0.7000  0.5000  0.9000
0.5000  0.3000
 315.  *  0.7000  0.6000  0.6000  0.6000  0.2000  0.1000  0.1000  0.1000  1.3000  1.0000  0.8000  0.6000  0.8000
0.5000  0.3000
 320.  *  0.6000  0.6000  0.6000  0.6000  0.2000  0.1000  0.1000  0.1000  1.4000  1.0000  0.8000  0.6000  0.8000
0.5000  0.3000
 325.  *  0.6000  0.6000  0.6000  0.6000  0.2000  0.1000  0.1000  0.1000  1.4000  1.1000  0.8000  0.7000  0.9000
0.5000  0.3000
 330.  *  0.6000  0.6000  0.6000  0.6000  0.1000  0.1000  0.1000  0.1000  1.4000  1.1000  0.8000  0.8000  0.8000
0.5000  0.3000
 335.  *  0.7000  0.7000  0.7000  0.7000  0.1000  0.1000  0.1000  0.1000  1.5000  0.9000  0.9000  0.8000  0.9000
0.5000  0.3000
 340.  *  0.8000  0.8000  0.8000  0.8000  0.2000  0.2000  0.2000  0.2000  1.4000  1.2000  0.9000  0.9000  0.9000
0.7000  0.4000
 345.  *  0.8000  0.8000  0.8000  0.7000  0.3000  0.3000  0.3000  0.3000  1.4000  1.1000  1.1000  0.8000  1.0000
0.7000  0.5000
 350.  *  0.8000  0.8000  0.8000  0.7000  0.6000  0.6000  0.5000  0.4000  1.3000  1.1000  1.1000  0.8000  1.2000
1.0000  0.6000
 355.  *  0.7000  0.7000  0.7000  0.6000  0.7000  0.7000  0.7000  0.7000  1.1000  1.1000  0.9000  0.7000  1.3000
1.0000  0.9000
 360.  *  0.5000  0.5000  0.5000  0.5000  0.9000  0.9000  0.8000  0.8000  1.0000  0.9000  0.8000  0.6000  1.4000
1.0000  1.0000

------*-----------------------------------------------------------------------------------------------------------
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 MAX   *  1.6000  1.2000  1.0000  0.9000  1.7000  1.5000  1.3000  1.1000  1.5000  1.2000  1.1000  0.9000  1.7000
1.5000  1.3000
 DEGR. *    285     200     190     200     125     170     170     170     335     340     345     340       5
15      10


PAGE  5
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MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	1.1000	0.0000	0.0000	0.0000	0.3000	0.1000	0.0000	0.6000	0.5000	0.6000	0.9000	0.7000	0.6000
10.	1.1000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.5000
15.	0.9000	0.0000	0.0000	0.0000	0.4000	0.2000	0.0000	0.5000	0.5000	0.5000	0.9000	0.7000	0.5000
20.	0.9000	0.0000	0.0000	0.0000	0.4000	0.3000	0.0000	0.5000	0.5000	0.5000	0.9000	0.8000	0.5000
25.	0.9000	0.0000	0.0000	0.0000	0.4000	0.3000	0.0000	0.5000	0.5000	0.5000	0.9000	0.8000	0.5000
30.	0.9000	0.0000	0.0000	0.0000	0.3000	0.3000	0.0000	0.5000	0.5000	0.5000	0.8000	0.8000	0.5000
35.	0.8000	0.0000	0.0000	0.0000	0.3000	0.3000	0.0000	0.5000	0.5000	0.5000	0.8000	0.8000	0.5000
40.	0.8000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000	0.5000	0.5000	0.5000	0.8000	0.7000	0.6000
45.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.5000	0.5000	0.5000	0.8000	0.7000	0.6000
50.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.6000	0.6000	0.6000	0.8000	0.8000	0.7000
55.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.6000	0.6000	0.6000	0.9000	0.8000	0.7000
60.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.6000	0.6000	0.6000	0.9000	0.8000	0.7000
65.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	0.9000	0.9000	0.8000
70.	0.7000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	1.0000	0.9000	0.8000
75.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	1.0000	0.9000	0.8000
80.	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.7000	0.7000	0.7000	1.1000	0.9000	0.8000
85.	0.6000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000	0.8000	0.8000	0.8000	1.1000	1.0000	0.9000
90.	0.6000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000	0.8000	0.8000	0.8000	1.0000	1.0000	0.9000
95.	0.6000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000	0.9000	0.8000	0.8000	1.3000	1.1000	0.9000
100.	0.6000	0.2000	0.2000	0.2000	0.5000	0.4000	0.3000	0.9000	0.9000	0.9000	1.2000	1.1000	0.9000
105.	0.6000	0.4000	0.4000	0.3000	0.7000	0.6000	0.4000	0.9000	0.9000	0.9000	1.2000	1.1000	1.1000
110.	0.6000	0.6000	0.6000	0.5000	0.8000	0.8000	0.7000	0.9000	0.9000	0.7000	1.2000	1.0000	0.9000
115.	0.6000	0.8000	0.8000	0.6000	1.1000	0.9000	0.8000	0.7000	0.7000	0.6000	1.0000	0.9000	0.9000
120.	0.6000	0.9000	0.9000	0.8000	1.2000	1.1000	1.0000	0.5000	0.5000	0.4000	0.8000	0.7000	0.7000
125.	0.6000	1.0000	1.0000	0.9000	1.3000	1.2000	1.1000	0.4000	0.4000	0.2000	0.7000	0.6000	0.3000
130.	0.6000	1.0000	1.0000	1.0000	1.4000	1.2000	1.0000	0.2000	0.2000	0.2000	0.5000	0.4000	0.3000
135.	0.6000	0.9000	0.9000	0.9000	1.2000	1.1000	1.0000	0.1000	0.1000	0.1000	0.4000	0.3000	0.2000
140.	0.7000	0.9000	0.9000	0.9000	1.2000	1.0000	1.0000	0.1000	0.1000	0.1000	0.3000	0.3000	0.2000
145.	0.7000	0.8000	0.8000	0.8000	1.3000	0.9000	0.9000	0.0000	0.0000	0.0000	0.3000	0.3000	0.1000
150.	0.8000	0.8000	0.8000	0.8000	1.1000	1.0000	0.9000	0.0000	0.0000	0.0000	0.3000	0.3000	0.1000
155.	0.8000	0.7000	0.7000	0.7000	1.0000	1.0000	0.7000	0.0000	0.0000	0.0000	0.4000	0.3000	0.0000
160.	0.9000	0.6000	0.6000	0.6000	0.9000	0.9000	0.6000	0.0000	0.0000	0.0000	0.4000	0.3000	0.0000
165.	0.9000	0.6000	0.6000	0.6000	1.0000	0.9000	0.6000	0.0000	0.0000	0.0000	0.4000	0.3000	0.0000
170.	1.0000	0.6000	0.6000	0.6000	0.9000	0.8000	0.6000	0.0000	0.0000	0.0000	0.3000	0.2000	0.0000
175.	1.0000	0.6000	0.6000	0.6000	0.9000	0.7000	0.6000	0.0000	0.0000	0.0000	0.3000	0.1000	0.0000
180.	0.8000	0.8000	0.6000	0.6000	0.8000	0.7000	0.6000	0.2000	0.0000	0.0000	0.2000	0.1000	0.0000
185.	0.7000	0.8000	0.7000	0.6000	0.6000	0.5000	0.5000	0.2000	0.1000	0.0000	0.1000	0.0000	0.0000
190.	0.4000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
195.	0.3000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
200.	0.2000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
205.	0.1000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
210.	0.1000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.1000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
220.	*	0.1000	0.8000	0.7000	0.5000	0.5000	0.5000	0.5000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
225.	*	0.1000	0.8000	0.7000	0.6000	0.5000	0.5000	0.5000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
230.	*	0.1000	0.9000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
235.	*	0.1000	0.9000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
240.	*	0.0000	0.9000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
245.	*	0.0000	0.9000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
250.	*	0.0000	0.8000	0.8000	0.7000	0.6000	0.6000	0.6000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
255.	*	0.0000	0.9000	0.9000	0.8000	0.7000	0.7000	0.7000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
260.	*	0.0000	1.0000	0.9000	0.9000	0.8000	0.8000	0.8000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
265.	*	0.0000	1.1000	1.0000	0.9000	0.8000	0.8000	0.8000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000
270.	*	0.0000	1.2000	1.1000	1.0000	0.9000	0.9000	0.9000	0.4000	0.3000	0.2000	0.1000	0.1000	0.1000
275.	*	0.0000	1.2000	1.1000	0.9000	0.9000	0.9000	0.9000	0.4000	0.3000	0.2000	0.1000	0.1000	0.1000
280.	*	0.0000	1.2000	1.2000	1.0000	1.0000	1.0000	1.0000	0.5000	0.3000	0.3000	0.2000	0.2000	0.2000
285.	*	0.0000	1.2000	1.1000	1.1000	1.0000	1.0000	0.9000	0.7000	0.6000	0.3000	0.4000	0.4000	0.2000
290.	*	0.0000	1.1000	1.1000	1.0000	0.9000	0.9000	0.8000	0.8000	0.7000	0.7000	0.5000	0.5000	0.5000
295.	*	0.0000	1.1000	1.0000	0.9000	0.8000	0.8000	0.6000	0.9000	1.1000	0.9000	0.7000	0.7000	0.7000
300.	*	0.0000	0.9000	0.8000	0.7000	0.6000	0.5000	0.5000	1.1000	1.1000	0.9000	0.9000	0.9000	0.7000
305.	*	0.1000	0.7000	0.6000	0.3000	0.4000	0.4000	0.3000	1.3000	1.2000	1.0000	0.9000	0.9000	0.9000
310.	*	0.1000	0.5000	0.4000	0.3000	0.2000	0.2000	0.2000	1.2000	1.1000	0.9000	0.9000	0.9000	0.9000
315.	*	0.1000	0.4000	0.3000	0.2000	0.1000	0.1000	0.1000	1.3000	1.1000	0.9000	0.8000	0.8000	0.8000
320.	*	0.1000	0.4000	0.3000	0.2000	0.1000	0.1000	0.1000	1.1000	1.1000	0.9000	0.8000	0.8000	0.8000
325.	*	0.1000	0.3000	0.3000	0.2000	0.1000	0.1000	0.1000	1.0000	0.9000	0.9000	0.8000	0.8000	0.8000
330.	*	0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	1.0000	0.9000	0.8000	0.7000	0.7000	0.7000
335.	*	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	1.0000	0.9000	0.7000	0.7000	0.7000	0.7000
340.	*	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	1.0000	0.9000	0.7000	0.7000	0.7000	0.7000
345.	*	0.4000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	1.0000	0.9000	0.7000	0.7000	0.7000	0.7000
350.	*	0.4000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	0.9000	0.8000	0.6000	0.6000	0.6000	0.6000
355.	*	0.8000	0.2000	0.1000	0.0000	0.1000	0.0000	0.0000	0.8000	0.8000	0.6000	0.7000	0.6000	0.6000
360.	*	0.9000	0.2000	0.0000	0.0000	0.1000	0.0000	0.0000	0.8000	0.6000	0.6000	0.8000	0.7000	0.6000
MAX	*	1.1000	1.2000	1.2000	1.1000	1.4000	1.2000	1.1000	1.3000	1.2000	1.0000	1.3000	1.1000	1.1000
DEGR.	*	5	275	280	285	130	125	125	315	305	305	95	95	105

THE HIGHEST CONCENTRATION OF 1.7000 PPM OCCURRED AT RECEPTOR 13.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2040

DATE : 5/ 6/19
TIME : 11:33:26

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. N Leg App - FreeFlow	*	-11.0	0.0	-11.0	1200.0	*	1200.	360.	AG	4800.	0.4	0.0	41.7		
2. N Leg Dep - FreeFlow	*	17.0	0.0	17.0	1200.0	*	1200.	360.	AG	7200.	0.4	0.0	52.7		
3. S Leg App - FreeFlow	*	17.0	0.0	17.0	-1200.0	*	1200.	180.	AG	7200.	0.4	0.0	52.7		
4. S Leg Dep - FreeFlow	*	-11.0	0.0	-11.0	-1200.0	*	1200.	180.	AG	4800.	0.4	0.0	41.7		
5. E Leg App - FreeFlow	*	7.0	15.0	1095.0	-492.0	*	1200.	115.	AG	7200.	0.4	0.0	52.7		
6. E Leg Dep - FreeFlow	*	-7.0	-15.0	1081.0	-522.0	*	1200.	115.	AG	7200.	0.3	0.0	52.7		
7. W Leg App - FreeFlow	*	-7.0	-15.0	-1095.0	492.0	*	1200.	295.	AG	7200.	0.3	0.0	52.7		
8. W Leg Dep - FreeFlow	*	7.0	15.0	-1081.0	522.0	*	1200.	295.	AG	7200.	0.4	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2040

DATE : 5/ 6/19
TIME : 11:33:26

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	43.0	27.4	5.9	*
2. N Leg, E Side - 25 m	*	43.0	99.4	5.9	*
3. N Leg, E Side - 50 m	*	43.0	181.4	5.9	*
4. N Leg, E Side-Midblk	*	43.0	617.4	5.9	*
5. N Leg, W Side-Corner	*	-32.0	62.4	5.9	*
6. N Leg, W Side - 25 m	*	-32.0	134.4	5.9	*
7. N Leg, W Side - 50 m	*	-32.0	216.4	5.9	*
8. N Leg, W Side-Midblk	*	-32.0	652.4	5.9	*
9. S Leg, E Side-Corner	*	43.0	-67.5	5.9	*
10. S Leg, E Side - 25 m	*	43.0	-139.5	5.9	*
11. S Leg, E Side - 50 m	*	43.0	-221.5	5.9	*
12. S Leg, E Side-Midblk	*	43.0	-657.5	5.9	*
13. S Leg, W Side-Corner	*	-32.0	-32.5	5.9	*
14. S Leg, W Side - 25 m	*	-32.0	-104.5	5.9	*
15. S Leg, W Side - 50 m	*	-32.0	-186.6	5.9	*

16.	S Leg, W Side-Midblk *	-32.0	-622.5	5.9	*
17.	E Leg, N Side - 25 m *	108.3	-3.0	5.9	*
18.	E Leg, N Side - 50 m *	182.6	-37.7	5.9	*
19.	E Leg, N Side-Midblk *	577.7	-222.0	5.9	*
20.	W Leg, N Side - 25 m *	-97.3	92.8	5.9	*
21.	W Leg, N Side - 50 m *	-171.6	127.5	5.9	*
22.	W Leg, N Side-Midblk *	-566.7	311.7	5.9	*
23.	E Leg, S Side - 25 m *	108.3	-97.9	5.9	*
24.	E Leg, S Side - 50 m *	182.6	-132.6	5.9	*
25.	E Leg, S Side-Midblk *	577.7	-316.8	5.9	*
26.	W Leg, S Side - 25 m *	-97.3	-2.1	5.9	*
27.	W Leg, S Side - 50 m *	-171.6	32.6	5.9	*
28.	W Leg, S Side-Midblk *	-566.7	216.8	5.9	*

JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2040

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	*	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.2000	0.3000	0.2000	0.1000	0.1000	0.4000	0.3000	0.2000
10.	*	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.1000	0.1000	0.4000	0.2000	0.2000
15.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
20.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
25.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
30.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
35.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
40.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
45.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
50.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000
55.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000
60.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000
65.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000
70.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
75.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
80.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000
85.	*	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000		

0.2000 0.2000
  90. * 0.0000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.4000
0.3000 0.2000
  95. * 0.0000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.4000
0.3000 0.2000
 100. * 0.0000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.4000
0.3000 0.2000
 105. * 0.1000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.3000 0.0000 0.0000 0.0000 0.4000
0.2000 0.2000
 110. * 0.1000 0.0000 0.0000 0.0000 0.3000 0.2000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.4000
0.2000 0.2000
 115. * 0.1000 0.0000 0.0000 0.0000 0.3000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.0000 0.3000
0.2000 0.2000
 120. * 0.3000 0.0000 0.0000 0.0000 0.5000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.0000 0.3000
0.2000 0.2000
 125. * 0.3000 0.0000 0.0000 0.0000 0.5000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.0000 0.3000
0.2000 0.2000
 130. * 0.2000 0.1000 0.0000 0.0000 0.5000 0.3000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 135. * 0.2000 0.1000 0.0000 0.0000 0.5000 0.3000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 140. * 0.2000 0.1000 0.0000 0.0000 0.4000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 145. * 0.2000 0.1000 0.0000 0.0000 0.3000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 150. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 155. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 160. * 0.2000 0.0000 0.0000 0.0000 0.3000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 165. * 0.2000 0.0000 0.0000 0.0000 0.4000 0.2000 0.2000 0.2000 0.0000 0.0000 0.0000 0.0000 0.2000
0.2000 0.2000
 170. * 0.3000 0.0000 0.1000 0.1000 0.4000 0.2000 0.1000 0.2000 0.1000 0.1000 0.1000 0.1000 0.2000
0.2000 0.2000
 175. * 0.3000 0.2000 0.1000 0.1000 0.4000 0.2000 0.2000 0.2000 0.1000 0.1000 0.1000 0.1000 0.2000
0.2000 0.2000
 180. * 0.3000 0.2000 0.2000 0.1000 0.3000 0.2000 0.1000 0.2000 0.1000 0.1000 0.1000 0.1000 0.2000
0.2000 0.2000
 185. * 0.3000 0.2000 0.2000 0.2000 0.2000 0.0000 0.1000 0.1000 0.2000 0.2000 0.2000 0.2000 0.1000
0.1000 0.1000
 190. * 0.4000 0.2000 0.2000 0.2000 0.1000 0.0000 0.0000 0.1000 0.3000 0.3000 0.3000 0.2000 0.1000
0.1000 0.1000
 195. * 0.4000 0.2000 0.1000 0.3000 0.2000 0.0000 0.0000 0.0000 0.3000 0.3000 0.3000 0.2000 0.0000
0.0000 0.0000
 200. * 0.4000 0.1000 0.1000 0.2000 0.2000 0.0000 0.0000 0.0000 0.3000 0.3000 0.3000 0.2000 0.0000
0.0000 0.0000
 205. * 0.4000 0.1000 0.1000 0.2000 0.2000 0.0000 0.0000 0.0000 0.2000 0.2000 0.2000 0.2000 0.0000
0.0000 0.0000
 210. * 0.3000 0.1000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.1000 0.1000 0.1000 0.1000 0.0000
0.0000 0.0000

PAGE 4
      JOB: Martinsville Soutern Connector   RUN: Existing 58 and New 220 2040

 WIND ANGLE RANGE: 5.-360.

 WIND * CONCENTRATION
 ANGLE *   (PPM)
 (DEGR)*   1   2   3   4   5   6   7   8   9   10   11   12   13
 14   15

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----
 215. * 0.3000 0.1000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.1000 0.1000 0.1000 0.1000 0.0000
0.0000 0.0000
 220. * 0.3000 0.1000 0.1000 0.1000 0.2000 0.0000 0.0000 0.0000 0.1000 0.1000 0.1000 0.1000 0.0000

```
0.0000  0.0000
 225.  *  0.2000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 230.  *  0.2000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 235.  *  0.2000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 240.  *  0.2000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 245.  *  0.2000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 250.  *  0.2000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 255.  *  0.4000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 260.  *  0.3000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 265.  *  0.3000  0.2000  0.1000  0.1000  0.2000  0.1000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 270.  *  0.3000  0.2000  0.1000  0.1000  0.2000  0.1000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 275.  *  0.3000  0.2000  0.1000  0.1000  0.2000  0.1000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 280.  *  0.3000  0.2000  0.1000  0.1000  0.2000  0.1000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.0000
0.0000  0.0000
 285.  *  0.3000  0.1000  0.1000  0.1000  0.3000  0.0000  0.0000  0.0000  0.1000  0.1000  0.1000  0.1000  0.1000
0.0000  0.0000
 290.  *  0.3000  0.1000  0.1000  0.1000  0.2000  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.1000  0.1000
0.0000  0.0000
 295.  *  0.2000  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.1000  0.1000
0.0000  0.0000
 300.  *  0.2000  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.4000  0.1000  0.1000  0.1000  0.2000
0.0000  0.0000
 305.  *  0.2000  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.4000  0.1000  0.1000  0.1000  0.3000
0.0000  0.0000
 310.  *  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.4000  0.2000  0.1000  0.1000  0.2000
0.1000  0.0000
 315.  *  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.4000  0.1000  0.1000  0.1000  0.2000
0.1000  0.0000
 320.  *  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.3000  0.1000  0.1000  0.1000  0.2000
0.1000  0.0000
 325.  *  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.1000  0.2000
0.0000  0.0000
 330.  *  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.1000  0.2000
0.0000  0.0000
 335.  *  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.1000  0.1000  0.2000  0.2000
0.0000  0.0000
 340.  *  0.3000  0.3000  0.3000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.1000  0.1000  0.2000  0.2000
0.0000  0.0000
 345.  *  0.3000  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.4000  0.1000  0.1000  0.3000  0.2000
0.0000  0.0000
 350.  *  0.3000  0.3000  0.3000  0.2000  0.1000  0.1000  0.1000  0.1000  0.4000  0.2000  0.1000  0.2000  0.2000
0.0000  0.0000
 355.  *  0.2000  0.2000  0.2000  0.2000  0.1000  0.1000  0.1000  0.1000  0.4000  0.2000  0.2000  0.2000  0.3000
0.0000  0.1000
 360.  *  0.1000  0.1000  0.1000  0.1000  0.2000  0.2000  0.2000  0.1000  0.4000  0.2000  0.1000  0.1000  0.4000
0.3000  0.1000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.4000  0.3000  0.3000  0.3000  0.5000  0.3000  0.2000  0.2000  0.4000  0.3000  0.3000  0.3000  0.4000
0.3000  0.2000
 DEGR. *    190     340     340     195     120     130       5       5     300     190     190     345       5
 5       5
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PAGE 5

JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2040

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28
5.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
10.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
15.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
20.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
25.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
30.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
35.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
40.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
45.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
50.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
55.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
60.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
65.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
70.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
75.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
80.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
85.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
90.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.1000	0.2000
95.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000
100.	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.1000	0.2000
105.	0.2000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000
110.	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.1000	0.3000	0.2000	0.1000
115.	0.2000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.1000
120.	0.2000	0.2000	0.2000	0.1000	0.3000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
125.	0.2000	0.3000	0.3000	0.2000	0.3000	0.1000	0.2000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
130.	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	0.2000	0.2000	0.2000	0.2000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	0.2000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	0.1000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000

JOB: Martinsville Soutern Connector RUN: Existing 58 and New 220 2040

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 16	17	18	19	20	21	22	23	24	25	26	27	28

215.	*	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
230.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
235.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
240.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
245.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250.	*	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
255.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
275.	*	0.0000	0.2000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
280.	*	0.0000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
285.	*	0.0000	0.3000	0.1000	0.2000	0.3000	0.3000	0.2000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
290.	*	0.0000	0.3000	0.2000	0.1000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
295.	*	0.0000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
300.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.3000	0.1000	0.2000	0.2000	0.2000	0.1000
305.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.3000	0.1000	0.2000	0.3000	0.2000	0.2000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.1000	0.2000	0.2000	0.2000	0.2000
315.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
320.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
325.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
330.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
335.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
340.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
345.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
350.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000
355.	*	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
360.	*	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
MAX	*	0.2000	0.3000	0.3000	0.2000	0.3000	0.3000	0.2000	0.3000	0.2000	0.2000	0.3000	0.2000	0.2000
DEGR.	*	5	125	125	125	120	285	125	300	5	5	20	5	5

THE HIGHEST CONCENTRATION OF 0.5000 PPM OCCURRED AT RECEPTOR 5.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead Exist 2018

DATE : 5/14/19
TIME : 14:23:14

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. S Leg App - FreeFlow	-4.0	19.0	856.0	-841.0	1216.	135.	AG	372.	3.7	0.0	41.7		
2. S Leg Dep - FreeFlow	-19.0	4.0	841.0	-856.0	1216.	135.	AG	541.	4.6	0.0	41.7		
3. E Leg App - FreeFlow	-4.0	19.0	837.0	860.0	1189.	45.	AG	2531.	3.0	0.0	52.7		
4. E Leg Dep - FreeFlow	12.0	-12.0	860.0	837.0	1200.	45.	AG	2531.	3.4	0.0	52.7		
5. W Leg App - FreeFlow	12.0	-12.0	-837.0	-860.0	1200.	225.	AG	2631.	3.4	0.0	52.7		
6. W Leg Dep - FreeFlow	-19.0	4.0	-860.0	-837.0	1189.	225.	AG	2631.	1.5	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead Exist 2018

DATE : 5/14/19
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ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. N Leg, E Side-Corner	-7.8	53.0	5.9
2. N Leg, E Side - 0 m	-7.8	53.0	5.9
3. N Leg, W Side-Corner	-53.0	7.8	5.9
4. S Leg, E Side-Corner	53.0	-7.8	5.9
5. S Leg, E Side - 25 m	104.0	-58.7	5.9
6. S Leg, E Side - 50 m	162.0	-116.7	5.9
7. S Leg, E Side-Midblk	470.2	-425.0	5.9
8. S Leg, W Side-Corner	7.8	-53.0	5.9
9. S Leg, W Side - 25 m	58.7	-104.0	5.9
10. S Leg, W Side - 50 m	116.7	-162.0	5.9
11. S Leg, W Side-Midblk	425.0	-470.2	5.9
12. E Leg, N Side - 25 m	43.1	104.0	5.9
13. E Leg, N Side - 50 m	101.1	162.0	5.9
14. E Leg, N Side-Midblk	409.4	470.2	5.9
15. W Leg, N Side - 25 m	-104.0	-43.1	5.9
16. W Leg, N Side - 50 m	-162.0	-101.1	5.9
17. W Leg, N Side-Midblk	-470.2	-409.4	5.9

18. E Leg, S Side - 25 m *	104.0	43.1	5.9	*
19. E Leg, S Side - 50 m *	162.0	101.1	5.9	*
20. E Leg, S Side-Midblk *	470.2	409.4	5.9	*
21. W Leg, S Side - 25 m *	-43.1	-104.0	5.9	*
22. W Leg, S Side - 50 m *	-101.1	-162.0	5.9	*
23. W Leg, S Side-Midblk *	-409.4	-470.2	5.9	*

PAGE 3
JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead Exist 2018

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.0000	0.0000	0.0000	0.5000	0.2000	0.2000	0.0000	0.6000	0.3000	0.3000	0.1000	0.0000	0.0000	0.0000	0.0000
10.	* 0.0000	0.0000	0.0000	0.6000	0.3000	0.2000	0.0000	0.7000	0.4000	0.3000	0.1000	0.0000	0.0000	0.0000	0.0000
15.	* 0.0000	0.0000	0.0000	0.6000	0.3000	0.2000	0.0000	0.7000	0.4000	0.3000	0.1000	0.0000	0.0000	0.0000	0.0000
20.	* 0.0000	0.0000	0.0000	0.6000	0.3000	0.2000	0.0000	0.8000	0.4000	0.3000	0.1000	0.0000	0.0000	0.0000	0.0000
25.	* 0.1000	0.1000	0.0000	0.7000	0.3000	0.2000	0.0000	0.8000	0.4000	0.3000	0.1000	0.1000	0.1000	0.1000	0.0000
30.	* 0.1000	0.1000	0.1000	0.7000	0.3000	0.2000	0.0000	0.8000	0.4000	0.3000	0.1000	0.1000	0.1000	0.1000	0.1000
35.	* 0.3000	0.3000	0.2000	0.7000	0.2000	0.1000	0.0000	0.8000	0.4000	0.3000	0.1000	0.2000	0.2000	0.2000	0.2000
40.	* 0.4000	0.4000	0.3000	0.7000	0.2000	0.0000	0.0000	0.8000	0.3000	0.2000	0.1000	0.4000	0.4000	0.4000	0.4000
45.	* 0.6000	0.6000	0.5000	0.5000	0.1000	0.0000	0.0000	0.6000	0.2000	0.1000	0.1000	0.5000	0.5000	0.4000	0.5000
50.	* 0.6000	0.6000	0.5000	0.4000	0.0000	0.0000	0.0000	0.6000	0.1000	0.1000	0.1000	0.6000	0.6000	0.6000	0.5000
55.	* 0.6000	0.6000	0.5000	0.2000	0.0000	0.0000	0.0000	0.4000	0.1000	0.1000	0.1000	0.6000	0.6000	0.6000	0.5000
60.	* 0.6000	0.6000	0.6000	0.1000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000	0.1000	0.6000	0.6000	0.6000	0.5000
65.	* 0.6000	0.6000	0.4000	0.1000	0.0000	0.0000	0.0000	0.2000	0.1000	0.1000	0.1000	0.6000	0.6000	0.6000	0.5000
70.	* 0.6000	0.6000	0.5000	0.1000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.6000	0.6000	0.6000	0.4000
75.	* 0.5000	0.5000	0.5000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.5000	0.5000	0.5000	0.3000
80.	* 0.5000	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.5000	0.5000	0.5000	0.5000
85.	* 0.5000	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.5000	0.5000	0.5000	0.4000
90.	* 0.5000	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.5000	0.5000	0.5000	0.3000
95.	* 0.5000	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.5000	0.5000	0.5000	0.3000
100.	* 0.5000	0.5000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000	0.4000	0.3000

105.	*	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000
0.4000	0.3000													
110.	*	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000
0.4000	0.3000													
115.	*	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000
0.4000	0.3000													
120.	*	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.4000	0.4000
0.4000	0.3000													
125.	*	0.4000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.4000	0.4000
0.4000	0.3000													
130.	*	0.4000	0.4000	0.4000	0.1000	0.1000	0.1000	0.1000	0.2000	0.2000	0.2000	0.1000	0.4000	0.4000
0.4000	0.3000													
135.	*	0.6000	0.6000	0.4000	0.2000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000
0.4000	0.3000													
140.	*	0.6000	0.6000	0.4000	0.2000	0.2000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000
0.4000	0.3000													
145.	*	0.6000	0.6000	0.4000	0.2000	0.2000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000	0.4000	0.4000
0.4000	0.3000													
150.	*	0.5000	0.5000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000
0.4000	0.3000													
155.	*	0.6000	0.6000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000
0.4000	0.3000													
160.	*	0.5000	0.5000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000
0.4000	0.3000													
165.	*	0.5000	0.5000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000
0.4000	0.3000													
170.	*	0.5000	0.5000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000
0.4000	0.3000													
175.	*	0.4000	0.4000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000
0.5000	0.3000													
180.	*	0.3000	0.3000	0.3000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000
0.5000	0.3000													
185.	*	0.4000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.6000	0.5000
0.5000	0.4000													
190.	*	0.4000	0.4000	0.4000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000
0.5000	0.4000													
195.	*	0.4000	0.4000	0.4000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.5000	0.5000
0.5000	0.4000													
200.	*	0.4000	0.4000	0.4000	0.1000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.5000	0.6000
0.6000	0.4000													
205.	*	0.5000	0.5000	0.5000	0.2000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.7000	0.5000
0.6000	0.5000													
210.	*	0.6000	0.6000	0.5000	0.2000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.6000	0.5000
0.6000	0.5000													

PAGE 4
JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead Exist 2018

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) *	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

215.	*	0.5000	0.5000	0.4000	0.4000	0.1000	0.1000	0.1000	0.2000	0.0000	0.0000	0.0000	0.5000	0.7000
0.7000	0.4000													
220.	*	0.5000	0.5000	0.4000	0.5000	0.1000	0.1000	0.1000	0.4000	0.0000	0.0000	0.0000	0.5000	0.7000
0.7000	0.4000													
225.	*	0.4000	0.4000	0.4000	0.7000	0.2000	0.1000	0.1000	0.6000	0.1000	0.0000	0.0000	0.5000	0.4000
0.5000	0.4000													
230.	*	0.2000	0.2000	0.3000	0.7000	0.2000	0.2000	0.1000	0.6000	0.1000	0.1000	0.0000	0.3000	0.4000
0.4000	0.2000													
235.	*	0.2000	0.2000	0.2000	0.7000	0.4000	0.2000	0.1000	0.6000	0.3000	0.1000	0.0000	0.3000	0.2000
0.2000	0.2000													

```
 240.  *  0.0000  0.0000  0.1000  0.7000  0.4000  0.2000  0.1000  0.6000  0.3000  0.1000  0.0000  0.1000  0.1000
0.1000  0.1000
 245.  *  0.0000  0.0000  0.0000  0.7000  0.4000  0.2000  0.1000  0.6000  0.3000  0.1000  0.0000  0.0000  0.1000
0.1000  0.0000
 250.  *  0.0000  0.0000  0.0000  0.7000  0.4000  0.2000  0.1000  0.5000  0.3000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.0000  0.0000  0.0000  0.6000  0.4000  0.2000  0.1000  0.5000  0.3000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  0.6000  0.4000  0.2000  0.1000  0.5000  0.3000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  0.6000  0.5000  0.3000  0.2000  0.5000  0.3000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  0.5000  0.4000  0.3000  0.2000  0.4000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.3000  0.2000  0.4000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.3000  0.2000  0.4000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.0000  0.0000  0.0000  0.3000  0.3000  0.3000  0.2000  0.4000  0.1000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.3000  0.2000  0.4000  0.1000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 295.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.3000  0.2000  0.4000  0.1000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.3000  0.2000  0.4000  0.1000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.4000  0.2000  0.1000  0.2000  0.4000  0.1000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.2000  0.2000  0.4000  0.2000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.1000  0.5000  0.2000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.4000  0.2000  0.2000  0.1000  0.5000  0.2000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000  0.2000  0.1000  0.2000  0.0000  0.0000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000  0.3000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.4000  0.4000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.4000  0.3000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000  0.3000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000  0.3000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000  0.3000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.0000  0.5000  0.3000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.6000  0.6000  0.6000  0.7000  0.5000  0.3000  0.2000  0.8000  0.4000  0.3000  0.2000  0.7000  0.7000
0.7000  0.5000
 DEGR. *     45      45      60     225     265     265     140      30      10       5     325     205     215
215      45


PAGE  5
      JOB: Martinsville Soutern Connector                     RUN: Exist220 and Morehead Exist 2018

       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
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angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
5.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.5000
10.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.5000	0.5000
15.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.7000	0.5000	0.5000
20.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.5000
25.	*	0.0000	0.0000	0.7000	0.7000	0.7000	0.5000	0.7000	0.6000
30.	*	0.0000	0.1000	0.7000	0.7000	0.7000	0.7000	0.7000	0.6000
35.	*	0.2000	0.1000	0.7000	0.7000	0.7000	0.7000	0.7000	0.6000
40.	*	0.3000	0.2000	0.7000	0.7000	0.6000	0.8000	0.7000	0.8000
45.	*	0.3000	0.5000	0.5000	0.5000	0.5000	0.5000	0.6000	0.6000
50.	*	0.5000	0.5000	0.4000	0.4000	0.4000	0.5000	0.4000	0.4000
55.	*	0.6000	0.5000	0.2000	0.2000	0.2000	0.2000	0.3000	0.2000
60.	*	0.5000	0.4000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000
65.	*	0.6000	0.4000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
70.	*	0.5000	0.4000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
75.	*	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80.	*	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85.	*	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
95.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
105.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
110.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	*	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	*	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	*	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	*	0.4000	0.4000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
205.	*	0.5000	0.4000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
210.	*	0.5000	0.4000	0.2000	0.1000	0.1000	0.2000	0.1000	0.1000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
215.	*	0.4000	0.4000	0.2000	0.3000	0.2000	0.2000	0.2000	0.2000
220.	*	0.4000	0.4000	0.4000	0.3000	0.5000	0.4000	0.3000	0.3000
225.	*	0.4000	0.3000	0.5000	0.6000	0.6000	0.6000	0.6000	0.5000
230.	*	0.2000	0.2000	0.7000	0.6000	0.7000	0.6000	0.6000	0.6000
235.	*	0.1000	0.1000	0.6000	0.8000	0.7000	0.6000	0.6000	0.6000
240.	*	0.1000	0.1000	0.6000	0.7000	0.7000	0.6000	0.6000	0.6000

245.	*	0.0000	0.0000	0.5000	0.6000	0.6000	0.6000	0.6000	0.6000
250.	*	0.0000	0.0000	0.6000	0.5000	0.6000	0.5000	0.5000	0.5000
255.	*	0.0000	0.0000	0.5000	0.6000	0.6000	0.5000	0.5000	0.5000
260.	*	0.0000	0.0000	0.4000	0.6000	0.6000	0.5000	0.5000	0.5000
265.	*	0.0000	0.0000	0.4000	0.5000	0.5000	0.5000	0.5000	0.5000
270.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
275.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
280.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
285.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
290.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
295.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
300.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
305.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
310.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
315.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
320.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
325.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
330.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
335.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
340.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
345.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
350.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
355.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
360.	*	0.0000	0.0000	0.5000	0.5000	0.5000	0.4000	0.4000	0.4000
------	*								
MAX	*	0.6000	0.5000	0.7000	0.8000	0.7000	0.8000	0.7000	0.8000
DEGR.	*	55	45	230	235	230	40	25	40

THE HIGHEST CONCENTRATION OF 0.8000 PPM OCCURRED AT RECEPTOR 8.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead No Build 2025

DATE : 5/14/19
TIME : 14:28:44

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. S Leg App - FreeFlow	-4.0	19.0	856.0	-841.0	1216.	135.	AG	391.	1.9	0.0	41.7		
2. S Leg Dep - FreeFlow	-19.0	4.0	841.0	-856.0	1216.	135.	AG	591.	1.3	0.0	41.7		
3. E Leg App - FreeFlow	-4.0	19.0	837.0	860.0	1189.	45.	AG	2689.	1.5	0.0	52.7		
4. E Leg Dep - FreeFlow	12.0	-12.0	860.0	837.0	1200.	45.	AG	2689.	1.7	0.0	52.7		
5. W Leg App - FreeFlow	12.0	-12.0	-837.0	-860.0	1200.	225.	AG	2731.	1.7	0.0	52.7		
6. W Leg Dep - FreeFlow	-19.0	4.0	-860.0	-837.0	1189.	225.	AG	2731.	1.5	0.0	52.7		

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JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead No Build 2025

DATE : 5/14/19
TIME : 14:28:44

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. N Leg, E Side-Corner	-7.8	53.0	5.9
2. N Leg, E Side - 0 m	-7.8	53.0	5.9
3. N Leg, W Side-Corner	-53.0	7.8	5.9
4. S Leg, E Side-Corner	53.0	-7.8	5.9
5. S Leg, E Side - 25 m	104.0	-58.7	5.9
6. S Leg, E Side - 50 m	162.0	-116.7	5.9
7. S Leg, E Side-Midblk	470.2	-425.0	5.9
8. S Leg, W Side-Corner	7.8	-53.0	5.9
9. S Leg, W Side - 25 m	58.7	-104.0	5.9
10. S Leg, W Side - 50 m	116.7	-162.0	5.9
11. S Leg, W Side-Midblk	425.0	-470.2	5.9
12. E Leg, N Side - 25 m	43.1	104.0	5.9
13. E Leg, N Side - 50 m	101.1	162.0	5.9
14. E Leg, N Side-Midblk	409.4	470.2	5.9
15. W Leg, N Side - 25 m	-104.0	-43.1	5.9
16. W Leg, N Side - 50 m	-162.0	-101.1	5.9
17. W Leg, N Side-Midblk	-470.2	-409.4	5.9

18. E Leg, S Side - 25 m *	104.0	43.1	5.9	*
19. E Leg, S Side - 50 m *	162.0	101.1	5.9	*
20. E Leg, S Side-Midblk *	470.2	409.4	5.9	*
21. W Leg, S Side - 25 m *	-43.1	-104.0	5.9	*
22. W Leg, S Side - 50 m *	-101.1	-162.0	5.9	*
23. W Leg, S Side-Midblk *	-409.4	-470.2	5.9	*

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JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead No Build 2025

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	* 0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
15.	* 0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
20.	* 0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.0000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
25.	* 0.0000	0.0000	0.0000	0.3000	0.2000	0.1000	0.0000	0.4000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000
30.	* 0.1000	0.1000	0.0000	0.4000	0.2000	0.0000	0.0000	0.4000	0.2000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
35.	* 0.1000	0.1000	0.1000	0.4000	0.2000	0.0000	0.0000	0.4000	0.2000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
40.	* 0.3000	0.3000	0.2000	0.4000	0.1000	0.0000	0.0000	0.4000	0.1000	0.0000	0.0000	0.2000	0.2000	0.1000	0.3000
45.	* 0.3000	0.3000	0.2000	0.3000	0.0000	0.0000	0.0000	0.4000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
50.	* 0.3000	0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
55.	* 0.3000	0.3000	0.3000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
60.	* 0.3000	0.3000	0.3000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
65.	* 0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
70.	* 0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.4000
75.	* 0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.4000
80.	* 0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
85.	* 0.3000	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000
90.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000
95.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000
100.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000

```
 105.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 110.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 115.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 120.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 125.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 130.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 135.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 140.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 145.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 150.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 155.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 160.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 165.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 170.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 175.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 180.  *  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.3000
 185.  *  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.3000
0.3000  0.3000
 190.  *  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.3000
0.3000  0.3000
 195.  *  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.4000  0.3000
0.3000  0.3000
 200.  *  0.3000  0.3000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.3000
0.3000  0.3000
 205.  *  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.3000  0.4000
0.3000  0.3000
 210.  *  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.3000  0.5000
0.3000  0.3000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Exist220 and Morehead No Build 2025

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.3000  0.4000
0.3000  0.3000
 220.  *  0.3000  0.3000  0.3000  0.1000  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.3000  0.4000
0.3000  0.3000
 225.  *  0.3000  0.3000  0.3000  0.4000  0.0000  0.0000  0.0000  0.3000  0.0000  0.0000  0.0000  0.3000  0.3000
0.3000  0.3000
 230.  *  0.2000  0.2000  0.3000  0.4000  0.1000  0.0000  0.0000  0.4000  0.1000  0.0000  0.0000  0.3000  0.2000
0.1000  0.3000
 235.  *  0.1000  0.1000  0.1000  0.4000  0.2000  0.0000  0.0000  0.4000  0.2000  0.0000  0.0000  0.1000  0.1000
0.1000  0.1000
```

```
 240.  *  0.0000  0.0000  0.1000  0.4000  0.2000  0.1000  0.0000  0.4000  0.2000  0.0000  0.0000  0.0000  0.0000
0.1000  0.1000
 245.  *  0.0000  0.0000  0.0000  0.4000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.1000  0.0000  0.3000  0.2000  0.1000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.3000  0.2000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.0000  0.0000  0.0000  0.1000  0.1000  0.0000  0.0000  0.3000  0.2000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.0000  0.0000  0.0000  0.1000  0.1000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 295.  *  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.0000  0.0000  0.1000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.0000  0.0000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.0000  0.0000  0.3000  0.2000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.3000  0.3000  0.3000  0.4000  0.2000  0.1000  0.0000  0.4000  0.2000  0.1000  0.0000  0.4000  0.5000
0.3000  0.4000
 DEGR. *     40      40      50      30       5       5       5      25       5       5       5     195     210
45      70


PAGE  5
      JOB: Martinsville Soutern Connector                      RUN: Exist220 and Morehead No Build 2025

       MODEL RESULTS
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       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
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angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
5.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
10.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
15.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
20.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
25.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000
30.	*	0.0000	0.1000	0.4000	0.4000	0.4000	0.4000	0.5000	0.4000
35.	*	0.1000	0.1000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
40.	*	0.2000	0.1000	0.4000	0.4000	0.3000	0.3000	0.4000	0.3000
45.	*	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.4000	0.3000
50.	*	0.4000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
55.	*	0.4000	0.3000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000
60.	*	0.4000	0.3000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
65.	*	0.4000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
75.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90.	*	0.2000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
95.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
105.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
110.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	*	0.3000	0.3000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
215.	*	0.3000	0.3000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
220.	*	0.3000	0.3000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
225.	*	0.3000	0.3000	0.3000	0.4000	0.3000	0.3000	0.3000	0.3000
230.	*	0.2000	0.1000	0.3000	0.4000	0.3000	0.4000	0.4000	0.3000
235.	*	0.1000	0.1000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
240.	*	0.1000	0.1000	0.4000	0.5000	0.4000	0.4000	0.4000	0.4000

245.	*	0.0000	0.0000	0.4000	0.3000	0.3000	0.3000	0.3000	0.3000
250.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
255.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
260.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
265.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
270.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
275.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
280.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
285.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
290.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
295.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
300.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
305.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
310.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
315.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000
320.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
325.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
330.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
335.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
340.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
345.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
350.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
355.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
360.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
MAX	*	0.4000	0.3000	0.4000	0.5000	0.4000	0.4000	0.5000	0.4000
DEGR.	*	50	45	30	240	30	25	30	30

THE HIGHEST CONCENTRATION OF 0.5000 PPM OCCURRED AT RECEPTOR 22.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead No Build 2040

DATE : 5/14/19
TIME : 14:32:15

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. S Leg App - FreeFlow	*	-4.0	19.0	856.0	-841.0	*	1216.	135.	AG	432.	0.5	0.0	41.7		
2. S Leg Dep - FreeFlow	*	-19.0	4.0	841.0	-856.0	*	1216.	135.	AG	365.	0.5	0.0	41.7		
3. E Leg App - FreeFlow	*	-4.0	19.0	837.0	860.0	*	1189.	45.	AG	3005.	0.4	0.0	52.7		
4. E Leg Dep - FreeFlow	*	12.0	-12.0	860.0	837.0	*	1200.	45.	AG	3005.	0.4	0.0	52.7		
5. W Leg App - FreeFlow	*	12.0	-12.0	-837.0	-860.0	*	1200.	225.	AG	2913.	0.4	0.0	52.7		
6. W Leg Dep - FreeFlow	*	-19.0	4.0	-860.0	-837.0	*	1189.	225.	AG	2913.	0.4	0.0	52.7		

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JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead No Build 2040

DATE : 5/14/19
TIME : 14:32:15

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	-7.8	53.0	5.9	*
2. N Leg, E Side - 0 m	*	-7.8	53.0	5.9	*
3. N Leg, W Side-Corner	*	-53.0	7.8	5.9	*
4. S Leg, E Side-Corner	*	53.0	-7.8	5.9	*
5. S Leg, E Side - 25 m	*	104.0	-58.7	5.9	*
6. S Leg, E Side - 50 m	*	162.0	-116.7	5.9	*
7. S Leg, E Side-Midblk	*	470.2	-425.0	5.9	*
8. S Leg, W Side-Corner	*	7.8	-53.0	5.9	*
9. S Leg, W Side - 25 m	*	58.7	-104.0	5.9	*
10. S Leg, W Side - 50 m	*	116.7	-162.0	5.9	*
11. S Leg, W Side-Midblk	*	425.0	-470.2	5.9	*
12. E Leg, N Side - 25 m	*	43.1	104.0	5.9	*
13. E Leg, N Side - 50 m	*	101.1	162.0	5.9	*
14. E Leg, N Side-Midblk	*	409.4	470.2	5.9	*
15. W Leg, N Side - 25 m	*	-104.0	-43.1	5.9	*
16. W Leg, N Side - 50 m	*	-162.0	-101.1	5.9	*
17. W Leg, N Side-Midblk	*	-470.2	-409.4	5.9	*

18. E Leg, S Side - 25 m *	104.0	43.1	5.9	*
19. E Leg, S Side - 50 m *	162.0	101.1	5.9	*
20. E Leg, S Side-Midblk *	470.2	409.4	5.9	*
21. W Leg, S Side - 25 m *	-43.1	-104.0	5.9	*
22. W Leg, S Side - 50 m *	-101.1	-162.0	5.9	*
23. W Leg, S Side-Midblk *	-409.4	-470.2	5.9	*

PAGE 3
JOB: Martinsville Soutern Connector RUN: Exist220 and Morehead No Build 2040

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40.	* 0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45.	* 0.1000	0.1000	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
50.	* 0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
55.	* 0.1000	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
60.	* 0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
65.	* 0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
70.	* 0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
75.	* 0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000
80.	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85.	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90.	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
95.	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100.	* 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

```
 105.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 110.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 115.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 120.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 125.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 130.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 135.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 140.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 145.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 150.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 155.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 160.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 165.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 170.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 175.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 180.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 185.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 190.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 195.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.1000  0.1000
 200.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.1000  0.1000
 205.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.1000  0.1000
 210.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.1000  0.1000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: Exist220 and Morehead No Build 2040

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000
0.1000  0.1000
 220.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.1000  0.1000
 225.  *  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.1000  0.1000
 230.  *  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 235.  *  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
```

```
 240.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 245.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 295.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000

------*-------------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.1000  0.1000  0.1000  0.1000  0.0000  0.0000  0.0000  0.1000  0.0000  0.0000  0.0000  0.1000  0.1000
0.1000  0.1000
 DEGR. *     45      45      50      10       5       5       5      30       5       5       5      45      45
45     195


PAGE  5
      JOB: Martinsville Soutern Connector                      RUN: Exist220 and Morehead No Build 2040

       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
```

angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
5.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.0000
15.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
20.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
25.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
30.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
35.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
40.	*	0.0000	0.0000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
45.	*	0.0000	0.1000	0.1000	0.1000	0.1000	0.0000	0.0000	0.1000
50.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
75.	*	0.0000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
95.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
105.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
110.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
215.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
220.	*	0.1000	0.1000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
225.	*	0.1000	0.1000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
230.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000
235.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
240.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000

245.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
250.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
255.	*	0.0000	0.0000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
260.	*	0.0000	0.0000	0.0000	0.0000	0.1000	0.0000	0.0000	0.0000
265.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
270.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
275.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
280.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
285.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
290.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
295.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
300.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
305.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
310.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
315.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
320.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
325.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
330.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
335.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
340.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
345.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
350.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
355.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
360.	*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
------	*								
MAX	*	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000	0.1000
DEGR.	*	60	45	10	10	10	225	20	15

THE HIGHEST CONCENTRATION OF 0.1000 PPM OCCURRED AT RECEPTOR 4.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: New 220 and Morehead 2025

DATE : 5/ 6/19
TIME : 13:12: 2

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT)				*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
	*	X1	Y1	X2	Y2	*									
1. S Leg App - FreeFlow	*	-4.0	19.0	856.0	-841.0	*	1216.	135.	AG	4800.	1.9	0.0	41.7		
2. S Leg Dep - FreeFlow	*	-19.0	4.0	841.0	-856.0	*	1216.	135.	AG	4800.	1.3	0.0	41.7		
3. E Leg App - FreeFlow	*	-4.0	19.0	837.0	860.0	*	1189.	45.	AG	7200.	1.5	0.0	52.7		
4. E Leg Dep - FreeFlow	*	12.0	-12.0	860.0	837.0	*	1200.	45.	AG	7200.	1.7	0.0	52.7		
5. W Leg App - FreeFlow	*	12.0	-12.0	-837.0	-860.0	*	1200.	225.	AG	7200.	1.7	0.0	52.7		
6. W Leg Dep - FreeFlow	*	-19.0	4.0	-860.0	-837.0	*	1189.	225.	AG	7200.	1.5	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: New 220 and Morehead 2025

DATE : 5/ 6/19
TIME : 13:12: 2

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	-7.8	53.0	5.9	*
2. N Leg, E Side - 0 m	*	-7.8	53.0	5.9	*
3. N Leg, W Side-Corner	*	-53.0	7.8	5.9	*
4. S Leg, E Side-Corner	*	53.0	-7.8	5.9	*
5. S Leg, E Side - 25 m	*	104.0	-58.7	5.9	*
6. S Leg, E Side - 50 m	*	162.0	-116.7	5.9	*
7. S Leg, E Side-Midblk	*	470.2	-425.0	5.9	*
8. S Leg, W Side-Corner	*	7.8	-53.0	5.9	*
9. S Leg, W Side - 25 m	*	58.7	-104.0	5.9	*
10. S Leg, W Side - 50 m	*	116.7	-162.0	5.9	*
11. S Leg, W Side-Midblk	*	425.0	-470.2	5.9	*
12. E Leg, N Side - 25 m	*	43.1	104.0	5.9	*
13. E Leg, N Side - 50 m	*	101.1	162.0	5.9	*
14. E Leg, N Side-Midblk	*	409.4	470.2	5.9	*
15. W Leg, N Side - 25 m	*	-104.0	-43.1	5.9	*
16. W Leg, N Side - 50 m	*	-162.0	-101.1	5.9	*
17. W Leg, N Side-Midblk	*	-470.2	-409.4	5.9	*

18. E Leg, S Side - 25 m *	104.0	43.1	5.9	*	
19. E Leg, S Side - 50 m *	162.0	101.1	5.9	*	
20. E Leg, S Side-Midblk *	470.2	409.4	5.9	*	
21. W Leg, S Side - 25 m *	-43.1	-104.0	5.9	*	
22. W Leg, S Side - 50 m *	-101.1	-162.0	5.9	*	
23. W Leg, S Side-Midblk *	-409.4	-470.2	5.9	*	

PAGE 3
JOB: Martinsville Soutern Connector RUN: New 220 and Morehead 2025

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.0000	0.0000	0.0000	0.8000	0.4000	0.2000	0.1000	1.1000	0.8000	0.6000	0.5000	0.0000	0.0000	0.0000	0.0000
10.	* 0.0000	0.0000	0.0000	0.8000	0.4000	0.2000	0.0000	1.2000	0.8000	0.6000	0.4000	0.0000	0.0000	0.0000	0.0000
15.	* 0.0000	0.0000	0.0000	0.8000	0.4000	0.2000	0.0000	1.2000	0.8000	0.6000	0.4000	0.0000	0.0000	0.0000	0.0000
20.	* 0.1000	0.1000	0.0000	0.9000	0.4000	0.2000	0.0000	1.3000	0.8000	0.6000	0.4000	0.1000	0.1000	0.1000	0.0000
25.	* 0.1000	0.1000	0.1000	1.0000	0.4000	0.2000	0.0000	1.4000	0.8000	0.6000	0.4000	0.1000	0.1000	0.1000	0.1000
30.	* 0.2000	0.2000	0.1000	1.0000	0.4000	0.2000	0.0000	1.4000	0.8000	0.6000	0.4000	0.2000	0.2000	0.2000	0.2000
35.	* 0.4000	0.4000	0.3000	1.0000	0.3000	0.2000	0.0000	1.5000	0.7000	0.6000	0.4000	0.4000	0.4000	0.3000	0.3000
40.	* 0.5000	0.5000	0.5000	1.0000	0.3000	0.1000	0.0000	1.5000	0.7000	0.5000	0.4000	0.5000	0.5000	0.5000	0.5000
45.	* 0.7000	0.7000	0.7000	0.8000	0.2000	0.0000	0.0000	1.3000	0.6000	0.4000	0.4000	0.7000	0.7000	0.7000	0.7000
50.	* 0.9000	0.9000	0.9000	0.6000	0.1000	0.0000	0.0000	1.0000	0.5000	0.4000	0.4000	0.9000	0.9000	0.8000	0.9000
55.	* 0.9000	0.9000	0.9000	0.4000	0.0000	0.0000	0.0000	0.9000	0.4000	0.4000	0.4000	0.9000	0.9000	0.9000	0.9000
60.	* 1.0000	1.0000	0.9000	0.2000	0.0000	0.0000	0.0000	0.6000	0.4000	0.4000	0.4000	1.0000	0.9000	0.9000	1.1000
65.	* 0.9000	0.9000	0.8000	0.1000	0.0000	0.0000	0.0000	0.5000	0.4000	0.4000	0.4000	0.9000	0.9000	0.9000	1.1000
70.	* 0.8000	0.8000	0.8000	0.1000	0.0000	0.0000	0.0000	0.4000	0.4000	0.4000	0.4000	0.8000	0.8000	0.8000	1.0000
75.	* 0.8000	0.8000	0.8000	0.1000	0.0000	0.0000	0.0000	0.4000	0.4000	0.4000	0.4000	0.8000	0.8000	0.8000	1.1000
80.	* 0.7000	0.7000	0.9000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.4000	0.4000	0.7000	0.7000	0.7000	0.9000
85.	* 0.7000	0.7000	0.7000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.4000	0.4000	0.7000	0.7000	0.7000	0.9000
90.	* 0.7000	0.7000	0.9000	0.0000	0.0000	0.0000	0.0000	0.4000	0.4000	0.4000	0.4000	0.7000	0.7000	0.7000	0.9000
95.	* 0.7000	0.7000	0.9000	0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.7000	0.7000	0.9000
100.	* 0.7000	0.7000	0.8000	0.0000	0.0000	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.7000	0.7000	0.7000	0.9000

```
 105.  *  0.6000  0.6000  0.8000  0.0000  0.0000  0.0000  0.0000  0.6000  0.6000  0.6000  0.6000  0.6000  0.6000
0.6000  0.8000
 110.  *  0.6000  0.6000  1.1000  0.1000  0.1000  0.1000  0.1000  0.6000  0.6000  0.6000  0.6000  0.6000  0.6000
0.6000  0.8000
 115.  *  0.7000  0.7000  1.1000  0.1000  0.1000  0.1000  0.1000  0.6000  0.6000  0.6000  0.6000  0.6000  0.6000
0.6000  0.8000
 120.  *  0.7000  0.7000  1.2000  0.2000  0.2000  0.2000  0.1000  0.7000  0.7000  0.7000  0.7000  0.6000  0.6000
0.6000  0.7000
 125.  *  0.8000  0.8000  1.1000  0.4000  0.4000  0.4000  0.2000  0.7000  0.7000  0.7000  0.7000  0.6000  0.6000
0.6000  0.7000
 130.  *  0.9000  0.9000  1.1000  0.5000  0.5000  0.5000  0.4000  0.7000  0.7000  0.7000  0.5000  0.7000  0.6000
0.6000  0.8000
 135.  *  1.1000  1.1000  1.1000  0.6000  0.6000  0.6000  0.5000  0.5000  0.5000  0.5000  0.5000  0.8000  0.7000
0.7000  0.9000
 140.  *  1.1000  1.1000  0.8000  0.8000  0.7000  0.7000  0.6000  0.4000  0.4000  0.3000  0.3000  0.8000  0.7000
0.6000  0.6000
 145.  *  1.1000  1.1000  0.7000  0.8000  0.8000  0.8000  0.7000  0.3000  0.3000  0.3000  0.3000  0.8000  0.6000
0.6000  0.6000
 150.  *  1.2000  1.2000  0.7000  0.7000  0.7000  0.7000  0.7000  0.1000  0.1000  0.1000  0.1000  0.8000  0.8000
0.6000  0.6000
 155.  *  1.1000  1.1000  0.6000  0.7000  0.7000  0.7000  0.7000  0.1000  0.1000  0.1000  0.1000  0.9000  0.8000
0.6000  0.6000
 160.  *  1.1000  1.1000  0.6000  0.7000  0.7000  0.7000  0.7000  0.0000  0.0000  0.0000  0.0000  0.9000  0.8000
0.6000  0.6000
 165.  *  0.8000  0.8000  0.6000  0.6000  0.6000  0.6000  0.6000  0.0000  0.0000  0.0000  0.0000  0.9000  0.8000
0.6000  0.6000
 170.  *  0.8000  0.8000  0.7000  0.6000  0.6000  0.6000  0.6000  0.0000  0.0000  0.0000  0.0000  1.0000  0.9000
0.7000  0.7000
 175.  *  0.9000  0.9000  0.7000  0.6000  0.6000  0.6000  0.6000  0.0000  0.0000  0.0000  0.0000  0.9000  0.9000
0.7000  0.7000
 180.  *  0.8000  0.8000  0.7000  0.5000  0.5000  0.5000  0.5000  0.0000  0.0000  0.0000  0.0000  0.9000  0.9000
0.7000  0.7000
 185.  *  0.7000  0.7000  0.7000  0.5000  0.5000  0.5000  0.5000  0.0000  0.0000  0.0000  0.0000  0.9000  0.9000
0.7000  0.7000
 190.  *  0.9000  0.9000  0.7000  0.5000  0.5000  0.5000  0.5000  0.0000  0.0000  0.0000  0.0000  0.9000  0.9000
0.7000  0.7000
 195.  *  0.9000  0.9000  0.8000  0.5000  0.5000  0.5000  0.5000  0.1000  0.0000  0.0000  0.0000  1.1000  1.1000
0.8000  0.8000
 200.  *  0.8000  0.8000  0.8000  0.4000  0.4000  0.4000  0.4000  0.1000  0.0000  0.0000  0.0000  1.0000  0.9000
0.8000  0.8000
 205.  *  0.7000  0.7000  0.9000  0.5000  0.4000  0.4000  0.4000  0.1000  0.0000  0.0000  0.0000  1.0000  1.0000
0.9000  0.9000
 210.  *  0.9000  0.9000  1.0000  0.6000  0.4000  0.4000  0.4000  0.2000  0.0000  0.0000  0.0000  1.1000  1.1000
0.9000  1.0000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: New 220 and Morehead 2025

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.9000  0.9000  0.9000  0.9000  0.4000  0.4000  0.4000  0.4000  0.0000  0.0000  0.0000  0.9000  1.0000
1.1000  0.9000
 220.  *  0.9000  0.9000  0.9000  1.0000  0.5000  0.4000  0.4000  0.6000  0.1000  0.0000  0.0000  0.9000  0.9000
1.0000  0.9000
 225.  *  0.7000  0.7000  0.7000  1.3000  0.6000  0.4000  0.4000  0.8000  0.2000  0.0000  0.0000  0.7000  0.7000
0.9000  0.7000
 230.  *  0.5000  0.5000  0.5000  1.5000  0.7000  0.5000  0.4000  1.0000  0.3000  0.1000  0.0000  0.5000  0.5000
0.7000  0.5000
 235.  *  0.3000  0.3000  0.4000  1.5000  0.7000  0.6000  0.4000  1.0000  0.3000  0.2000  0.0000  0.3000  0.4000
0.3000  0.4000
```

```
 240.  *  0.1000  0.1000  0.2000  1.4000  0.8000  0.6000  0.4000  1.0000  0.4000  0.2000  0.0000  0.2000  0.2000
0.2000  0.2000
 245.  *  0.1000  0.1000  0.1000  1.4000  0.8000  0.6000  0.4000  1.0000  0.4000  0.2000  0.0000  0.1000  0.1000
0.1000  0.1000
 250.  *  0.0000  0.0000  0.1000  1.3000  0.8000  0.6000  0.4000  0.9000  0.4000  0.2000  0.0000  0.0000  0.1000
0.1000  0.1000
 255.  *  0.0000  0.0000  0.0000  1.2000  0.9000  0.7000  0.5000  0.8000  0.4000  0.2000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  1.2000  0.9000  0.7000  0.5000  0.8000  0.4000  0.2000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  1.1000  0.9000  0.7000  0.6000  0.8000  0.4000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  1.1000  0.8000  0.7000  0.6000  0.7000  0.3000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.0000  0.0000  0.0000  0.9000  0.9000  0.8000  0.7000  0.6000  0.3000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.0000  0.0000  0.0000  0.9000  0.9000  0.8000  0.7000  0.6000  0.3000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.0000  0.0000  0.0000  1.0000  0.8000  0.8000  0.7000  0.6000  0.3000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.0000  0.0000  0.0000  1.0000  0.8000  0.8000  0.8000  0.6000  0.3000  0.2000  0.1000  0.0000  0.0000
0.0000  0.0000
 295.  *  0.0000  0.0000  0.0000  0.8000  0.8000  0.8000  0.7000  0.6000  0.3000  0.3000  0.2000  0.0000  0.0000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.8000  0.8000  0.8000  0.7000  0.6000  0.4000  0.3000  0.1000  0.0000  0.0000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.8000  0.8000  0.7000  0.7000  0.7000  0.4000  0.3000  0.3000  0.0000  0.0000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.8000  0.6000  0.6000  0.7000  0.7000  0.4000  0.4000  0.3000  0.0000  0.0000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.8000  0.6000  0.6000  0.6000  0.7000  0.5000  0.5000  0.5000  0.0000  0.0000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.7000  0.5000  0.5000  0.4000  0.7000  0.6000  0.5000  0.6000  0.0000  0.0000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.7000  0.4000  0.4000  0.2000  0.8000  0.7000  0.7000  0.7000  0.0000  0.0000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.7000  0.4000  0.3000  0.2000  0.7000  0.7000  0.7000  0.7000  0.0000  0.0000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.6000  0.4000  0.3000  0.2000  0.8000  0.8000  0.7000  0.6000  0.0000  0.0000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.6000  0.3000  0.3000  0.2000  0.9000  0.8000  0.8000  0.7000  0.0000  0.0000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.6000  0.3000  0.2000  0.1000  0.9000  0.7000  0.8000  0.7000  0.0000  0.0000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.6000  0.3000  0.2000  0.1000  0.8000  0.8000  0.8000  0.7000  0.0000  0.0000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.6000  0.3000  0.2000  0.1000  0.9000  0.7000  0.7000  0.7000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.7000  0.3000  0.2000  0.1000  1.1000  0.7000  0.6000  0.5000  0.0000  0.0000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  1.2000  1.2000  1.2000  1.5000  0.9000  0.8000  0.8000  1.5000  0.8000  0.8000  0.7000  1.1000  1.1000
1.1000  1.1000
 DEGR. *    150     150     120     230     275     275     290      35     335     340     120     195     195
215      60
```


MODEL RESULTS

REMARKS : In search of the angle corresponding to
the maximum concentration, only the first

angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
5.	*	0.0000	0.0000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
10.	*	0.0000	0.0000	0.8000	0.8000	0.8000	0.8000	0.7000	0.8000
15.	*	0.0000	0.0000	0.8000	0.8000	0.8000	1.0000	0.7000	0.8000
20.	*	0.1000	0.1000	0.9000	0.9000	0.9000	1.1000	0.9000	0.9000
25.	*	0.1000	0.1000	1.0000	1.0000	0.9000	1.2000	1.0000	0.9000
30.	*	0.2000	0.2000	1.0000	1.0000	1.0000	1.1000	1.1000	1.0000
35.	*	0.4000	0.3000	1.0000	1.0000	0.9000	1.2000	1.1000	1.2000
40.	*	0.5000	0.7000	1.0000	0.9000	0.8000	1.2000	1.1000	1.1000
45.	*	0.7000	0.9000	0.8000	0.8000	0.7000	1.0000	1.0000	0.9000
50.	*	0.9000	1.0000	0.6000	0.6000	0.5000	0.8000	0.8000	0.7000
55.	*	1.0000	1.1000	0.4000	0.4000	0.3000	0.7000	0.6000	0.3000
60.	*	1.1000	0.9000	0.2000	0.2000	0.2000	0.4000	0.4000	0.2000
65.	*	1.0000	0.9000	0.1000	0.1000	0.1000	0.3000	0.3000	0.1000
70.	*	1.0000	0.8000	0.1000	0.1000	0.1000	0.3000	0.3000	0.1000
75.	*	1.1000	0.8000	0.1000	0.1000	0.1000	0.3000	0.3000	0.1000
80.	*	0.9000	0.7000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
85.	*	0.9000	0.7000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
90.	*	0.9000	0.7000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
95.	*	0.9000	0.7000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
100.	*	0.9000	0.7000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
105.	*	0.8000	0.6000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
110.	*	0.8000	0.6000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
115.	*	0.8000	0.6000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
120.	*	0.8000	0.6000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
125.	*	0.7000	0.6000	0.0000	0.0000	0.0000	0.2000	0.2000	0.0000
130.	*	0.6000	0.6000	0.0000	0.0000	0.0000	0.2000	0.0000	0.0000
135.	*	0.7000	0.7000	0.1000	0.0000	0.0000	0.2000	0.0000	0.0000
140.	*	0.6000	0.6000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000
145.	*	0.6000	0.6000	0.3000	0.1000	0.0000	0.0000	0.0000	0.0000
150.	*	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
155.	*	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
160.	*	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
165.	*	0.6000	0.6000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
170.	*	0.7000	0.7000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000
175.	*	0.7000	0.7000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
180.	*	0.7000	0.7000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
185.	*	0.7000	0.7000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
190.	*	0.7000	0.7000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
195.	*	0.8000	0.8000	0.3000	0.3000	0.1000	0.1000	0.1000	0.1000
200.	*	0.8000	0.8000	0.3000	0.3000	0.1000	0.1000	0.1000	0.1000
205.	*	0.9000	0.9000	0.3000	0.3000	0.1000	0.1000	0.1000	0.1000
210.	*	0.9000	0.9000	0.4000	0.4000	0.2000	0.2000	0.2000	0.2000

PAGE 6
JOB: Martinsville Soutern Connector RUN: New 220 and Morehead 2025

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
215.	*	0.9000	0.9000	0.7000	0.6000	0.3000	0.4000	0.4000	0.3000
220.	*	0.9000	0.8000	0.8000	0.8000	0.7000	0.6000	0.6000	0.5000
225.	*	0.7000	0.7000	1.0000	0.9000	0.9000	0.8000	0.8000	0.7000
230.	*	0.5000	0.5000	1.2000	1.1000	1.1000	1.0000	0.9000	0.8000
235.	*	0.4000	0.3000	1.2000	1.1000	1.2000	1.0000	1.0000	0.9000
240.	*	0.2000	0.2000	1.1000	1.2000	1.0000	1.0000	1.0000	1.0000

245.	*	0.1000	0.1000	1.2000	1.0000	0.9000	1.0000	1.0000	0.9000
250.	*	0.1000	0.1000	1.0000	0.9000	0.9000	0.9000	0.9000	0.9000
255.	*	0.0000	0.0000	0.9000	0.7000	0.8000	0.8000	0.8000	0.8000
260.	*	0.0000	0.0000	0.9000	0.7000	0.8000	0.8000	0.8000	0.8000
265.	*	0.0000	0.0000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
270.	*	0.0000	0.0000	0.6000	0.6000	0.7000	0.7000	0.7000	0.7000
275.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
280.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
285.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
290.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
295.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
300.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
305.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
310.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
315.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
320.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
325.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
330.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
335.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
340.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
345.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
350.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
355.	*	0.0000	0.0000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
360.	*	0.0000	0.0000	0.7000	0.7000	0.7000	0.6000	0.6000	0.7000
------	*								
MAX	*	1.1000	1.1000	1.2000	1.2000	1.2000	1.2000	1.1000	1.2000
DEGR.	*	60	55	230	240	235	25	30	35

THE HIGHEST CONCENTRATION OF 1.5000 PPM OCCURRED AT RECEPTOR 8.

*** EPA CAL3QHC Model Run implemented using the FHWA Resource Center CAL3i graphical user interface
CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 13045 PAGE 1

JOB: Martinsville Soutern Connector RUN: New 220 and Morehead 2040

DATE : 5/ 6/19
TIME : 13:17:33

The MODE flag has been set for calculating concentrations for POLLUTANT: CO

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	*	LINK COORDINATES (FT) X1	Y1	X2	Y2	*	LENGTH (FT)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)	V/C	QUEUE (VEH)
1. S Leg App - FreeFlow	*	-4.0	19.0	856.0	-841.0	*	1216.	135.	AG	4800.	0.5	0.0	41.7		
2. S Leg Dep - FreeFlow	*	-19.0	4.0	841.0	-856.0	*	1216.	135.	AG	4800.	0.5	0.0	41.7		
3. E Leg App - FreeFlow	*	-4.0	19.0	837.0	860.0	*	1189.	45.	AG	7200.	0.4	0.0	52.7		
4. E Leg Dep - FreeFlow	*	12.0	-12.0	860.0	837.0	*	1200.	45.	AG	7200.	0.4	0.0	52.7		
5. W Leg App - FreeFlow	*	12.0	-12.0	-837.0	-860.0	*	1200.	225.	AG	7200.	0.4	0.0	52.7		
6. W Leg Dep - FreeFlow	*	-19.0	4.0	-860.0	-837.0	*	1189.	225.	AG	7200.	0.4	0.0	52.7		

PAGE 2
JOB: Martinsville Soutern Connector RUN: New 220 and Morehead 2040

DATE : 5/ 6/19
TIME : 13:17:33

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	*	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE

RECEPTOR LOCATIONS

RECEPTOR	*	COORDINATES (FT) X	Y	Z	*
1. N Leg, E Side-Corner	*	-7.8	53.0	5.9	*
2. N Leg, E Side - 0 m	*	-7.8	53.0	5.9	*
3. N Leg, W Side-Corner	*	-53.0	7.8	5.9	*
4. S Leg, E Side-Corner	*	53.0	-7.8	5.9	*
5. S Leg, E Side - 25 m	*	104.0	-58.7	5.9	*
6. S Leg, E Side - 50 m	*	162.0	-116.7	5.9	*
7. S Leg, E Side-Midblk	*	470.2	-425.0	5.9	*
8. S Leg, W Side-Corner	*	7.8	-53.0	5.9	*
9. S Leg, W Side - 25 m	*	58.7	-104.0	5.9	*
10. S Leg, W Side - 50 m	*	116.7	-162.0	5.9	*
11. S Leg, W Side-Midblk	*	425.0	-470.2	5.9	*
12. E Leg, N Side - 25 m	*	43.1	104.0	5.9	*
13. E Leg, N Side - 50 m	*	101.1	162.0	5.9	*
14. E Leg, N Side-Midblk	*	409.4	470.2	5.9	*
15. W Leg, N Side - 25 m	*	-104.0	-43.1	5.9	*
16. W Leg, N Side - 50 m	*	-162.0	-101.1	5.9	*
17. W Leg, N Side-Midblk	*	-470.2	-409.4	5.9	*

18. E Leg, S Side - 25 m *	104.0	43.1	5.9	*
19. E Leg, S Side - 50 m *	162.0	101.1	5.9	*
20. E Leg, S Side-Midblk *	470.2	409.4	5.9	*
21. W Leg, S Side - 25 m *	-43.1	-104.0	5.9	*
22. W Leg, S Side - 50 m *	-101.1	-162.0	5.9	*
23. W Leg, S Side-Midblk *	-409.4	-470.2	5.9	*

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5.	* 0.0000	0.0000	0.0000	0.2000	0.0000	0.0000	0.0000	0.5000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
10.	* 0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.0000	0.5000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
15.	* 0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.0000	0.5000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
20.	* 0.0000	0.0000	0.0000	0.2000	0.1000	0.0000	0.0000	0.5000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
25.	* 0.0000	0.0000	0.0000	0.3000	0.1000	0.0000	0.0000	0.5000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
30.	* 0.0000	0.0000	0.0000	0.3000	0.1000	0.0000	0.0000	0.4000	0.3000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000
35.	* 0.1000	0.1000	0.1000	0.3000	0.0000	0.0000	0.0000	0.4000	0.3000	0.2000	0.2000	0.1000	0.1000	0.1000	0.0000
40.	* 0.1000	0.1000	0.1000	0.3000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000	0.2000	0.1000	0.1000	0.1000	0.1000
45.	* 0.2000	0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.4000	0.2000	0.2000	0.2000	0.1000	0.1000	0.1000	0.3000
50.	* 0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000	0.3000
55.	* 0.3000	0.3000	0.2000	0.1000	0.0000	0.0000	0.0000	0.3000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000	0.3000
60.	* 0.3000	0.3000	0.2000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.3000	0.3000	0.3000	0.3000
65.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.3000	0.2000	0.2000	0.2000
70.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000
75.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000
80.	* 0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.1000
85.	* 0.2000	0.2000	0.1000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
90.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
95.	* 0.2000	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
100.	* 0.2000	0.2000	0.3000	0.0000	0.0000	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000

```
 105.  *  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000
0.2000  0.2000
 110.  *  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000
0.2000  0.2000
 115.  *  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000
0.2000  0.2000
 120.  *  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.0000  0.3000  0.3000  0.3000  0.2000  0.2000  0.2000
0.2000  0.2000
 125.  *  0.3000  0.3000  0.4000  0.1000  0.1000  0.1000  0.1000  0.3000  0.3000  0.3000  0.2000  0.2000  0.2000
0.2000  0.2000
 130.  *  0.3000  0.3000  0.4000  0.1000  0.1000  0.1000  0.1000  0.3000  0.3000  0.3000  0.2000  0.2000  0.2000
0.2000  0.2000
 135.  *  0.4000  0.4000  0.4000  0.2000  0.2000  0.2000  0.1000  0.2000  0.2000  0.2000  0.1000  0.2000  0.2000
0.2000  0.2000
 140.  *  0.4000  0.4000  0.3000  0.2000  0.2000  0.2000  0.2000  0.1000  0.1000  0.1000  0.1000  0.2000  0.2000
0.2000  0.2000
 145.  *  0.4000  0.4000  0.3000  0.2000  0.2000  0.2000  0.2000  0.1000  0.1000  0.1000  0.1000  0.2000  0.2000
0.2000  0.2000
 150.  *  0.3000  0.3000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 155.  *  0.3000  0.3000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 160.  *  0.3000  0.3000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 165.  *  0.3000  0.3000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 170.  *  0.3000  0.3000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 175.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 180.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 185.  *  0.1000  0.1000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.2000
0.2000  0.2000
 190.  *  0.1000  0.1000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.1000  0.2000
0.2000  0.2000
 195.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.1000  0.2000
0.2000  0.2000
 200.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.1000  0.2000
0.2000  0.2000
 205.  *  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.2000  0.1000
0.3000  0.3000
 210.  *  0.2000  0.2000  0.3000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.3000  0.1000
0.3000  0.3000

PAGE  4
      JOB: Martinsville Soutern Connector                       RUN: New 220 and Morehead 2040

 WIND ANGLE RANGE:   5.-360.

 WIND  * CONCENTRATION
 ANGLE *     (PPM)
 (DEGR)*       1       2       3       4       5       6       7       8       9      10      11      12      13
 14      15

------*-----------------------------------------------------------------------------------------------------------
-----------
 215.  *  0.2000  0.2000  0.3000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.3000  0.2000
0.3000  0.3000
 220.  *  0.2000  0.2000  0.3000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.3000  0.3000
0.3000  0.3000
 225.  *  0.2000  0.2000  0.2000  0.4000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.3000  0.2000
0.1000  0.1000
 230.  *  0.1000  0.1000  0.1000  0.4000  0.2000  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.1000  0.1000
0.1000  0.1000
 235.  *  0.1000  0.1000  0.1000  0.4000  0.3000  0.2000  0.2000  0.3000  0.0000  0.0000  0.0000  0.0000  0.0000
0.1000  0.1000
```

```
 240.  *  0.0000  0.0000  0.0000  0.4000  0.3000  0.2000  0.2000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 245.  *  0.0000  0.0000  0.0000  0.5000  0.3000  0.2000  0.2000  0.3000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 250.  *  0.0000  0.0000  0.0000  0.5000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 255.  *  0.0000  0.0000  0.0000  0.5000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 260.  *  0.0000  0.0000  0.0000  0.5000  0.3000  0.2000  0.2000  0.2000  0.1000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 265.  *  0.0000  0.0000  0.0000  0.5000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 270.  *  0.0000  0.0000  0.0000  0.3000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 275.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 280.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 285.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 290.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 295.  *  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 300.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.2000  0.2000  0.2000  0.0000  0.0000  0.0000  0.0000  0.0000
0.0000  0.0000
 305.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.2000  0.2000  0.0000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 310.  *  0.0000  0.0000  0.0000  0.3000  0.1000  0.1000  0.2000  0.2000  0.1000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 315.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.1000  0.3000  0.1000  0.1000  0.1000  0.0000  0.0000
0.0000  0.0000
 320.  *  0.0000  0.0000  0.0000  0.2000  0.1000  0.1000  0.1000  0.3000  0.1000  0.1000  0.2000  0.0000  0.0000
0.0000  0.0000
 325.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.1000  0.2000  0.1000  0.1000  0.3000  0.0000  0.0000
0.0000  0.0000
 330.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.1000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000
 335.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.1000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000
 340.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000
 345.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000
 350.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000
 355.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000
 360.  *  0.0000  0.0000  0.0000  0.2000  0.0000  0.0000  0.0000  0.2000  0.2000  0.2000  0.2000  0.0000  0.0000
0.0000  0.0000

------*-----------------------------------------------------------------------------------------------------------
-----------
 MAX   *  0.4000  0.4000  0.4000  0.5000  0.3000  0.2000  0.2000  0.5000  0.3000  0.3000  0.3000  0.3000  0.3000
0.3000  0.3000
 DEGR. *    135     135     125     245     235     135     140       5      10     120     325      50      50
50      45


PAGE  5
      JOB: Martinsville Soutern Connector                      RUN: New 220 and Morehead 2040

       MODEL RESULTS
       -------------

       REMARKS : In search of the angle corresponding to
                 the maximum concentration, only the first
```

angle, of the angles with same maximum
concentrations, is indicated as maximum.

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
5.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
10.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
15.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
20.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.1000	0.2000	0.2000
25.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.2000	0.1000	0.2000
30.	*	0.0000	0.0000	0.3000	0.3000	0.3000	0.3000	0.1000	0.3000
35.	*	0.0000	0.1000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
40.	*	0.1000	0.1000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
45.	*	0.2000	0.1000	0.2000	0.1000	0.1000	0.2000	0.2000	0.1000
50.	*	0.3000	0.3000	0.1000	0.1000	0.1000	0.2000	0.1000	0.1000
55.	*	0.2000	0.3000	0.1000	0.1000	0.1000	0.0000	0.1000	0.1000
60.	*	0.1000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65.	*	0.1000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
75.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
95.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
105.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
110.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
115.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
120.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
125.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
130.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
150.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
155.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
160.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
165.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
170.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
175.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
180.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
185.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
195.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
200.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
205.	*	0.2000	0.2000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
210.	*	0.3000	0.3000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

WIND ANGLE RANGE: 5.-360.

WIND ANGLE (DEGR)	*	CONCENTRATION (PPM) 16	17	18	19	20	21	22	23
215.	*	0.3000	0.3000	0.0000	0.1000	0.1000	0.1000	0.1000	0.1000
220.	*	0.3000	0.3000	0.2000	0.1000	0.1000	0.1000	0.1000	0.1000
225.	*	0.1000	0.1000	0.2000	0.2000	0.1000	0.2000	0.1000	0.1000
230.	*	0.1000	0.1000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
235.	*	0.1000	0.1000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
240.	*	0.0000	0.0000	0.3000	0.1000	0.3000	0.3000	0.3000	0.3000

245.	*	0.0000	0.0000	0.2000	0.1000	0.2000	0.3000	0.3000	0.3000
250.	*	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
255.	*	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
260.	*	0.0000	0.0000	0.1000	0.2000	0.2000	0.2000	0.2000	0.2000
265.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
270.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
275.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
280.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
285.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
290.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
295.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
300.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
305.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
310.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
315.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
320.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
325.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
330.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
335.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
340.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
345.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
350.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
355.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
360.	*	0.0000	0.0000	0.2000	0.2000	0.2000	0.2000	0.2000	0.2000
------	*								
MAX	*	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
DEGR.	*	50	50	25	25	25	30	35	30

THE HIGHEST CONCENTRATION OF 0.5000 PPM OCCURRED AT RECEPTOR 8.