APRIL 2024

LINK 101

SR 101 CORRIDOR PROJECT
SOUTHEAST INDIANA

Preliminary Alternatives Traffic Analysis Report

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CHAPTER 1 – INTRODUCTION

To address the purpose and need for the Link 101 project, initially 10 preliminary alternatives – Alternatives A through J – were developed in the eastern, central, and western portions of the project area. Preliminary alternatives also varied in their use of existing roadways, including options that were completely on new alignment, completely on existing roadways, or a combination of new alignments and existing roadways. Based on input from the public to improve and make greater use of the existing roadways in order to minimize impacts to the rural setting of the project area, two additional options – Alternatives K and L – were developed based on a lower design speed. The resulting 12 preliminary alternatives are shown in Figure 1-1.

The purpose of this report is to summarize the traffic evaluation of each of the preliminary alternatives, as well as the No-Build Alternative, for the 2050 planning horizon. The data in this report serves as an input to the evaluation of alternatives documented in the *Preliminary Alternatives Screening Report*.

The remainder of this report is structured in three chapters:

- Chapter 2 provides an overview of the traffic evaluation tools used;
- Chapter 3 summarizes the evaluation of different traffic metrics, called measures of effectiveness (MOE), to quantitatively differentiate the preliminary alternatives from both the No-Build Alternative and from each other; and
- Chapter 4 summarizes the primary findings, focused on differentiating factors between the preliminary alternatives.

Detailed tables and mapping are provided at the end of the report in appendices.

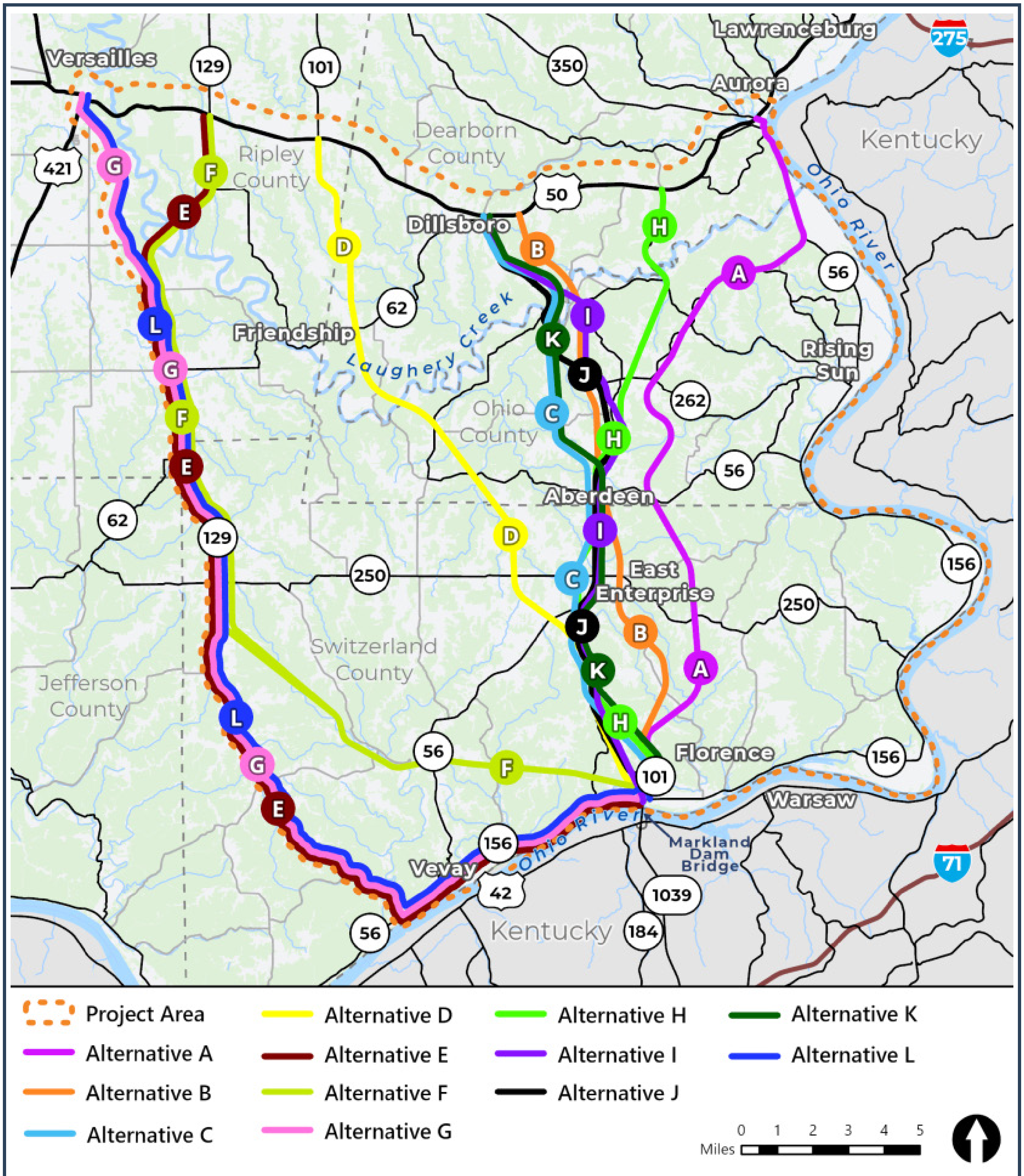


Figure 1-1. Link 101 Preliminary Alternatives

CHAPTER 2 – TRAFFIC EVALUATION METHODS OVERVIEW

The primary tool used to support the traffic evaluation of the preliminary alternatives is the Link 101 Focused Travel Demand Model (hereafter referred to as the Link 101 Model). A travel demand model is a mathematical representation of transportation supply and demand for a geographic region that is used to measure the transportation impact that a change in supply (in this case, the roadway network) has on demand (volumes and/or travel patterns on roads), or vice-versa.

A brief description of the Link 101 Model follows:

- The model was developed using the Indiana Statewide Travel Demand Model (ISTDM), which is the official model used by INDOT for larger (statewide) planning initiatives and represents the only travel model covering the entire Link 101 project area.
- The model is calibrated to 2019 conditions (meaning the demand and supply characteristics reflect 2019) and has a 2050 horizon (forecast) year. Since the ISTDM's horizon year (the farthest out year it forecasts) is 2045, for the Link 101 Model, this was extended to 2050 based on utilizing the 2045 ISTDM roadway network with 2050 socioeconomic (population and employment) forecasts.
- The socioeconomic data used in the Link 101 Model was updated based on the latest official population projections by county from STATS Indiana, developed in 2019. The forecasts for 2050 exhibit overall relatively modest changes in population and employment (substantially lower in several counties compared to the default data in the ISTDM, which was developed in 2015). Table 2-1 shows the 2019 and forecast 2050 population and employment for the four counties comprising the project area that were used in the Link 101 Model.
- The model includes portions of both Kentucky and Ohio to account for regional travel patterns and travel between Indiana and bordering states (see Figure 2-1).
- All alternatives evaluated in 2050 share a common background roadway network, referred to as the No-Build Alternative, and assume the same 2050 horizon year socioeconomic forecasts.

Table 2-1. Population and Employment by Project Area County

SOCIOECONOMIC DATA	DEARBORN COUNTY	OHIO COUNTY	RIPLEY COUNTY	SWITZERLAND COUNTY
Population				
2019 Population	50,679	5,940	28,995	9,737
2050 Population	50,952	5,550	31,014	12,666
Population Change	273	-390	2,019	2,929
Population Change (%)	0.5%	-6.6%	7.0%	30.1%
Employment				
2019 Employment	15,650	2,067	5,588	2,998
2050 Employment	15,768	2,067	6,752	4,101
Employment Change	118	0	1,164	1,103
Employment Change (%)	0.8%	0%	20.8%	36.8%

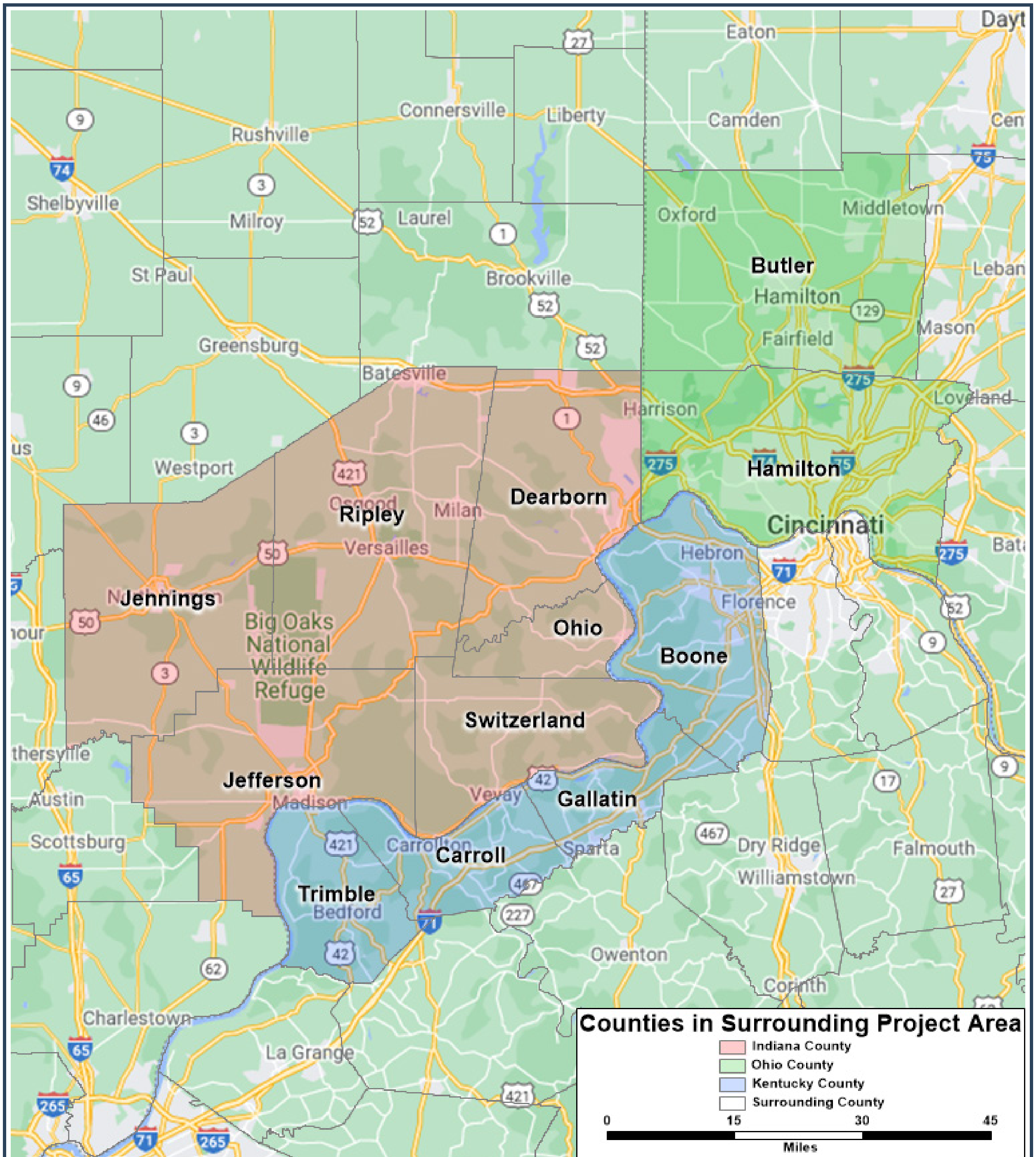


Figure 2-1. Limits of the Link 101 Model

CHAPTER 3 – TRAFFIC PERFORMANCE-BASED EVALUATION OF ALTERNATIVES

The evaluation of the preliminary alternatives from a traffic standpoint encompasses several metrics, ranging from broad-based project area and corridor-level daily traffic volumes to more selective measurements such as the impact that a preliminary alternative may have on traffic safety. Each metric is discussed below.

As documented in the *Preliminary Alternatives Screening Report*, procedurally, the preliminary alternatives first must satisfy the purpose and need criteria before being evaluated for environmental, engineering, traffic, and cost screening criteria. Of the 12 preliminary alternatives, 10 were found to meet the purpose and need – Alternatives A through J. Alternatives K and L were dismissed because they do not meet design standards for a 55 mph roadway and therefore, are not considered further in this preliminary screening evaluation.

Note that all volumes, unless noted, represent average weekday daily volumes (two-way) for the 2050 horizon year. The No-Build Alternative is included as a point of reference for comparison and assumes no significant roadway improvements in the project area.[1]

3.1 CORRIDOR VOLUMES

Maps showing the forecast daily two-way volumes, for both all vehicles and trucks, for each of the preliminary alternatives and the No-Build Alternative are provided in Appendix A. For the No-Build Alternative, shown in Figure A-1, daily volumes are shown for all state routes in the project area plus the collection of roadway segments that represent the existing shortest and fastest route between the Markland Dam Bridge and US 50. Volumes for the preliminary alternatives are illustrated on two sets of figures: first, the daily two-way traffic volumes along the preliminary alternative for both all vehicles and trucks (Figures A-2 through A-11) and second, the changes in daily volumes on other roadways in the project area as a result of the preliminary alternative compared to No-Build conditions (Figures A-12 through A-21). In the forecasting process to evaluate the differences in volumes, travel patterns were allowed to change in response to each preliminary alternative and what route(s) are more/less attractive for each vehicle's travel needs. As noted on those maps, the roadway segments within the project area that would have differences of less than 100 vehicles per day (vpd) are not shown.

Summaries of the range in traffic volume and estimated changes on other project area roadways associated with each preliminary alternative are provided below. Overall, Alternative A would have

[1] As noted in the *Draft Purpose and Need Statement,* the No-Build Alternative includes all projects listed in the applicable statewide and regional plans; however, those projects are primarily maintenance projects or minor intersection improvements that would not materially affect regional travel patterns.

the highest overall volume on any segment (12,200 vpd); however, it's important to recognize that would occur on an existing segment of SR 56 south of Aurora that would, under the No-Build Alternative, carry 9,000 vpd. Alternative H is forecast to have the second highest volume with 6,700 vpd in the East Enterprise area. Alternatives E, F, and G are grouped in the lower end, both in terms of overall range and highest volume. Similar findings apply to the truck volumes, though the variation in truck volume across the preliminary alternatives is considerably smaller (between 100 and 650 trucks per day).

In terms of effects on other roadways, by providing an improved north-south connection that would attract trips off of existing roadways, all preliminary alternatives would reduce traffic volumes on nearby parallel north-south roadways in the project area, though to different degrees. Overall, the more westerly alignments (Alternatives E, F, and G) would have less of an impact on other project roadways compared to the more eastern and central alternatives, which would offer a more attractive route to a greater number of motorists. Additionally, the preliminary alternatives would also increase traffic on some east-west routes due to vehicles being attracted to the new roadway. Increases and/or decreases in volumes along US 50 would also vary by alternative, with the more central preliminary alternatives (Alternatives B, C, H, I, and J) increasing volumes the most and Alternatives A and D resulting in decreased volumes on several segments of US 50.

Alternative A

- Volumes along Alternative A:
    - For the new alignment portion of Alternative A (18 miles), volumes would range from 3,300 vpd (south of Aurora) to 4,900 vpd (north of the Markland Dam Bridge near SR 250).
    - For the portion of Alternative A that would utilize SR 56 south of Aurora (5 miles), volumes would range from 8,800 to 12,200 vpd. The No-Build volume on this portion would be 5,600 to 9,000 vpd.
    - The average truck percentage over Alternative A would be 12% of the total volume, ranging from 350 to 1,100 trucks per day.
- Effects on other project area roadways:
    - Alternative A would result in reductions in traffic on several parallel north-south roadways throughout the central and western portions of the project area, including along portions of SR 56, Tapps Ridge Road, Markland Pike, Cass Union Road, SR 262, Hueseman Road, and Cole Lane. Some of the greatest reductions in north-south traffic would be up to 2,000 vpd north of Aberdeen.
    - The decrease in volume along Huesman Road and Cole Lane also result in a decrease in traffic along US 50 to the west of Aurora.
    - The greatest increase in volume would be 1,600 vpd along SR 56 east of Aberdeen, associated with trips originating near Aberdeen accessing the new route.

Alternative B

- Volumes along Alternative B:
  - Alternative B, which would be 18 miles of total length traversing all new terrain, would generate volumes ranging from 3,000 vpd (approaching Dillsboro) to 4,500 vpd (between the Markland Dam Bridge and East Enterprise).
  - The average truck percentage over Alternative B would be 13% of the total volume, ranging from 450 to 600 trucks per day.
- Effects on other project area roadways:
  - Alternative B, which would provide a relatively direct path between Markland Dam and US 50 near Dillsboro, would attract trips (i.e., reduce volumes) from adjacent north-south roadways throughout the central and eastern portions of the project area. The largest reductions would be up to 2,000 vpd on SR 56 between East Enterprise and Aberdeen.
  - The relatively direct path to US 50 would "split" the market for US 50 travel west and east, resulting in some volume increases on US 50 on either side of where Alternative B would connect.
  - The SR 156 segment between Vevay and Markland Dam Bridge would also exhibit a volume increase, reflecting the desire to access Alternative B from Vevay rather than traveling north on existing roads.

Alternative C

- Volumes along Alternative C:
  - The highest traffic volumes on both the new alignment and existing roadway portions of Alternative C would be in the area from Markland Pike, by East Enterprise and Aberdeen, to SR 56/Cass Union Road and would range from 4,600 to 5,700 vpd.
  - The lowest overall traffic volume would be 1,700 vpd on the northernmost portion of Alternative C, approaching Dillsboro.
  - Elsewhere along Alternative C, volumes would range between 3,200 to 3,700 vpd.
  - The average truck percentage over Alternative C would be 15% of the total volume, ranging from 350 to 600 trucks per day.
- Effects on other project area roadways:
  - The central route of Alternative C would offer a more attractive route benefitting motorists traveling between Markland Dam Bridge and both Versailles and Aurora, and would reduce volumes from primarily north-south roadways throughout the central and eastern portions of the project area. Some of the highest reductions would be up to 1,200 vpd on Markland Pike south of the alignment and Cass Union Road north of the alignment. It would also reduce volumes up to 3,000 vpd on SR 56 in East Enterprise, due to the bypass.
  - Coming from Vevay, travelers would take advantage of the improved mobility offered by the alternative by accessing it from Tapps Ridge Road and SR 56,

which would experience volume increases up to 600 vpd. The alignment would also provide an improved connection to Aurora and points north and east via Hueseman Road (volume increase up to 1,700 vpd) and to Dillsboro and points west and north along US 50.
- Overall, volumes along US 50 would increase up to 1,400 vpd to the east of the proposed connection point and 650 vpd to the west.

Alternative D

- Volumes along Alternative D:
  - Alternative D, which would be 22 miles of total length primarily traversing all new terrain, would generate volumes ranging from 1,500 vpd (near where it would cross Laughery Creek) to 4,900 vpd (in the vicinity of where it would cross Markland Pike and SR 56).
  - Overall, lower volumes on Alternative D would typically be along the more northern portions of the alignment and higher volumes would be along the southern portions of the alignment.
  - The average truck percentage over Alternative D would be 17% of the total volume, ranging from 400 to 650 trucks per day.
- Effects on other project area roadways:
  - The central-eastern route of Alternative D would offer a more attractive route benefitting motorists traveling between Markland Dam Bridge and primarily Dillsboro/Versailles, and would reduce volumes from north-south roadways throughout the central portion of the project area. The highest reductions would be up to 750 vpd along Bear Branch Road.
  - Travelers would take advantage of the improved mobility offered by the alternative by accessing it from Tapps Ridge Road and SR 56, which would experience volume increases up to 600 vpd. The alignment would also provide a more limited improvement in the connection to Aurora and points north and east via Hueseman Road (volume increase up to 350 vpd).
  - Alternative D would overall reduce volumes along US 50 up to 500 vpd.

Alternative E

- Volumes along Alternative E:
  - For the new alignment portion of Alternative E (4 miles, east of Versailles), volumes would range from 400 to 850 vpd – the lowest along the alternative.
  - For the portion of Alternative E that would utilize SR 56/156 from Markland Dam Bridge through Vevay, volumes would range from 4,600 to 6,100 vpd – the highest along the alternative. The No-Build volume along this same portion would range from 3,600 to 5,200 vpd.
  - For the portion of Alternative E that would utilize SR 129 from Vevay to south of Versailles, volumes would range from 650 to 2,500 vpd. The No-Build volume along this same portion would range from 250 to 2,200 vpd.

- The average truck percentage over Alternative E would be 16% of the total volume, ranging from 100 to 500 trucks per day.

- Effects on other project area roadways:
    - The westerly route of Alternative E would not be attractive to motorists other than those destined between the Markland Dam Bridge and Vevay to Versailles and as such, would yield little impact on volume to other corridors in the area.
    - Alternative E would result in increases in traffic on a handful of roadways adjacent to the new route, generally due to vehicles being attracted to the new roadway to it for a portion of their trip; however, these increases are more limited than other alternatives (up to 150 vpd).
    - Alternative E would have little to no impact on volumes along US 50.

Alternative F

- Volumes along Alternative F:
    - For the new alignment portions of Alternative F (19 miles, from SR 101 at the Markland Dam Bridge to SR 129, as well as the shorter portion to the east of Versailles), volumes would range from 500 vpd (adjacent to where it would connect to SR 129) to 3,000 vpd (north of the Markland Dam Bridge).
    - For the portion of Alternative F that would utilize SR 129 (10 miles), volumes would range from 1,900 vpd to 2,500 vpd. The No-Build volume along this same portion would range from 1,800 vpd to 2,000 vpd.
    - The average truck percentage over Alternative F would be 19% of the total volume, ranging from 200 to 450 trucks per day, with the higher share being along the existing roadway.
- Effects on other project area roadways:
    - Similar to Alternative E noted above, the overall westerly route of Alternative F would not be attractive to motorists other than those destined between the Markland Dam Bridge and Vevay to Versailles and as such, would yield little impact on volume to other north-south corridors in the area. The exception is that Alternative F would provide a shortcut between Markland Dam Bridge and Pleasant, which would reduce volumes along SR 156/SR 56 and SR 129 (up to 600 vpd).
    - Alternative F would result in increases in traffic on a handful of roadways adjacent to the new route, generally due to vehicles being attracted to the new roadway to it for a portion of their trip; however, these increases are more limited than other alternatives (up to 200 vpd).
    - Alternative F would have little to no impact on volumes along US 50.

Alternative G

- Volumes along Alternative G:
  - For the portion of Alternative G that would utilize SR 56/156 from Markland Dam Bridge through Vevay, volumes would range from 4,600 to 6,100 vpd – the highest along the alternative. The No-Build volume along this same portion would range from 3,600 to 5,200 vpd.
  - For the portion of the Alternative G that would utilize SR 129 from Vevay to Versailles, volumes would range from 650 to 3,700 vpd. The No-Build volume along this same portion would range from 250 to 2,800 vpd.
  - In Versailles, volumes for Alternative G on US 421 would be up to 19,000 vpd. The No-Build volume along this same portion would be between 18,100 to 18,700 vpd.
  - The average truck percentage over Alternative G would be 16% of the total volume, ranging from 150 to 500 trucks per day, and up to 3,400 trucks per day on the short portion of existing US 421.
- Effects on other project area roadways:
  - The westerly route of Alternative G would not be attractive to motorists other than those destined between the Markland Dam Bridge and Vevay to Versailles and as such, would yield little impact on volume to other corridors in the area.
  - Alternative G would result in increases in traffic on a handful of roadways adjacent to the new route, generally due to vehicles being attracted to the new roadway to it for a portion of their trip; however, these increases are more limited than other alternatives (up to 150 vpd).
  - Alternative G would have little to no impact on volumes along US 50.

Alternative H

- Volumes along Alternative H:
  - Volumes along Alternative H would range from 3,700 vpd (on a new alignment section north of the Markland Dam Bridge) to 6,700 vpd (along SR 56 approaching Aberdeen, in an area utilizing existing roadway).
  - There are several other areas along new alignment with higher volumes that would be between 6,000 to 6,300 vpd, including near East Enterprise and along the northern portion of the alignment where it would connect to US 50.
  - The average truck percentage over Alternative H would be 14% of the total volume, ranging from 550 to 1,000 trucks per day – one of the highest of any alternative.
- Effects on other project area roadways:
  - Alternative H, which would provide a relatively direct path between Markland Dam Bridge and US 50 near Aurora, would attract trips (i.e., reduce volumes) from adjacent north-south roadways throughout the central and eastern portions of the project area. Some of the greatest reductions would be on Hueseman Road

(up to 800 vpd), on SR 56 in Aurora (up to 900 vpd), Markland Pike (up to 1,300 vpd), and SR 56 in East Enterprise (up to 2,900 vpd).
  - Alternative H would result in increases in traffic on a handful of roadways adjacent to the new route, generally due to vehicles being attracted to the new roadway to it for a portion of their trip, particularly yielding a greater attraction from locations west of the corridor; volumes along Tapps Ridge Road, SR 56 from Vevay, and SR 250 would increase up to 950 vpd.
  - Alternative H would increase volume up to 2,000 vpd on US 50 to the east of where it would connect (towards Aurora).

Alternative I

- Volumes along Alternative I:
  - In the middle portion of Alternative I, the areas that would utilize existing portions of Markland Pike, SR 56, SR 262, and Cass Union Road (approximately 11 miles total) would have the highest volumes, ranging from 4,300 vpd to 5,800 vpd. The No-Build volume along these roadways would range from 2,400 vpd to 3,500 vpd.
  - Volumes along new alignment in the northern and southern portions of Alternative I (11 miles total) would have lower volumes that would range from 1,500 to 2,800 vpd.
  - The average truck percentage over Alternative I would be 13% of the total volume, ranging from 350 to 550 trucks per day.
- Effects on other project area roadways:
  - Alternative I, which would provide a relatively direct path between Markland Dam Bridge and US 50 near Dillsboro, would attract trips (i.e., reduce volumes) from adjacent north-south roadways primarily from the central and eastern portions of the project area. The highest reductions would be up to 1,100 vpd on SR 56 north of Vevay.
  - The SR 156/SR 56 segment and Tapps Ridge Road segment between Vevay and Markland Dam Bridge would also exhibit a volume increase (up to 1,200 vpd), reflecting the desire to access Alternative I from Vevay rather than traveling north on existing roads. Similarly, volumes on Laughery Creek Road and Cole Lane would increase up to 1,700 vpd between Alternative I and its connection to US 50, for motorists traveling to Aurora and beyond.
  - The relatively direct path to US 50 would "split" the market for travel along US 50 travel, resulting in volume increases on US 50 on either side of where Alternative I would connect (up to 600 vpd to the west and up to 500 vpd to the east).

Alternative J

- Volumes along Alternative J:
  - In the middle portion of Alternative J, the areas that would utilize existing portions of Markland Pike, SR 56, SR 262, and Cass Union Road (approximately 13

miles total) would have the highest volumes, ranging from 4,000 to 5,500 vpd. The No-Build volume along these roadways would range from 2,400 vpd to 3,500 vpd.
    - Volumes on the new alignment in the northern and southern portions of Alternative J (6 miles total) would range from 1,900 vpd to 3,200 vpd.
    - The average truck percentage over Alternative J would be 13% of the total volume, ranging from 350 to 550 trucks per day.

- Effects on other project area roadways:
    - Alternative J, which would provide a relatively direct path between Markland Dam Bridge and Dillsboro, would attract trips (i.e., reduce volumes) from adjacent north-south roadways primarily from the central and eastern portions of the project area. The highest reductions would be up to 1,100 vpd on SR 129 north of Vevay.
    - The SR 156/SR 56 segment and Tapps Ridge Road segment between Vevay and Markland Dam Bridge would also exhibit a volume increase (up to 1,200 vpd), reflecting the desire to access Alternative J from Vevay rather than traveling north on existing roads. Similarly, volumes on Hueseman Road would increase up to 1,500 vpd between Alternative J and its connection to US 50, for motorists traveling to Aurora and beyond.
    - The relatively direct path to US 50 would "split" the market for US 50 travel west and east, resulting in some volume increases on US 50 on either side of where Alternative J would connect (up to 650 vpd to the west and up to 1,200 vpd to the east).

3.2 REGIONAL AND PROJECT AREA TRAVEL IMPACT

The preliminary alternatives are designed to facilitate improved north-south travel in the project area between the Markland Dam Bridge and US 50. Thus, the preliminary alternatives could potentially benefit both local and regional travel. Detailed trip tables, and the magnitude of the change in trips versus the No-Build Alternative that would be associated with each preliminary alternative, are provided in Appendix B for trips in and through the project area. Figure 3-1 summarizes the impact that each preliminary alternative would have in terms of the total number of forecasted trips by auto and truck within the project area and the share that would be wholly internal (i.e., both trip origin and destination located within the project area).

There would be relatively small differences among the preliminary alternatives in comparison with the No-Build Alternative in terms of trips in and through the project area. Key findings include:

- Under the No-Build Alternative, 0.6% of trips in the project area (approximately 700 of 110,000 total trips) would be "through trips" – that is, their trip would start and end outside the project area without stopping in the project area. None of the preliminary alternatives would have a substantial effect on through trips. Alternatives E, F, and G would have the least impact, with through trips ranging from 0.6% to 0.8% of all trips. The remaining alternatives would increase the share of through trips to 1.3% to 1.5%.

- Non-through-trips would be divided roughly equally between internal trips (those that start **and** finish within the project area) and internal-to-external/external-to-internal trips (those that start **or** finish within the project area). This is true for the No-Build Alternative as well as all of the preliminary alternatives.
- All preliminary alternatives would increase the number of total trips forecasted in the project area, relative to the No-Build, with the increase ranging between 0.2% and 0.7%. Both auto and truck trips would increase. The increases reflect that the presence of the alternatives would offer an alternate travel path for externally based travel through the project area. The slight variation in overall traffic volumes reflect the different levels of attractiveness of the preliminary alternative routes for regional travel.
- Six of the 10 preliminary alternatives (Alternatives A, B, C, H, I, and J) would exhibit a drop in internal trip share, ranging from 0.4% to 0.9%. This indicates that externally based travel (i.e., trips having one or both trip ends outside the project area) would account for a slightly greater share of project area trips than internally based travel.
- Only Alternatives D, E, F, and G would simultaneously increase both overall trip making and internal share (albeit slightly – less than 1%).
- Alternative A would increase trip making in the project area the most (an increase of approximately 800 trips), primarily from external-based travel (likely due to its proximity to the I-71 corridor) relative to the other preliminary alternative alignments. Alternative H would exhibit a similar, though slightly more muted, change than Alternative A (an increase of approximately 600 trips) and would also provide a more easterly-aligned alternative (and therefore more competitive with the I-71 corridor) relative to the others.
- All preliminary alternatives would similarly increase truck volumes by 3% (less than 100 additional truck trips per day), though Alternatives A and H would result in the only decreases in internally based truck travel (approximately 6% decrease relative to the No-Build).

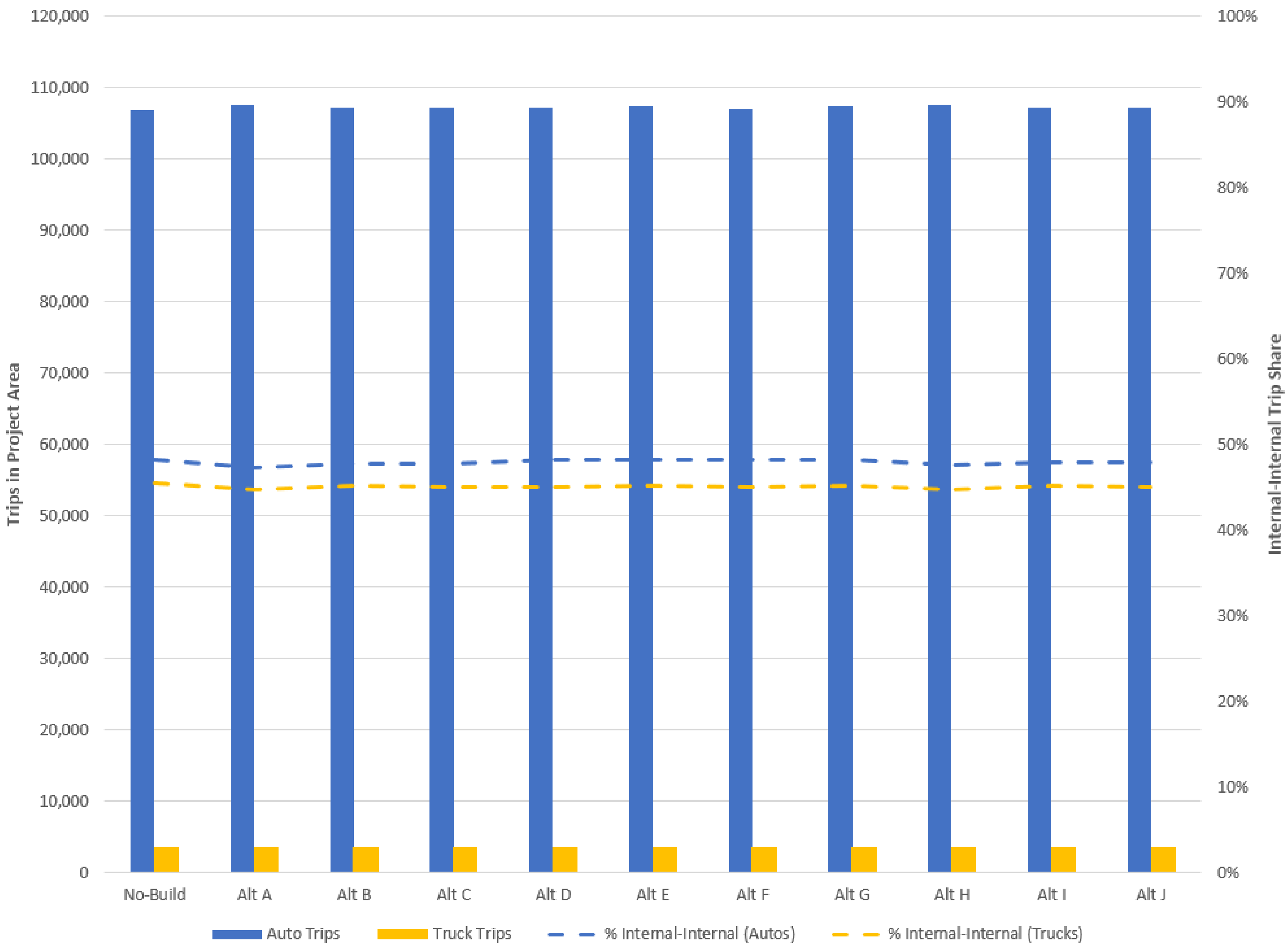


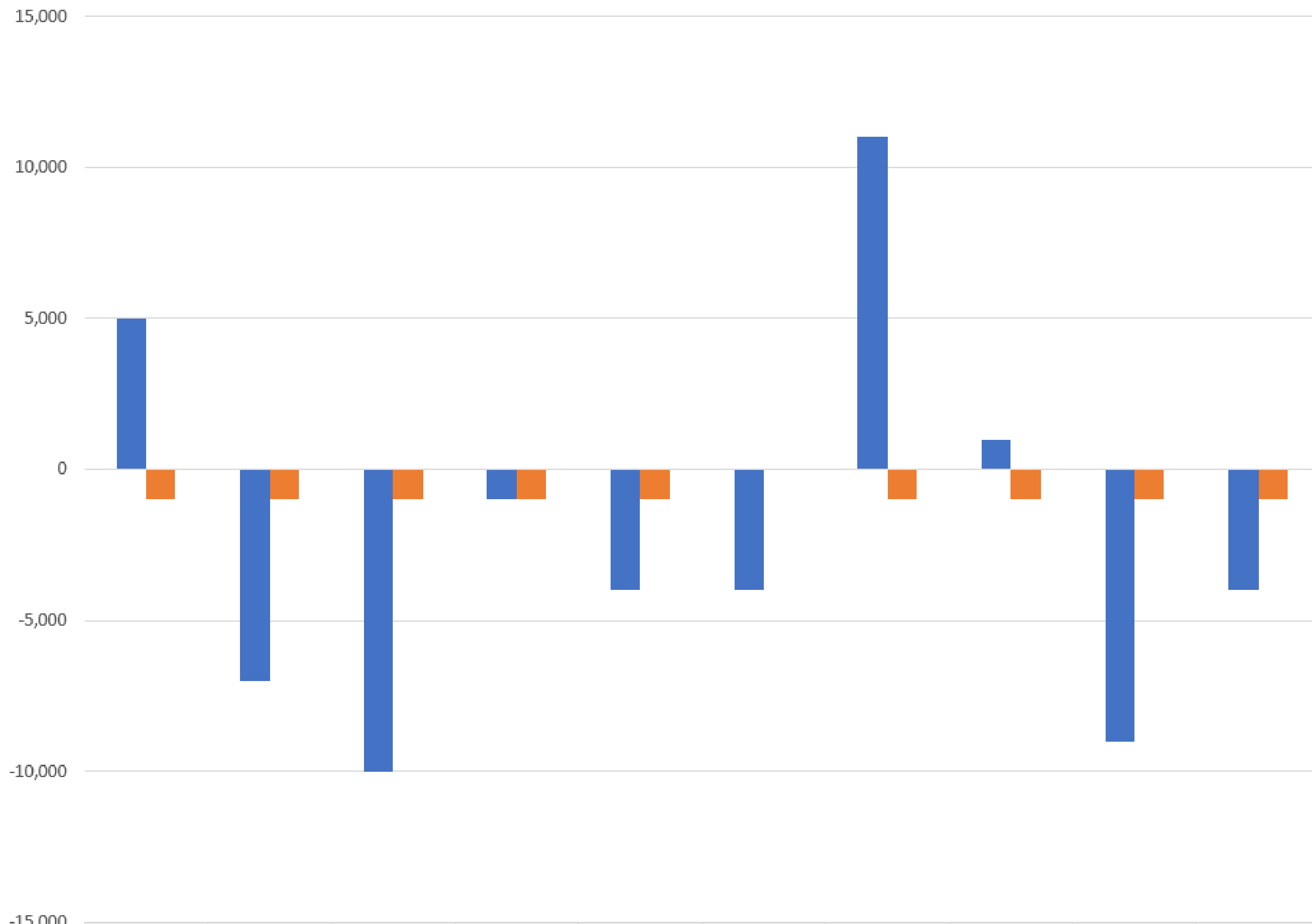
Figure 3-1. Summary of 2050 Daily Trips within Project Area

The regional travel impact of the preliminary alternatives was also evaluated in terms of vehicle miles traveled (VMT) and vehicle hours traveled (VHT). One vehicle traveling one mile represents 1 VMT. Similarly, 1 VHT is the equivalent of one vehicle traveling one hour. These measures, when viewed as changes relative to the No-Build Alternative, help provide a more comprehensive assessment of the changes in number of trips in the project area by considering the impact the trip changes would have on mobility as measured by changes in aggregate vehicle miles and hours traveled.

The VMT and VHT aggregations are performed over an area that includes the project area as well as adjacent counties in Indiana, Kentucky, and Ohio. This is done to realize the full impact of these changes because the true VMT and VHT differences would extend beyond the defined project area. For example, consider a new external-based trip that, under the No-Build Alternative, does not pass through the project area, but would pass through the project area for a preliminary alternative. The true change in that trip's mobility is realized by considering the origin-destination path under both the No-Build and preliminary alternative, not just within the project area.

Figure 3-2 illustrates the changes in VMT and VHT for each preliminary alternative relative to the No-Build Alternative. Detailed VMT and VHT tables are provided in Appendix C: Table C-1 provides regional VMT for all vehicles as well as for autos and trucks separately; Table C-2 provides the change in VMT relative to the No-Build Alternative; and Table C-3 and C-4 provide similar information for VHT, respectively. As shown in Figure 3-2, key findings include:

- Nine of the preliminary alternatives would reduce VHT by approximately 1,000 hours relative to the No-Build, indicating that the preliminary alternatives would provide an overall travel time savings to the region. Compared to the regional VHT, these time savings would be very small (0.02%). Alternative F would result in no change to regional VHT.
- Truck VHT would not change with any of the preliminary alternatives.
- Seven of the 10 preliminary alternatives would reduce VMT, suggesting that a more efficient path would be offered by these alternatives.
- Three preliminary alternatives (Alternatives A, G, and H) would increase VMT, indicating a need for motorists to travel more out of their way (i.e., travel farther) to realize the time savings. This is not unusual as people are more apt to choose a route based on travel time and not travel distance.
- The preliminary alternatives that would increase VMT are the ones that would have the most westerly and easterly alignments: Alternatives A, G, and H. This result is consistent with the above bullet point regarding traveling out of one's way to achieve a time savings. The VMT increase associated with Alternative G would be in part due to traffic shifting from US 421 to the upgraded SR 129 south of Versailles. Alternative E would be less competitive with a portion of the market serving US 421 than Alternative G and therefore US 421 motorists would not traveling the extra distance.
- Both the VMT and VHT changes for all preliminary alternatives would be very small such that their impact on regional travel would be marginal.



	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
VMT Change	5,000	-7,000	-10,000	-1,000	-4,000	-4,000	11,000	1,000	-9,000	-4,000
VHT Change	-1,000	-1,000	-1,000	-1,000	-1,000	0	-1,000	-1,000	-1,000	-1,000

Figure 3-2. Change in VMT and VHT within Project Area (Compared to the No-Build Alternative)

Note: Negative values indicate a savings over the No-Build Alternative. The VMT/VHT change for all preliminary alternatives is negligible (< 0.02%); see Appendix C.

3.3 SUB-PROJECT AREA TRAVEL IMPACT

This section presents travel impacts measured at smaller sub-regions within the project area. This is accomplished using screen lines, which represent the total sum of forecast traffic volumes crossing an imaginary line to gauge changes in overall demand flow across the different sub-regions within the project area.

Six screen line locations were defined for evaluation. Three of the screen lines represent travel across the Indiana state line in the project area (i.e., border crossings): the Markland Dam Bridge and US 421 bridge across the Ohio River and the US 50/I-275 connection near the Ohio border. To capture north-south travel through the project area, three screen lines were located at different latitudes: the northern portion (just south of US 50), the central region (just north of SR 250/SR 56), and the southern portion (south of SR 250). Detailed information is provided in Appendix D: Figure D-1 illustrates the screen line locations; Figures D-2 through D-4 show the aggregated forecast volumes across the three border crossing screen lines; and Figures D-5 through D-7 show the screen line volumes for the upper, middle, and lower regions of the project area.

3.3.1 BORDER CROSSING SCREEN LINES

Table 3-1 shows the variation in forecast daily volumes across the three Indiana border crossings nearest the project area (see also Figure D-2), as well as the volume changes from the No-Build Alternative in percentage terms. Not surprisingly, the Markland Dam Bridge would experience the greatest percentage change (increase) in volume under the preliminary alternatives, with the Ohio border crossing exhibiting the least. This is because the preliminary alternatives are inherently designed to accommodate traffic utilizing the Markland Dam Bridge and the associated recent roadway improvements in Kentucky connecting I-71 with the bridge. However, the data shows that the total combined volume across the three border crossings would generally be flat across the preliminary alternatives, with a maximum increase in crossings of 1%.

As shown in Table 3-1, the preliminary alternatives that would run through the central and eastern portions of the project area, terminating in or near Dillsboro or Aurora, would exhibit the largest increases in traffic across the Markland Dam Bridge. In contrast, the westerly alignments, terminating in or near Versailles, would exhibit less change, with Alternatives E and G showing an increase of 3% in volume across the Markland Dam Bridge. The US 421 bridge in Madison would experience a slight decrease (around 2% on average) in volume for each preliminary alternative.

Table 3-1 also provides volume data for trucks (see also Figure D-3). The change in truck volumes at the border crossings would exhibit a somewhat similar pattern as all vehicles. In the case of Markland Dam Bridge, the magnitude of the percent change would be heightened by the lower demand of trucks relative to all vehicles. Increases would range as high as 56%, but it's important to note that value correlates to an increase of 250 additional trucks. The share of trucks compared to total volume on this bridge is forecast to increase from 6% (No-Build Alternative) to an average of 8% across all preliminary alternatives (see also Figure D-4). The other two border screen line locations (i.e., the US 421 bridge and the US 50/I-275 connection near the Ohio border) would maintain about the same truck share across each of the build alternatives. Overall, the change in total truck volume crossing the three border locations together range from no increase to a 150 vpd increase.

Table 3-1. Daily Screen Line Volumes (Border Crossings)

ALTERNATIVE	DAILY VOLUME (PERCENT CHANGE FROM NO-BUILD)				
	TYPE	MARKLAND DAM BRIDGE	US 421 BRIDGE	IN/OH BORDER	TOTAL
No-Build	All Vehicles	6,800 (N/A)	18,300 (N/A)	58,800 (N/A)	83,900 (N/A)
	Trucks	450 (N/A)	3,000 (N/A)	2,700 (N/A)	6,200 (N/A)
Alternative A	All Vehicles	7,600 (12%)	18,000 (-2%)	59,100 (1%)	84,700 (1%)
	Trucks	650 (44%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)
Alternative B	All Vehicles	7,800 (15%)	18,000 (-2%)	58,800 (0%)	84,600 (1%)
	Trucks	650 (44%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)
Alternative C	All Vehicles	7,900 (16%)	17,700 (-3%)	58,800 (0%)	84,400 (1%)
	Trucks	650 (44%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)
Alternative D	All Vehicles	8,400 (24%)	17,800 (-3%)	58,900 (0%)	85,100 (1%)
	Trucks	700 (56%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)
Alternative E	All Vehicles	7,000 (3%)	18,100 (-1%)	58,800 (0%)	83,900 (0%)
	Trucks	450 (0%)	2,900 (-3%)	2,700 (0%)	6,100 (-2%)
Alternative F	All Vehicles	7,300 (7%)	17,800 (-3%)	58,900 (0%)	84,000 (0%)
	Trucks	500 (11%)	2,800 (-7%)	2,700 (0%)	6,000 (-2%)
Alternative G	All Vehicles	7,000 (3%)	18,300 (0%)	58,900 (0%)	84,200 (0%)
	Trucks	450 (0%)	3,000 (0%)	2,700 (0%)	6,200 (0%)
Alternative H	All Vehicles	7,900 (16%)	17,800 (-3%)	58,900 (0%)	84,600 (1%)
	Trucks	700 (56%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)
Alternative I	All Vehicles	7,900 (16%)	17,900 (-2%)	58,800 (0%)	84,600 (1%)
	Trucks	650 (44%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)
Alternative J	All Vehicles	8,000 (18%)	17,700 (-3%)	58,900 (0%)	84,600 (1%)
	Trucks	650 (44%)	2,900 (-3%)	2,700 (0%)	6,300 (2%)

Note: The total may not match the sum of the values due to rounding (values above 1,000 are rounded to the nearest thousand and values below 1,000 to the nearest fifty).

3.3.2 North-South Travel Screen Lines

Focusing on travel within the project area, Table 3-2 provides forecasted north-south traffic volumes across the three screen lines bisecting the project area (i.e., across the southern end, middle, and northern end, respectively) (see also Figure D-5). The table also presents the screen line forecast volume changes from the No-Build Alternative in percentage terms. Eight of the 10 preliminary alternatives generally would result in an increase in north-south flow (i.e., more traffic volume) across each of the three screen lines, relative to the No-Build Alternative. The exceptions would be Alternative F, which would exhibit a slight decrease in volume across each screen line and Alternative E, which would exhibit a slight decrease at two of the screen lines. Table 3-2 also shows the impact that the preliminary alternatives would have on north-south truck flow (see also Figure D-6). All but Alternatives E, F, and G generally would increase forecast north-south truck flow through the project area. However, the change in truck volume would be rather small such that it would not appreciably change the truck share of overall daily traffic (see Figure D-7): about 11% of the total volume flow across the northern end of the project area would be trucks, regardless of alternative; in the middle portion, the truck share would remain mostly constant at 14% of the total flow; and at the southern end, trucks would account for about 13% of the total north-south flow across all alternatives.

Table 3-2. Daily Screen Line Volumes (Project Area North-South Flow)

ALTERNATIVE	DAILY VOLUME (PERCENT CHANGE FROM NO-BUILD)				
	TYPE	SOUTH OF SR 250	NORTH OF SR 250/ SR 56	SOUTH OF US 50	TOTAL
No-Build	All Vehicles	26,500 (N/A)	23,000 (N/A)	31,100 (N/A)	80,600 (N/A)
	Trucks	3,300 (N/A)	3,200 (N/A)	3,300 (N/A)	9,800 (N/A)
Alternative A	All Vehicles	27,900 (5%)	24,600 (7%)	33,000 (6%)	85,500 (6%)
	Trucks	3,600 (9%)	3,500 (9%)	3,600 (9%)	10,700 (9%)
Alternative B	All Vehicles	27,700 (5%)	24,100 (5%)	32,200 (4%)	84,000 (4%)
	Trucks	3,500 (6%)	3,400 (6%)	3,500 (6%)	10,400 (6%)
Alternative C	All Vehicles	28,100 (6%)	24,100 (5%)	32,000 (3%)	84,200 (4%)
	Trucks	3,500 (6%)	3,400 (6%)	3,500 (6%)	10,400 (6%)
Alternative D	All Vehicles	28,400 (7%)	24,100 (5%)	32,000 (3%)	84,500 (5%)
	Trucks	3,600 (9%)	3,400 (6%)	3,600 (9%)	10,600 (8%)
Alternative E	All Vehicles	27,000 (2%)	23,000 (0%)	30,900 (-1%)	80,900 (0%)
	Trucks	3,400 (3%)	3,200 (0%)	3,300 (0%)	9,900 (1%)
Alternative F	All Vehicles	25,200 (-5%)	22,900 (0%)	30,800 (-1%)	78,900 (-2%)
	Trucks	3,200 (-3%)	3,100 (-3%)	3,300 (0%)	9,600 (-2%)
Alternative G	All Vehicles	27,100 (2%)	23,100 (0%)	31,300 (1%)	81,500 (1%)
	Trucks	3,400 (3%)	3,200 (0%)	3,400 (3%)	10,000 (2%)
Alternative H	All Vehicles	28,700 (8%)	24,800 (8%)	32,800 (5%)	86,300 (7%)
	Trucks	3,700 (12%)	3,500 (9%)	3,600 (9%)	10,800 (10%)
Alternative I	All Vehicles	28,200 (6%)	24,100 (5%)	32,200 (4%)	84,500 (5%)
	Trucks	3,600 (9%)	3,400 (6%)	3,500 (6%)	10,500 (7%)
Alternative J	All Vehicles	28,100 (6%)	24,000 (4%)	32,000 (3%)	84,100 (4%)
	Trucks	3,500 (6%)	3,300 (3%)	3,500 (6%)	10,300 (5%)

3.4 TRAFFIC SAFETY

The purpose and need for the Link 101 project included an analysis of recent crash data in the project area to determine the Index of Crash Frequency (ICF) and Index of Crash Cost (ICC) for roadway segments and intersections within the project area. The ICF is a measure of the number of crashes while the ICC is measure of the severity of the crashes based on the cost of the crashes. This method compares observed crash rates and costs to expected crash rates and costs based on roadway type and traffic volumes. An ICF and ICC of 0 and below indicates the number of crashes and costs are as expected or better than expected for that particular roadway or intersection. An ICF and ICC above 0 indicates the number of crashes and costs are above what is expected for that particular roadway or intersection, which indicates an elevated crash or cost location. The higher the number above or below 0 represents the degree to which the number of crashes and costs deviate from what is expected. For this analysis, only roadways that were classified as minor collectors or higher were evaluated. The results of the ICF and ICC analysis are shown in Figure 3-3 and Figure 3-4, respectively.

Key findings from these figures, and as documented in the purpose and need for the Link 101 project, include:

- Forty-four percent of the roadways and intersections within the project area have an ICF greater than 0 and are considered elevated crash locations.
- Thirty-five percent and 56 percent of the roadways and intersections, respectively, along the existing fastest and shortest route have an ICF greater than 0 and are considered elevated crash locations.
- The majority of the elevated crash locations, noted above, are located in the northern half of the project area.
- The majority of the roadway segments and intersections in the project area and along the existing shortest and fastest route were not identified as elevated crash cost locations, indicating that most of the crashes are less severe.

The Link 101 Model was also used to identify the extent to which each preliminary alternative would reduce VMT on these roadway segments identified as elevated crash locations – which is a performance measure for satisfying the purpose and need for the project. For this analysis, the elevated crash locations were treated equally regardless of how high the ICF was above 0.

Figure 3-5 illustrates the change in VMT on the elevated crash locations for each preliminary alternative. Detailed tables are provided in Appendix E, including the daily VMT on the elevated crash locations for the preliminary alternatives, broken down by vehicle class, and the percent change in VMT for these locations relative to the No-Build Alternative. Based on the data shown in Figure 3-5 and associated tables, key findings include:

- All preliminary alternatives would reduce VMT on the elevated crash locations in the project area, relative to the No-Build Alternative. The reductions in VMT would range from -1.8 percent (Alternative B) to -13.3 percent (Alternative A).
- Alternatives A and H would reduce VMT on the elevated crash locations the most for both overall (all vehicles) and for autos, followed by Alternative G. All would provide more than an 8% reduction in VMT on elevated crash locations.
- Alternatives B, C, I, and J would increase truck VMT on the elevated crash locations by about 1-2%. The corresponding VMT change for autos would be among the lowest.

While a reduced exposure (VMT) on elevated crash locations would not directly guarantee reduced incidence of crashes, the reduction should be viewed favorably in terms of roadway safety.

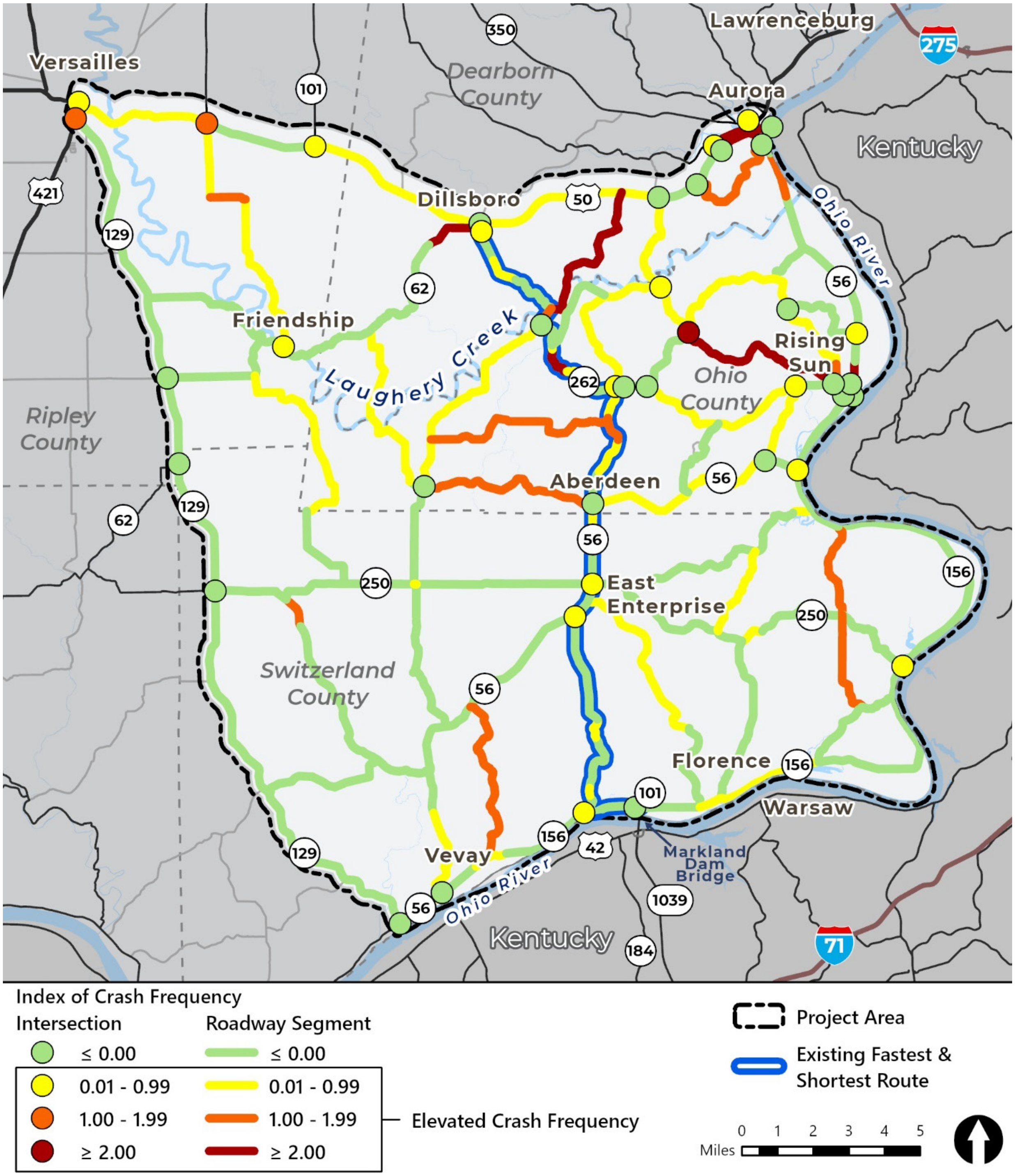


Figure 3-3. Index of Crash Frequency

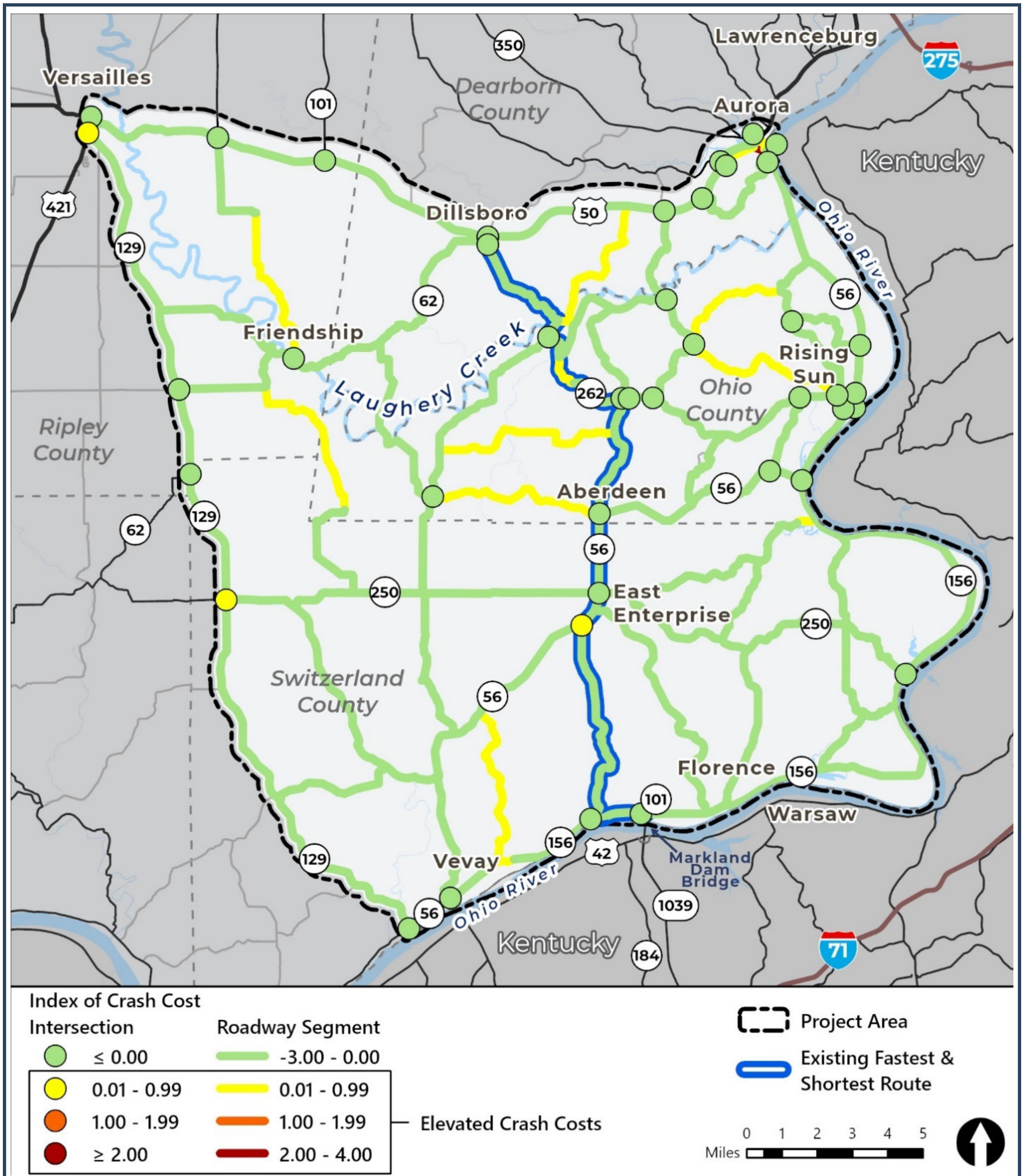


Figure 3-4. Index of Crash Severity

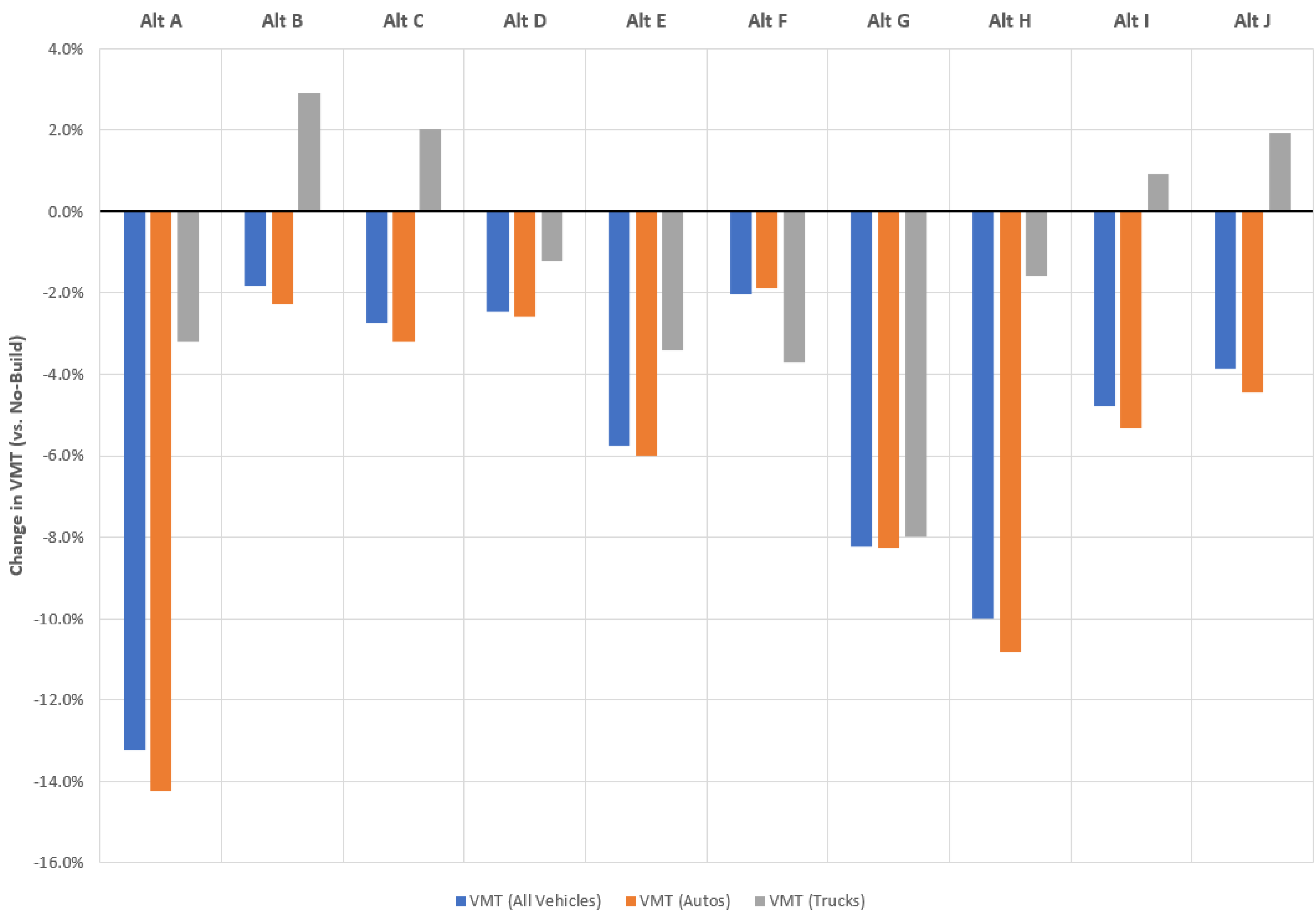


Figure 3-5. Change in 2050 Daily VMT on Roadway Segments Identified as Elevated Crash Locations in the Project Area, vs. No-Build

Note: Negative values indicate a reduction in aggregate VMT on the elevated crash segments over the No-Build Alternative.

3.5 TRAVEL TIME

The Link 101 Model was used to estimate travel times along each of the preliminary alternatives based on predicted travel speeds and areas of potential congestion.

Performance measures were established to be used in evaluating the ability of each preliminary alternative to satisfy the purpose and need of the project and included reducing travel time between SR 101 at Markland Dam Bridge and US 50. Based on this analysis of projected travel times, it was determined that each preliminary alternative would reduce travel time between SR 101 at the Markland Dam Bridge and US 50 by 4 minutes (Alternative E) to 14 minutes (Alternative D), compared to traveling along existing routes to the same locations (i.e., No-Build Alternative) (Table 3-3). As a result, all the preliminary alternatives would satisfy this purpose and need performance measure.

Table 3-3. Travel Time Savings

ALTERNATIVE	SOUTHERN TERMINUS	NORTHERN TERMINUS	2050 N0-BUILD[1] (MINUTES)	2050 BUILD (MINUTES)	DIFFERENCE (MINUTES/%)
Alternative A	Markland Dam Bridge	Aurora	37	26	-11 -30%
Alternative B	Markland Dam Bridge	1 mile east of Dillsboro	33	20	-13 -39%
Alternative C	Markland Dam Bridge	Dillsboro	32	21	-11 -34%
Alternative D	Markland Dam Bridge	SR 101, East of Versailles	38	24	-14 -37%
Alternative E	Markland Dam Bridge	SR 129, East of Versailles	42	38	-4 -10%
Alternative F	Markland Dam Bridge	SR 129, East of Versailles	42	32	-10 -24%
Alternative G	Markland Dam Bridge	Versailles	46	38	-8 -17%
Alternative H	Markland Dam Bridge	East of Dillsboro	34	21	-13 -38%
Alternative I	Markland Dam Bridge	Dillsboro	32	21	-11 -34%
Alternative J	Markland Dam Bridge	Dillsboro	32	21	-11 -34%

[1] The 2050 No-Build travel times were based on using existing routes that correspond to each preliminary alternative's northern terminus.

Recognizing that the US 50 terminus would be the final destination for relatively few drivers, the Link 101 Model was also used to estimate the travel time to a range of destinations along US 50 for each preliminary alternative. The results, shown in Table 3-4, indicate that travel times for most destinations would be improved, regardless of the alternative. For example, while Alternative B would reduce travel time between the Markland Dam Bridge and its northern terminus near

Dillsboro by 13 minutes compared to No-Build conditions, it would also reduce the travel time for drivers headed to Aurora (or points east of Aurora) by approximately 7 minutes and for drivers headed to Versailles (or points north or west of Versailles) by 11 minutes compared to the existing fastest route to those destinations.

Note the travel time savings reflected in Table 3-4 do not require a driver to use the entirety of an alternative, or any portion of an alternative, in reaching a destination. For example, if Alternative F were constructed, a driver headed to Dillsboro would be expected to only use a small portion of the alignment of Alternative F, likely only as far as Markland Pike where they would turn northward and use existing roadways to Dillsboro; as a result, their travel time savings would be minimal at approximately 1 minute. For another example, with Alternative B, drivers would use the new route to connect to US 50 near Dillsboro and then use US 50 to reach Versailles, saving 11 minutes compared to taking SR 156/SR 56/SR 129, the existing fastest route.

Table 3-5 combines the travel time data with travel pattern data from the Link 101 Model to calculate a weighted travel time savings for each alternative compared to 2050 No-Build conditions. The Link 101 Model was used to identify the percentage of full-length trips (i.e., vehicles traveling north across the Markland Dam Bridge to each of the identified destinations along US 50 and beyond) based on the shortest travel path. Trips crossing the Markland Dam Bridge that would terminate within the project area or leave the project area to the west without passing through one of the US 50 destinations were not counted. Each US 50 destination represents trips that either end at/near that location or pass through it destined elsewhere. Each destination beyond US 50 was allocated to one of the seven US 50 destinations (i.e., trips were not double counted). The allocation was determined according to which US 50 destination would offer the shortest travel time. Maps provided in Appendix F show the routes allocated to each US 50 destination.

Based on the data in Table 3-4 and Table 3-5, key findings include:

- Overall, travel times for most destinations would be improved, regardless of the alternative.
- Alternatives that would connect in the central portion of US 50 (from SR 101 to Cole Lane) would have the highest weighted average travel time savings (10-13 minutes). This includes Alternatives B, C, D, H, I, and J.
- Alternatives that would connect at the western end of US 50 (Versailles or SR 129) would have the lowest weighted average travel time savings. This includes Alternatives E, F, and G. The travel time savings for Alternatives E and G would be limited to only Versailles and SR 129. For all other destinations, vehicles would arrive faster using the existing roadway network. Alternative F would provide minimal travel time savings (1-2 minutes) to destinations east of SR 101.
- Trips destined to Aurora would be fastest for the two eastern-most alternatives (Alternatives A and H). The most western alternatives (Alternatives E, F, and G) would provide very little or no benefit for drivers destined for Aurora since they would be using existing roads for all or almost all of the trip.

- Alternatives that would connect to US 50 in Dillsboro or farther east would provide a minimum of 6 minutes of travel time savings to all destinations. Even Alternative A, the eastern-most preliminary alternative, would reduce travel time to Versailles by 6 minutes.
- All trips destined for Versailles would be faster, regardless of the alternative. The greatest reduction in travel time to Versailles would be provided by Alternatives B, C, D, F, I, and J (11-14 minutes). For Alternatives B, C, D, I, and J, this is because these would provide a very direct route north from the Markland Dam Bridge to US 50, which would provide a high-speed connection to Versailles. For Alternative F, the bypass of Vevay would shorten the trip to Versailles by approximately 5 miles and would also avoid the incorporated area of Vevay where speed limits are lower.
- For full-length trips traveling along most alternatives, the most common destinations along US 50 are Aurora, SR 101, and SR 129. These three destinations account for 79% or more of the full-length trips among these seven US 50 destinations for each alternative, with all but Alternatives D, E, and G accounting for 93% or more.

Table 3-4. Summary of Travel Times to US 50 Destinations

ALTERNATIVE	FROM MARKLAND DAM BRIDGE TO:													
	VERSAILLES		SR 129, EAST OF VERSAILLES		SR 101		DILLSBORO		1 MILE EAST OF DILLSBORO		COLE LANE		AURORA	
	TIME (MIN)	DISTANCE (MILES)	TIME (MIN)	DISTANCE (MILES)	TIME (MIN)	DISTANCE (MILES)	TIME (MIN)	DISTANCE (MILES)	TIME (MIN)	DISTANCE (MILES)	TIME (MIN)	DISTANCE (MILES)	TIME (MIN)	DISTANCE (MILES)
2019 Existing	46	35	41	31	38	28	32	23	34	24	34	23	37	26
2050 No-Build	46	35	42	31	38	28	32	23	33	24	34	23	37	26
2050 Alternative A	40	34	35	30	32	27	26	22	27	23	25	20	**26**	**24**
2050 Alternative B	35	31	30	27	27	24	21	19	**20**	**18**	24	22	30	26
2050 Alternative C	35	31	30	27	27	24	**21**	**19**	22	20	25	21	31	25
2050 Alternative D	32	29	27	25	**24**	**22**	25	21	27	22	29	21	34	25
2050 Alternative E	40	35	**38**	**34**	38	28	32	23	33	24	34	23	37	26
2050 Alternative F	34	30	**32**	**29**	35	32	31	22	32	23	32	22	37	26
2050 Alternative G	**38**	**35**	41	31	38	28	32	23	33	24	34	23	37	26
2050 Alternative H	39	33	34	29	31	26	25	21	25	23	**21**	**19**	26	23
2050 Alternative I	35	31	30	27	27	24	**21**	**19**	22	20	26	21	31	25
2050 Alternative J	34	31	30	27	26	24	**21**	**19**	22	20	26	22	31	26

Note: Values in bold indicate each preliminary alternative's terminus at US 50.

Table 3-5. Summary of Weighted Average Travel Time Savings to US 50 Destinations

ALTERNATIVE	PERCENT OF TRIPS AND TRAVEL TIME SAVINGS (IN MINUTES) COMPARED TO 2050 NO-BUILD CONDITIONS FROM MARKLAND DAM BRIDGE TO:														WEIGHTED AVERAGE TRAVEL TIME SAVINGS[1]
	VERSAILLES		SR 129, EAST OF VERSAILLES		SR 101		DILLSBORO		1 MILE EAST OF DILLSBORO		COLE LANE		AURORA		
	% OF TRIPS	TIME SAVINGS	% OF TRIPS	TIME SAVINGS	% OF TRIPS	TIME SAVINGS	% OF TRIPS	TIME SAVINGS	% OF TRIPS	TIME SAVINGS	% OF TRIPS	TIME SAVINGS	% OF TRIPS	TIME SAVINGS	
Alternative A	0%	-6	10%	-7	5%	-6	1%	-6	0%	-6	3%	-9	80%	**-11**	-9
Alternative B	0%	-11	20%	-12	50%	-11	2%	-11	4%	**-13**	0%	-10	24%	-7	-11
Alternative C	0%	-11	21%	-12	51%	-11	2%	**-11**	1%	-11	4%	-9	21%	-6	-10
Alternative D	20%	-14	17%	-15	51%	**-14**	0%	-7	0%	-6	0%	-5	11%	-3	-13
Alternative E	1%	-6	0%	**-4**	41%	0	8%	0	3%	0	2%	0	45%	0	0
Alternative F	3%	-12	73%	**-10**	1%	-3	3%	-1	1%	-1	1%	-2	18%	0	-8
Alternative G	1%	**-8**	0%	-1	41%	0	8%	0	3%	0	2%	0	45%	0	0
Alternative H	0%	-7	9%	-8	5%	-7	1%	-7	0%	-8	4%	**-13**	80%	-11	-10
Alternative I	0%	-11	22%	-12	52%	-11	2%	**-11**	4%	-11	0%	-8	19%	-6	-10
Alternative J	0%	-12	21%	-12	56%	-12	2%	**-11**	1%	-11	0%	-8	20%	-6	-10

Note: Values in bold indicate each preliminary alternative's terminus at US 50.

[1] The weighted average travel time savings is based on the percentage of full-length trips (i.e., vehicles starting at or near the Markland Dam Bridge and traveling to US 50) traveling to each of the identified destinations or beyond, based on the shortest travel path.

3.6 TRAFFIC OPERATIONS

A planning-level analysis of traffic operations is performed for the preliminary alternatives to initially assess the expected level of service (LOS) on major roadways in the project area. Roadway congestion is categorized into a LOS ranging from A (free-flow conditions) to F (heavy congestion). According to INDOT, for rural roadways, LOS A, B, and C is considered acceptable while LOS D, E, and F is unacceptable. For roads in urbanized areas, the acceptable threshold is LOS D and above. The planning-level LOS is assessed using forecast daily, two-way traffic volumes from the Link 101 Model compared to the applicable thresholds noted above. Details, including a table of the LOS thresholds and resulting figures of potential LOS-deficient locations by preliminary alternative, are provided in Appendix G.

For No-Build conditions in the project area (see Figure F-1), a few locations along US 50, one location along SR 56 south of Aurora, and one location on SR 129/US 421 in Versailles have forecast volumes that would exceed the desired LOS threshold. These exceedances would be relatively modest. The largest exceedance on a rural segment is SR 56 between Aurora and Hartford Pike, which is forecast to carry up to 9,000 vpd (compared to the threshold of 7,100 vpd). The two largest exceedances of the threshold for urban segments are on SR 129/US 421 and US 50 immediately to the west of SR 129/US 421 in downtown Versailles. The forecast volumes on these two sections are 18,100 vpd and 17,700 vpd, respectively, compared to the threshold of 13,100 vpd for an urban roadway segment. However, the model is limited in its ability to accurately forecast volumes in urbanized areas due to less roadway network detail being represented in the model, resulting in traffic being assigned (in this case) to only two available roads. Likely, some of the traffic on these roads would utilize other roads within the downtown zone, thereby lessening the traffic volume on the primary roadways. Additional analysis is needed to better understand traffic conditions in urbanized areas and determine whether the LOS is deficient.

For the locations that exceed the thresholds for the No-Build Alternative, the biggest volume change associated with any of the preliminary alternatives is the SR 56 segment between Aurora and Thuermer Hollow Road. Under Alternative A, the forecast volumes increase by 3,000 vpd over the No-Build Alternative. For all preliminary alternatives, the only new roadway that would fall below the LOS standard is the segment across Markland Dam Bridge (see Figures F-2 through F-14). All but Alternatives E and G show this segment to be potentially LOS-deficient. The exceedances at the Markland Dam Bridge would be modest; the largest exceedance is for Alternative D, which has a forecast volume of 8,400 vpd compared to the threshold of 7,100 vpd for this roadway type. Additionally, Alternative A would result in an additional 0.9 miles of SR 56 south of Aurora (between Hartford Pike and Thuermer Hollow Road) having forecast volumes that would exceed the desired LOS threshold. Alternative D would result in an additional 1.4 miles of US 50 (between the north leg of SR 129 and South County Road 525E) where the LOS threshold volume is exceeded by the forecast volume. However, the volume increases would be similarly modest as noted for No-Build conditions above.

Given the nature of the planning-level thresholds and the modest level of exceedances, these exceedances do not constitute a fatal flaw. However, for any alternatives that are carried forward in the process, these locations should be reviewed more closely and with more detailed analysis tools.

CHAPTER 4 – SUMMARY OF FINDINGS

The Link 101 model was developed to facilitate a quantitative evaluation of various traffic metrics for the preliminary alternatives. The model was calibrated to existing traffic conditions and then used to forecast travel demand in the project area for a 2050 horizon year. The findings are summarized as follows:

- All preliminary alternatives would reduce VMT on the elevated crash segments in the project area, relative to the No-Build Alternative, and this reduction should be viewed favorably in terms of roadway safety. Alternatives A and H would reduce VMT on the elevated crash segments the most both overall (all vehicles) and for autos, followed by Alternative G. All three of these preliminary alternatives would provide more than an 8% reduction in VMT on elevated crash segments.
- All preliminary alternatives would improve travel time between the Markland Dam Bridge and its terminus at US 50. These travel time savings would range from 4 to 14 minutes, with the preliminary alternatives in the central portion of the project area providing the greatest savings. Those central alternatives would improve travel times for all destinations along US 50, including Versailles, regardless of their terminus location along US 50.
- The easterly aligned preliminary alternatives would generally attract the most volume. Alternatives A, B, C, H, I, and J would have forecast volumes in the range of 4,400 to 5,700 vpd measured roughly in the middle of the corridor. The remaining preliminary alternatives would have volumes in the 2,000 to 2,600 vpd range measured at the same location. The differences in these two ranges of volumes may be due to the proximity of the more easterly alternatives to the I-71 corridor (attracting travel from this corridor) and an overall stronger travel market in the east (Aurora/Lawrenceburg area) relative to the west (Versailles area).
- The most central alternatives (Alternatives B, C, H, I, and J) would increase traffic volumes along US 50 the most – up to 2,000 vpd – whereas Alternative A and D would decrease traffic volumes along US 50 (up to 1,300 vpd and 500 vpd, respectively). Similar to other existing roadways in the project area, the most westerly alternatives (Alternatives E, F, and G) would primarily serve existing traffic between Vevey and Versailles and therefore would generally have little to no impact on volumes on US 50.
- The change in number of trips within the project area across the preliminary alternatives, relative to the No-Build Alternative, would be marginal (less than 1% change). There would be marginal increases in trip-making through the project area that would be, in part, a result of external trips finding a more attractive route on the preliminary alternatives. This would translate into a regional benefit in terms of travel time savings (reduction in VHT for most preliminary alternatives). However, the savings would be negligible (less than 0.02%) relative to the magnitude of travel in the region.
- The potential for congestion on the roadway network resulting from the forecast volumes on any of the preliminary alternatives or other nearby corridors would be minimal. The planning-level screening analysis identified a handful of roadway segments,

primarily on US 50, that would potentially require further evaluation. However, the forecast volumes across all the preliminary alternatives would not be that different at these locations to suggest that one preliminary alternative would be more likely to produce congestion than any of the others.

The purpose of the analysis presented in this report is to inform the evaluation of the preliminary alternatives and, to the extent possible, aid in the identification of the alternative(s) that would be recommended to be carried forward for further design development and more detailed analysis. During that detailed analysis, some of the analyses presented in this report may be revisited. In addition, as additional design detail becomes available, additional traffic analyses, such as the projected LOS at specific locations in the project area, will be completed.

APPENDIX A. DAILY TWO-WAY TRAFFIC VOLUMES

Figure A-1. Daily Two-Way Traffic Volumes – No-Build Alternative

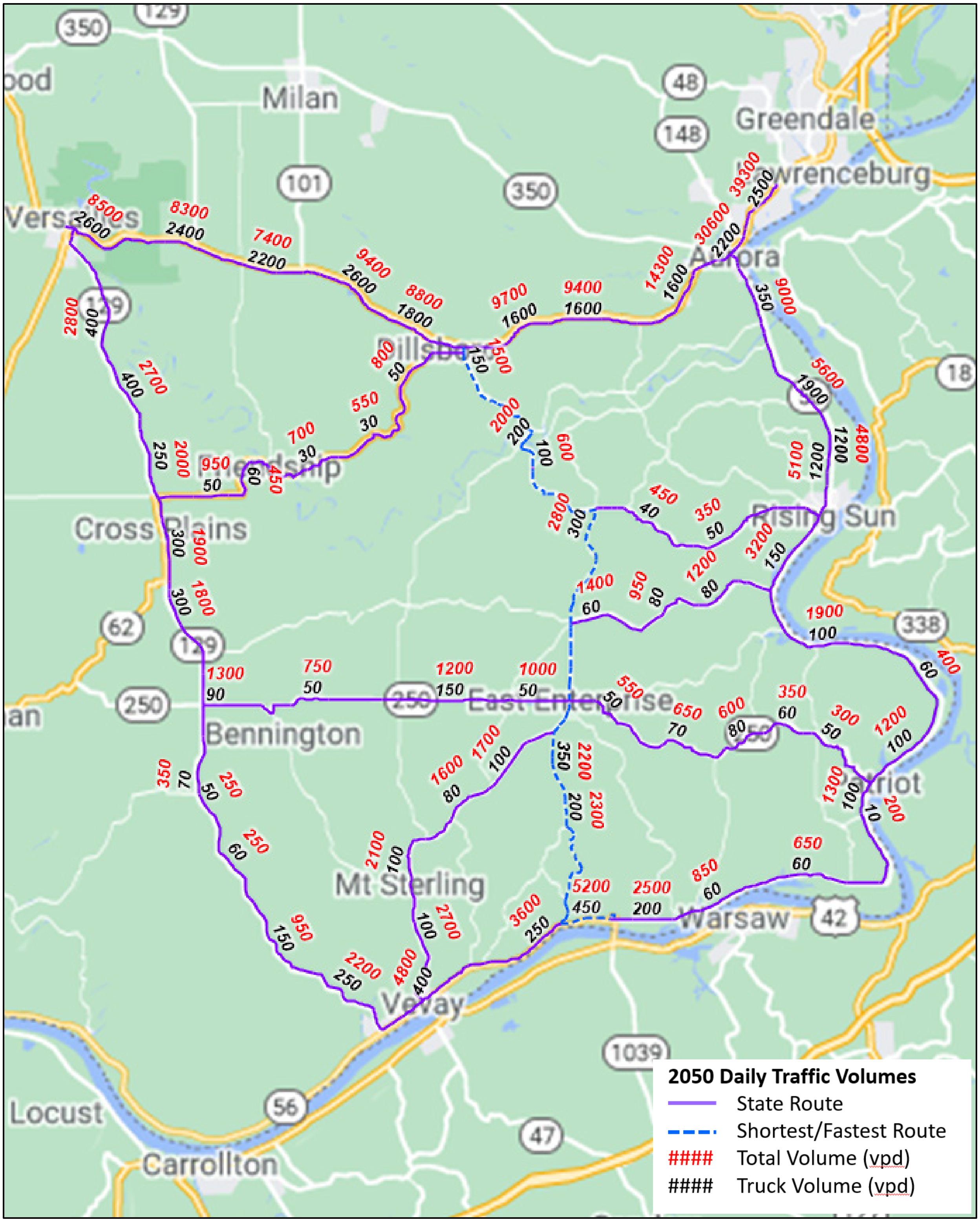


Figure A-2. Daily Two-Way Traffic Volumes – Alternative A

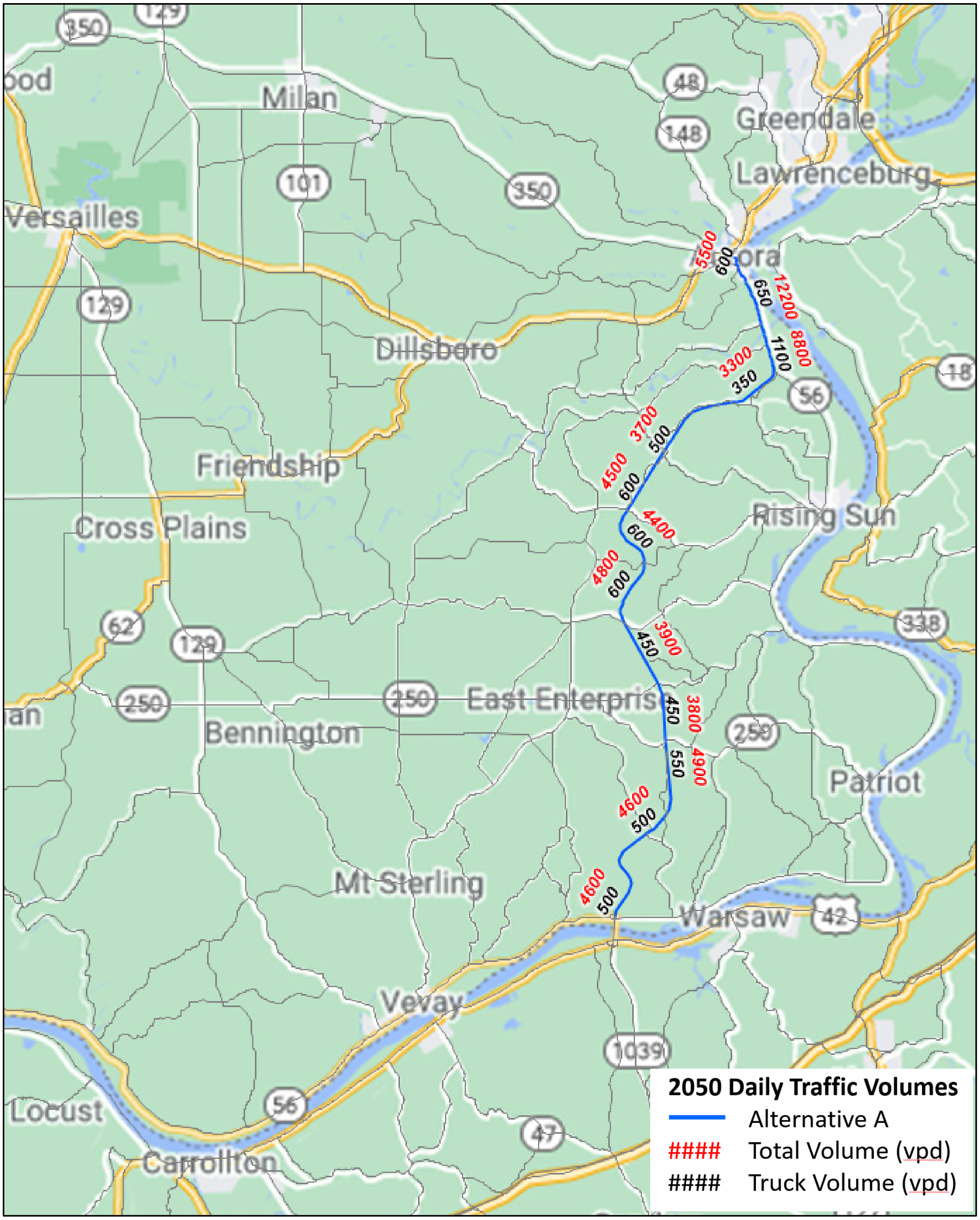


Figure A-3. Daily Two-Way Traffic Volumes – Alternative B

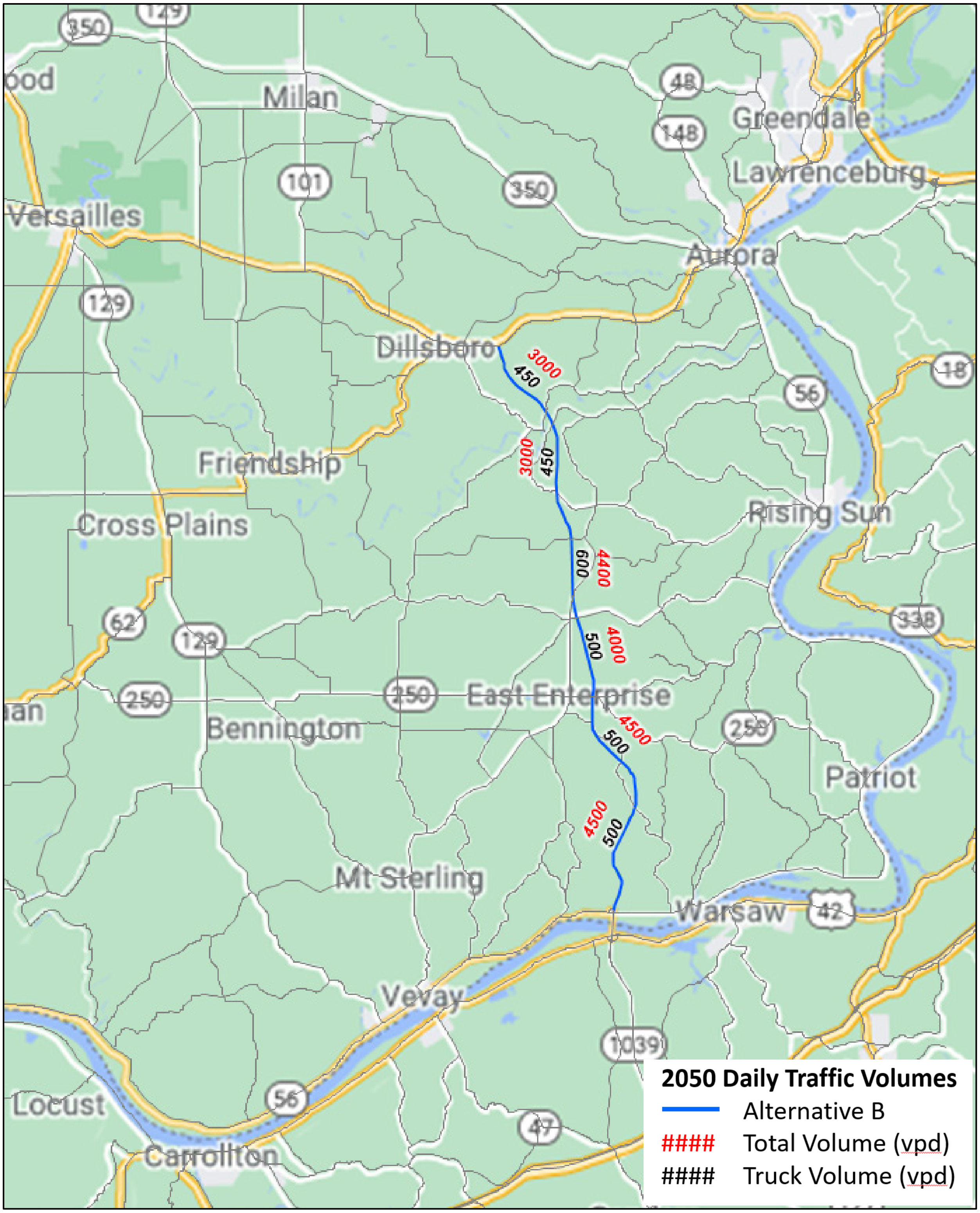


Figure A-4. Daily Two-Way Traffic Volumes – Alternative C

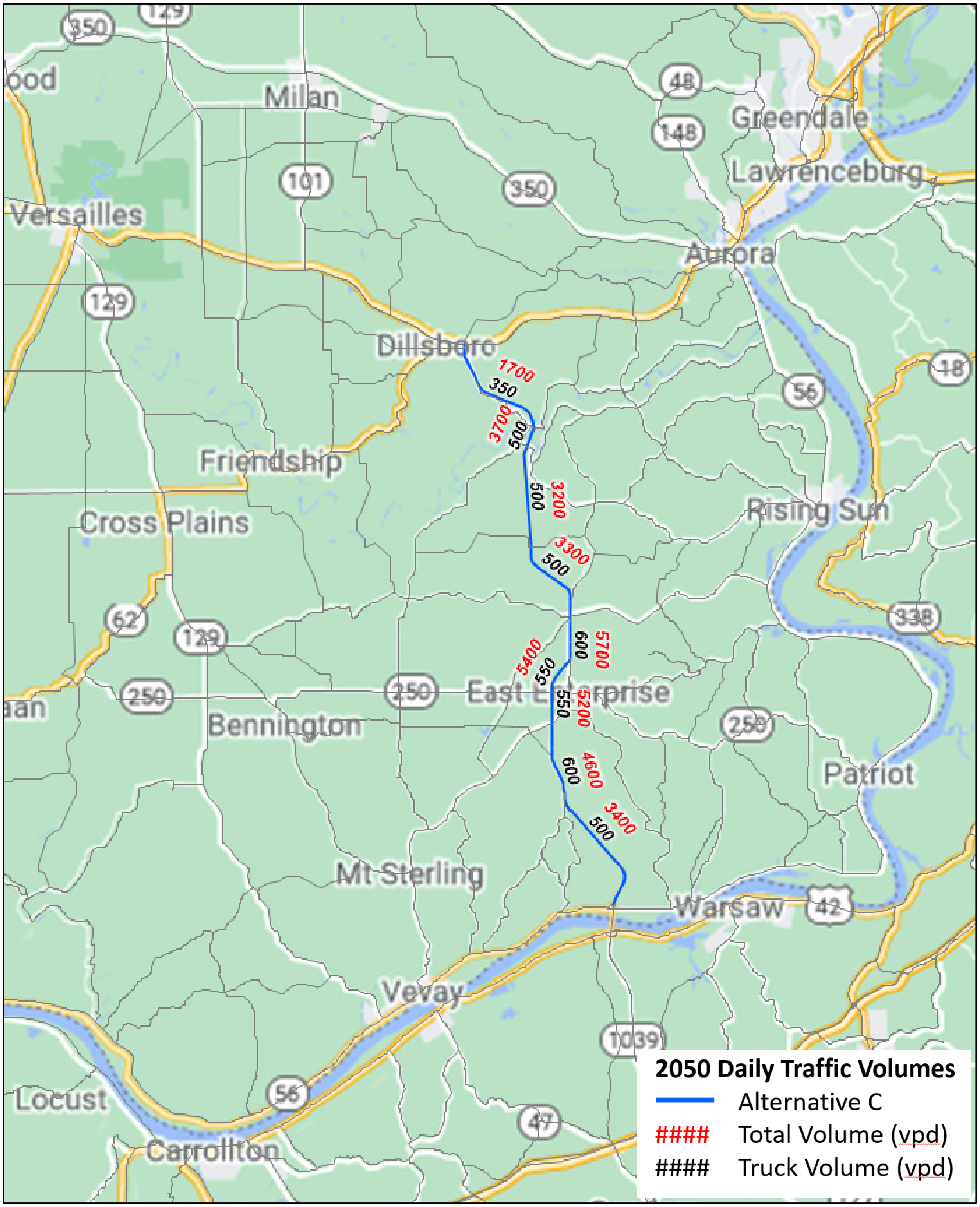


Figure A-5. Daily Two-Way Traffic Volumes – Alternative D

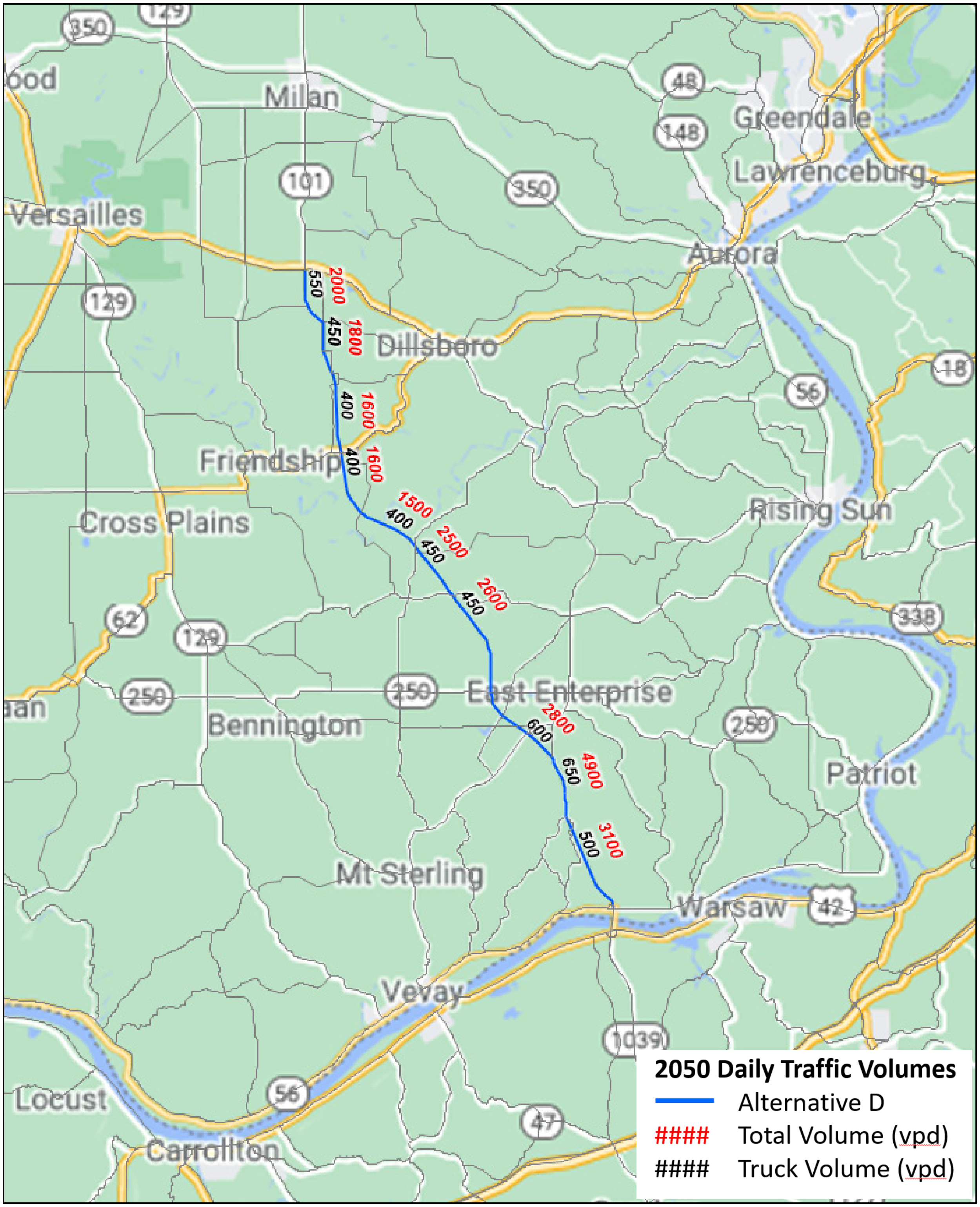


Figure A-6. Daily Two-Way Traffic Volumes – Alternative E

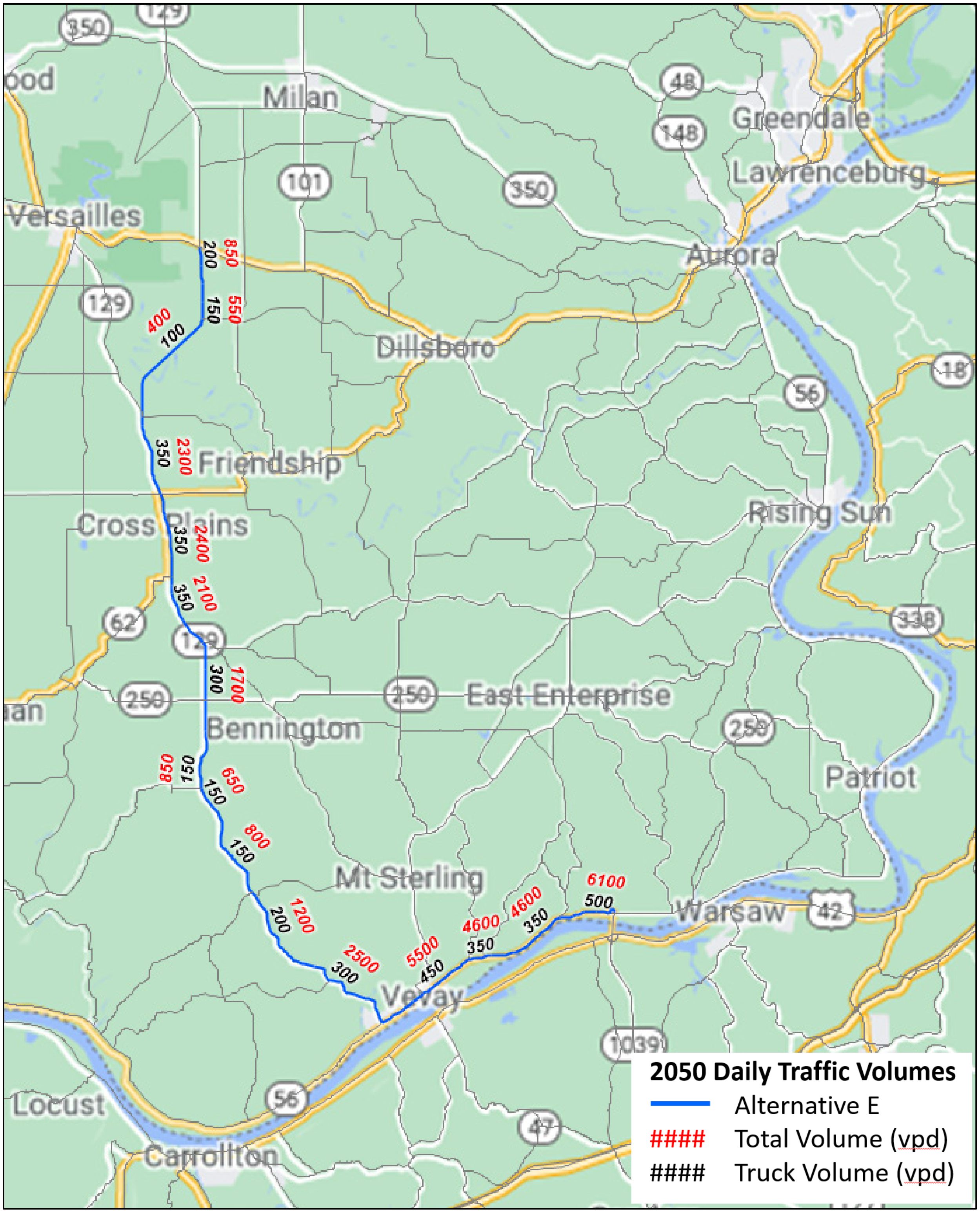


Figure A-7. Daily Two-Way Traffic Volumes – Alternative F

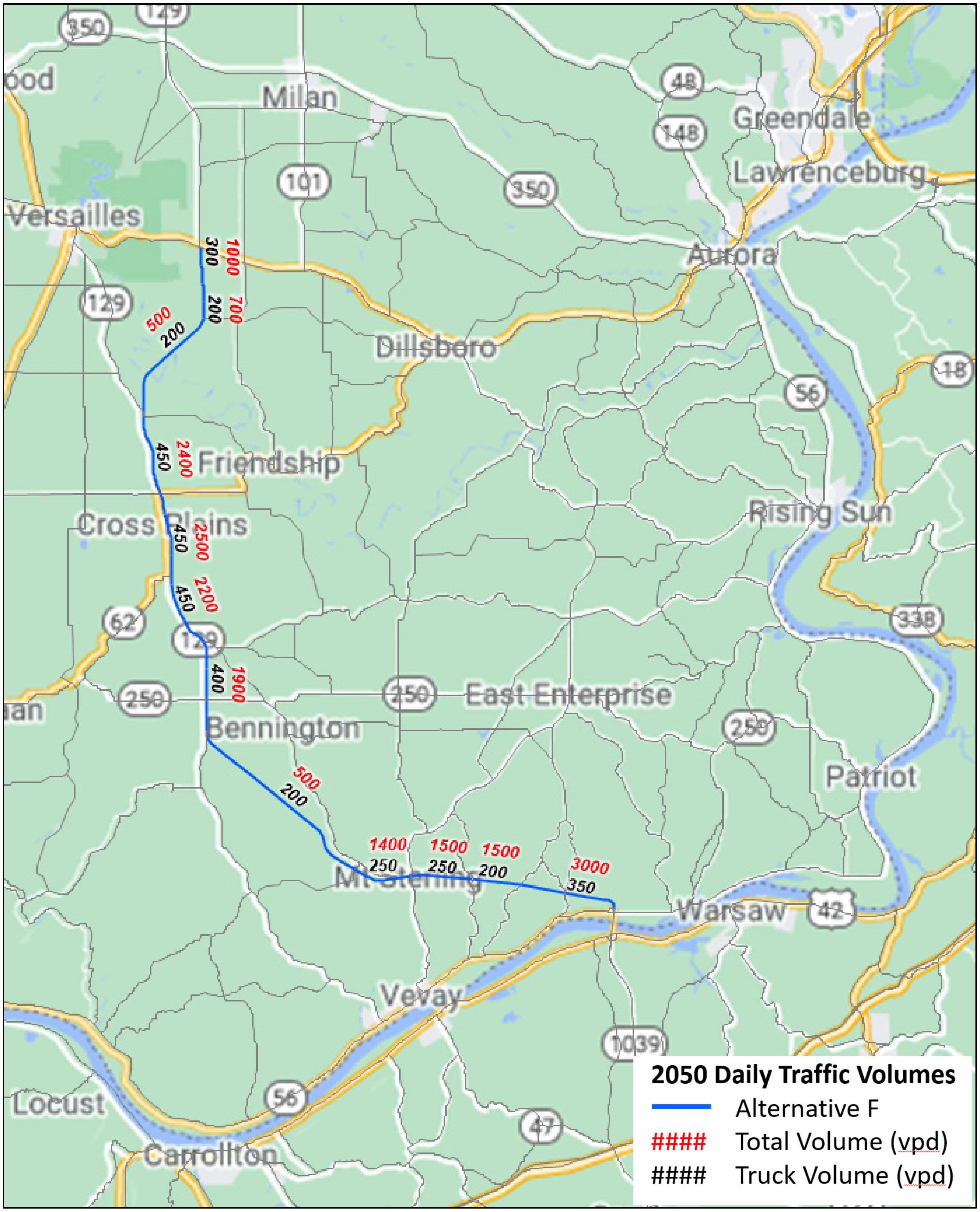


Figure A-8. Daily Two-Way Traffic Volumes – Alternative G

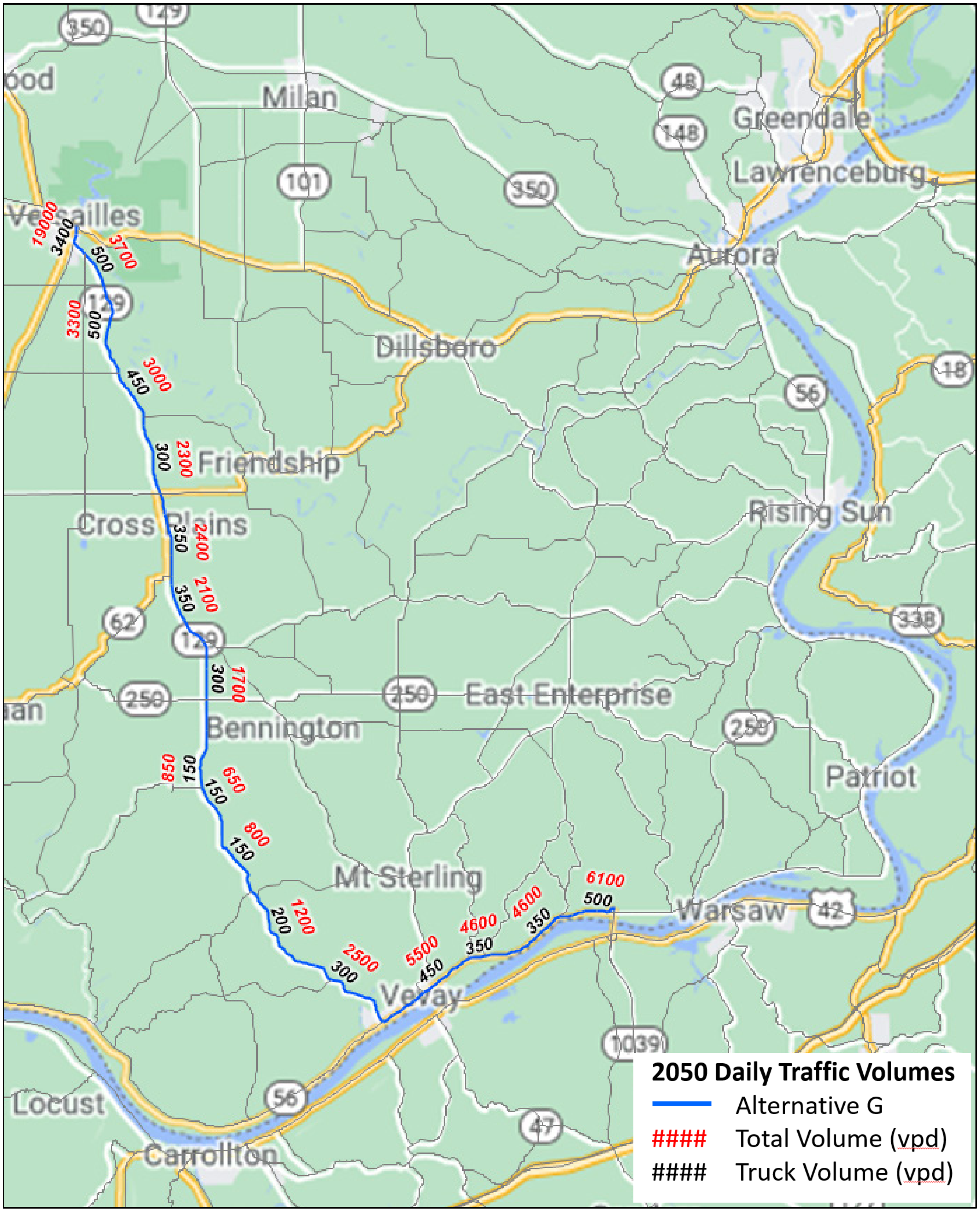


Figure A-9. Daily Two-Way Traffic Volumes – Alternative H

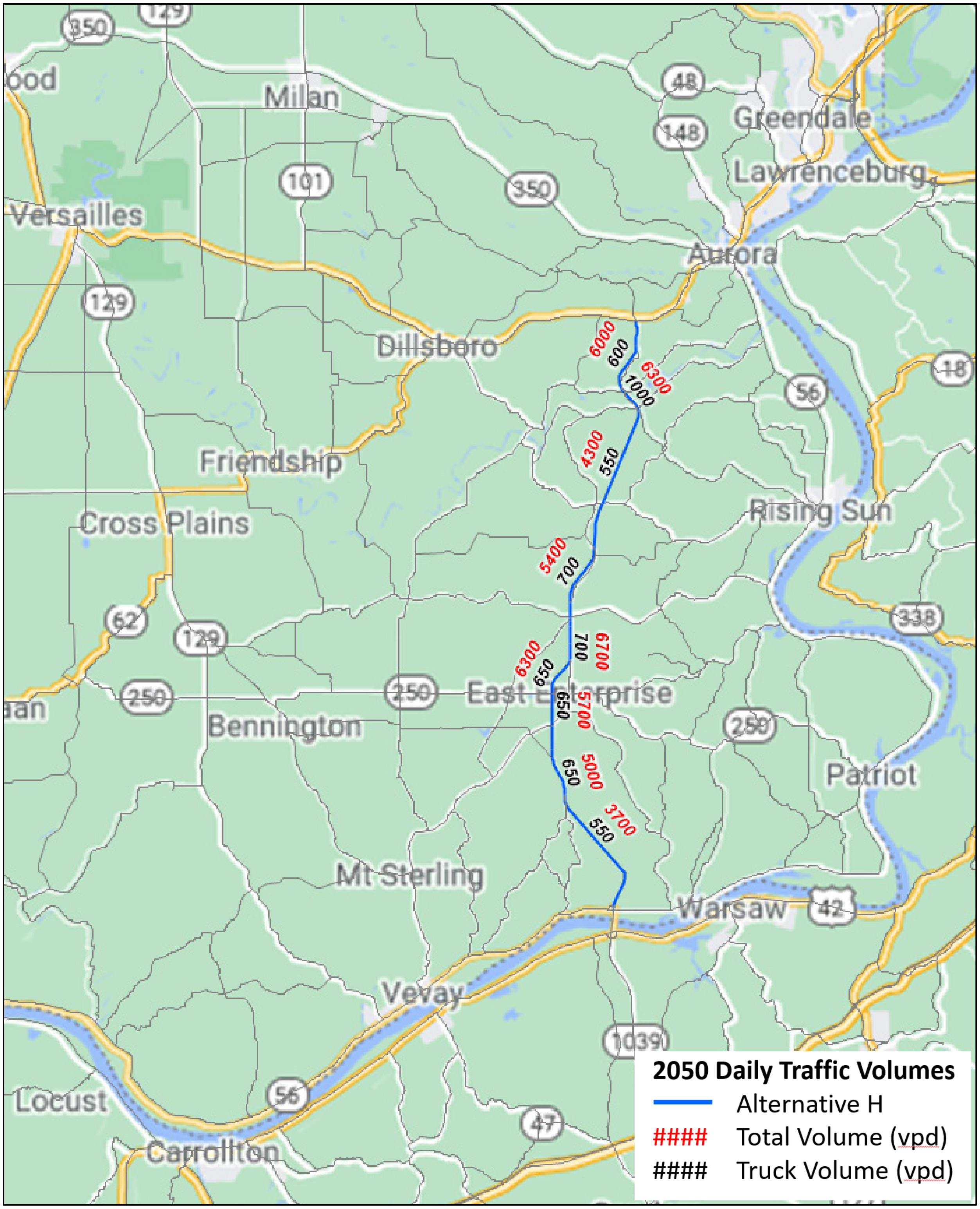


Figure A-10. Daily Two-Way Traffic Volumes – Alternative I

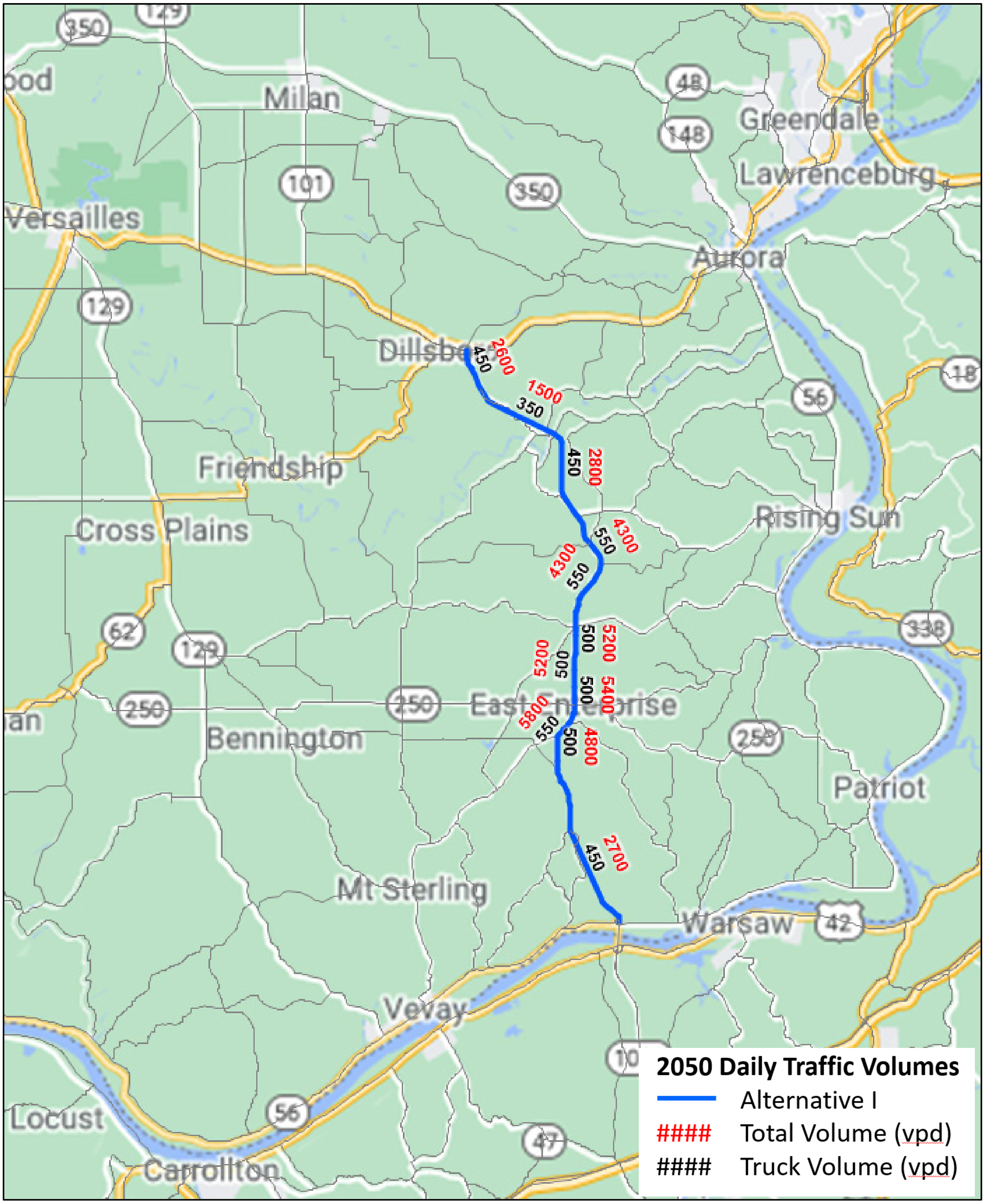


Figure A-11. Daily Two-Way Traffic Volumes – Alternative J

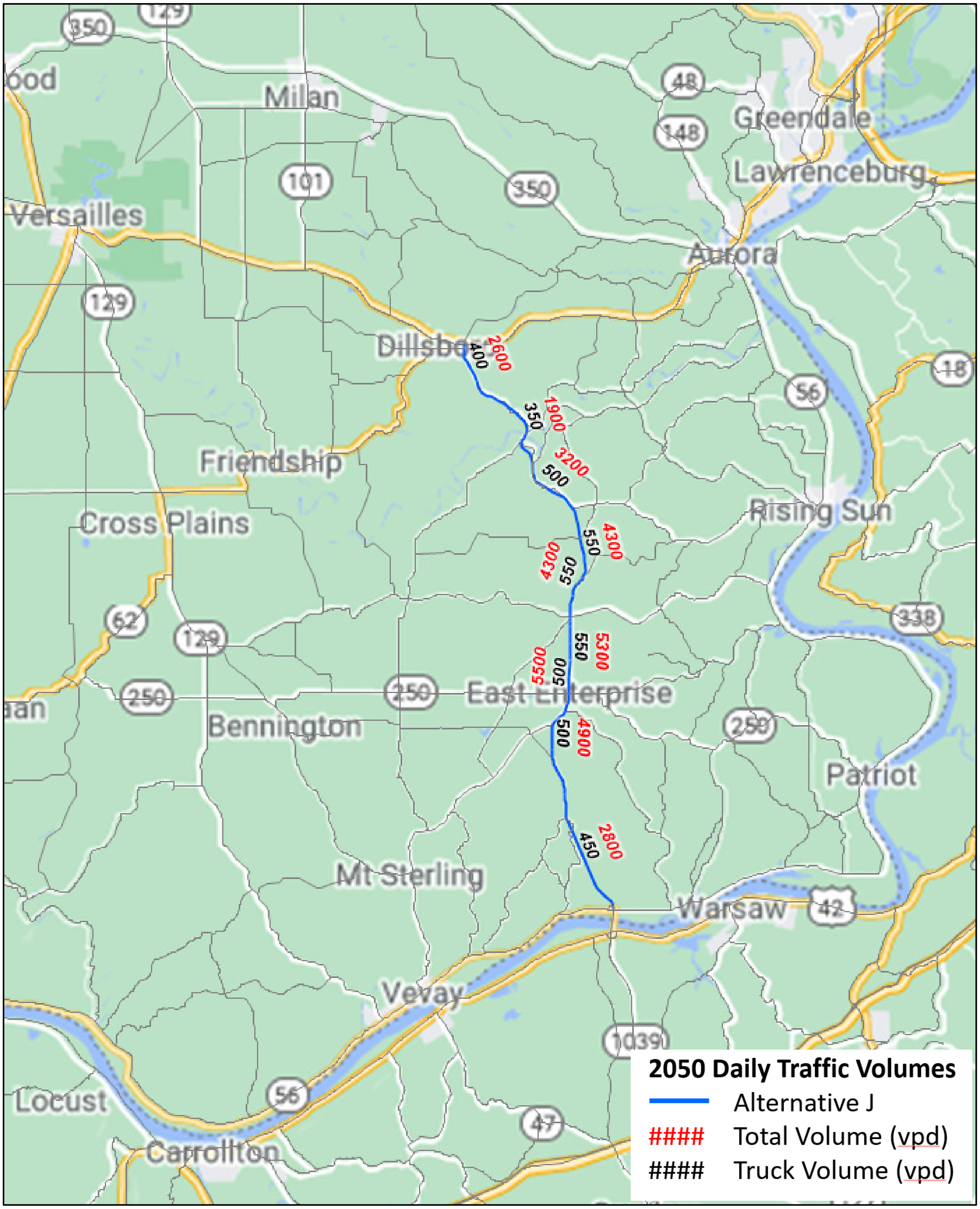


Figure A-12. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative A

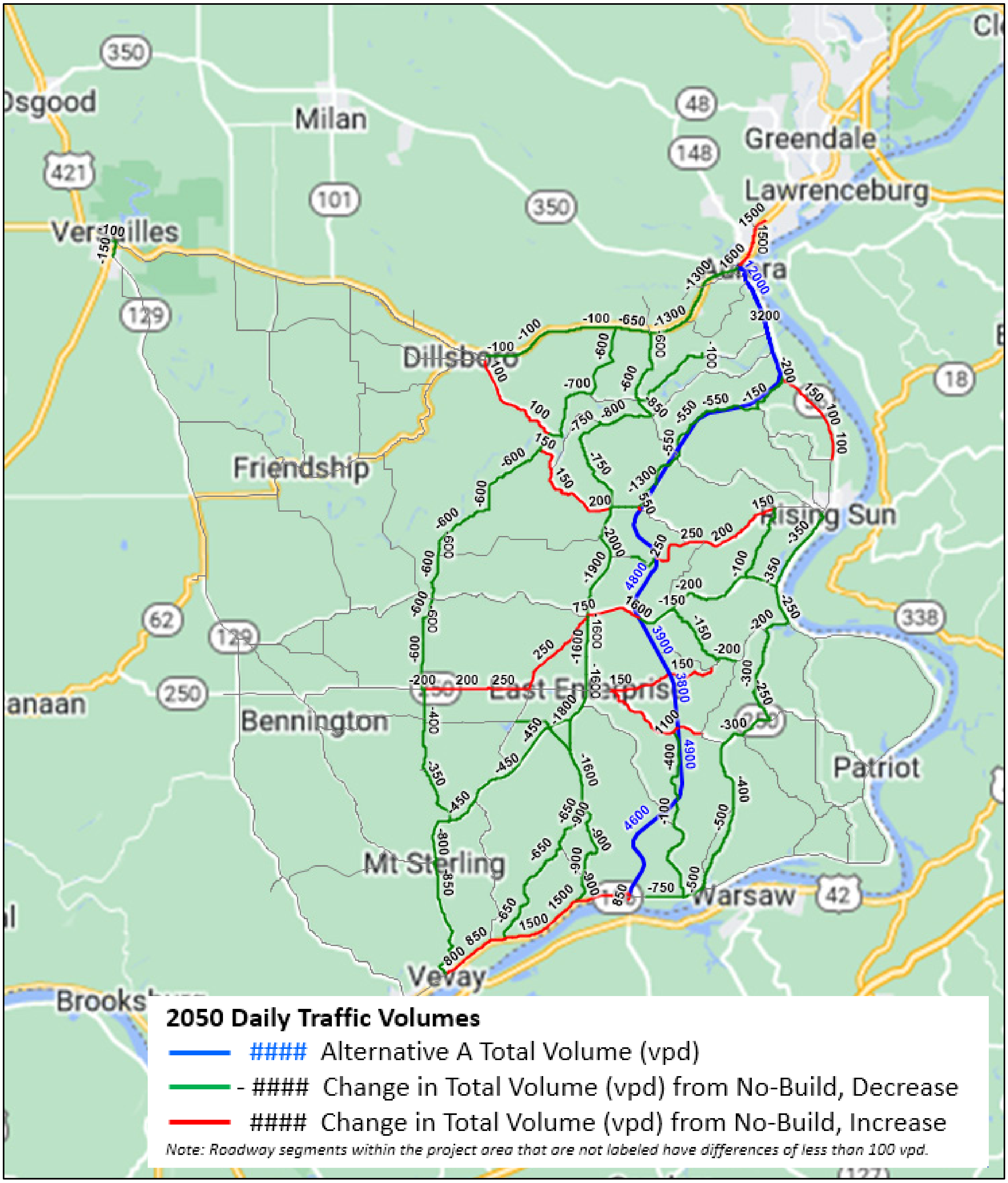


Figure A-13. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative B

Figure A-14. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative C

Figure A-15. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative D

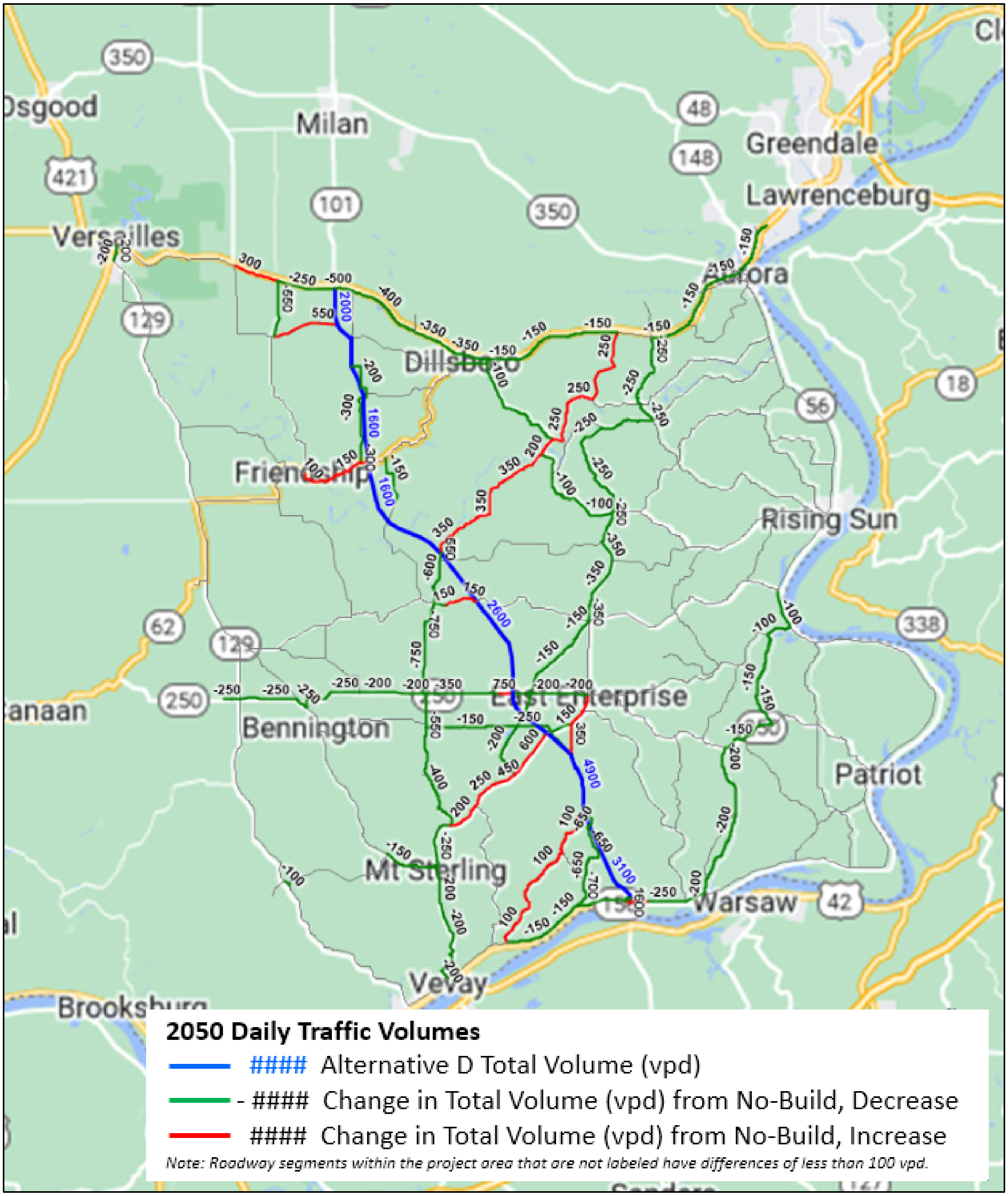


Figure A-16. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative E

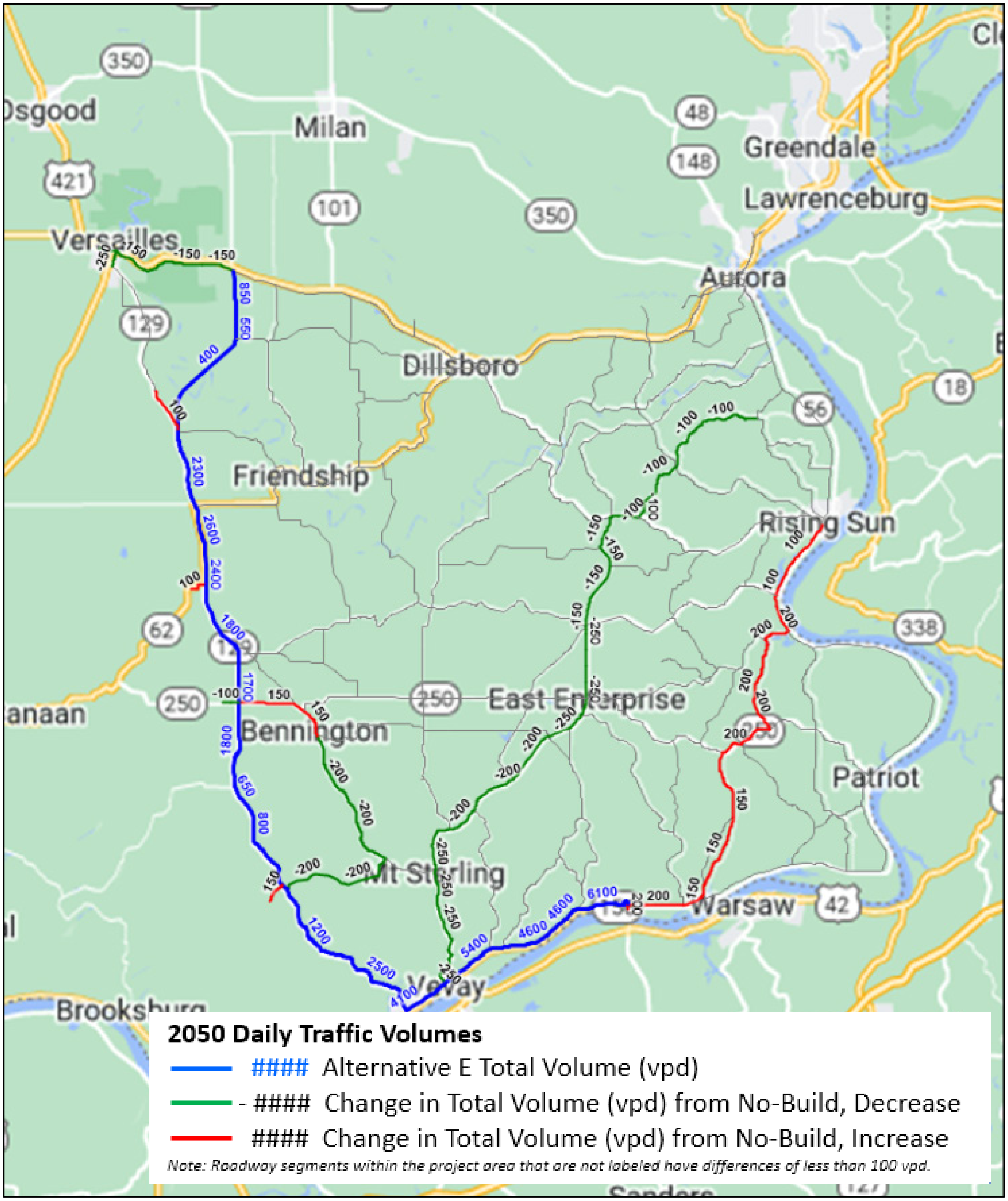


Figure A-17. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative F

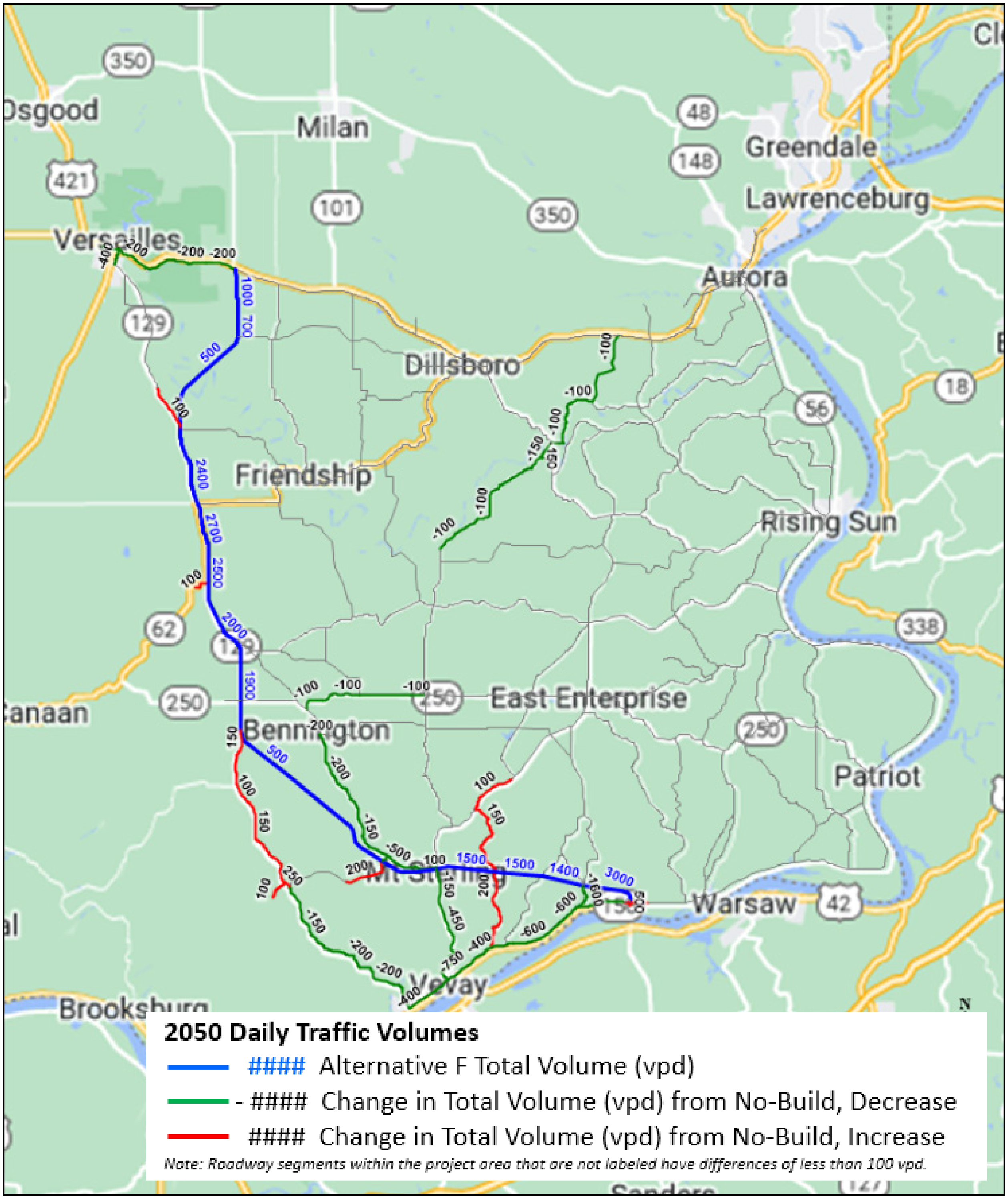


Figure A-18. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative G

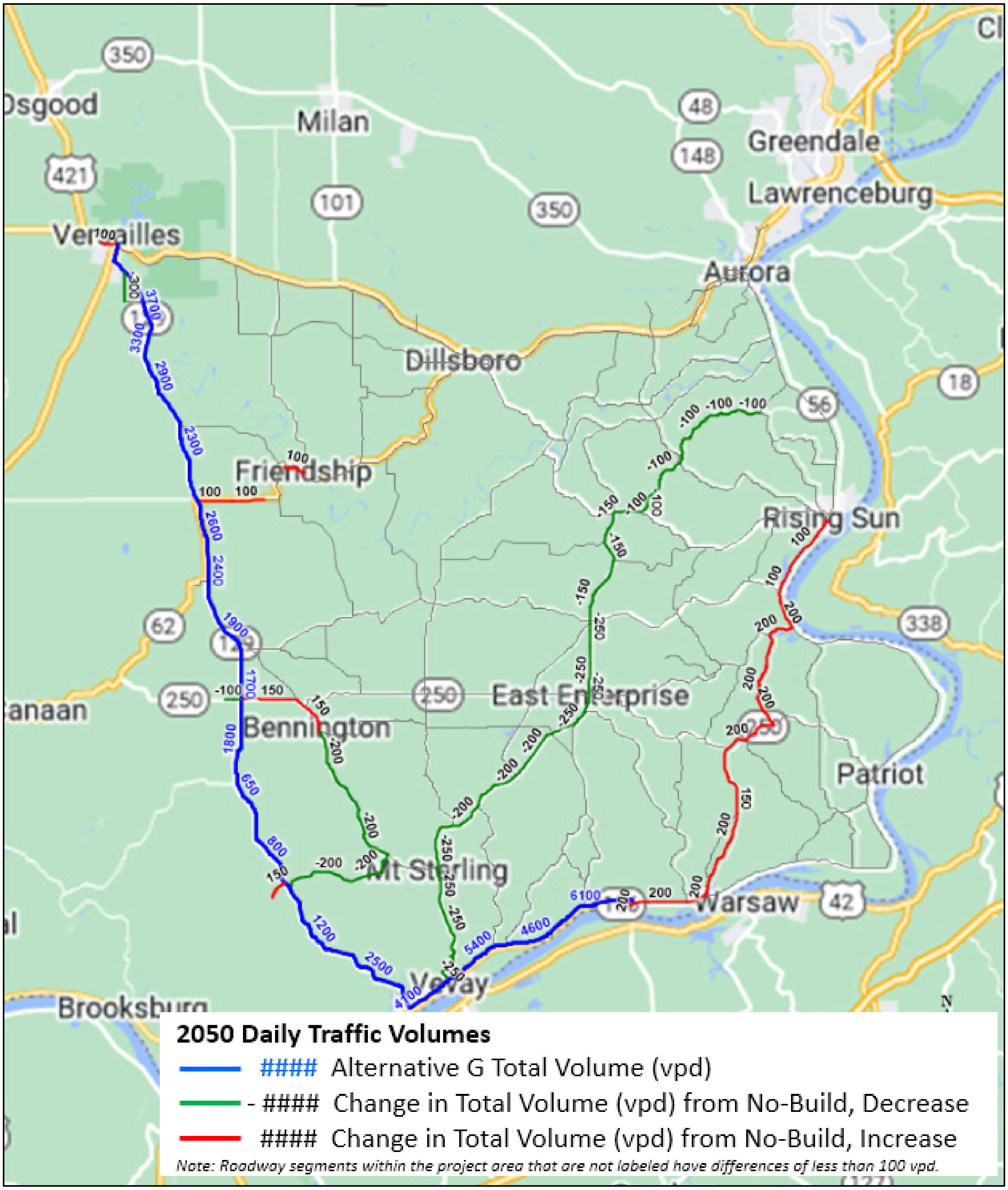


Figure A-19. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative H

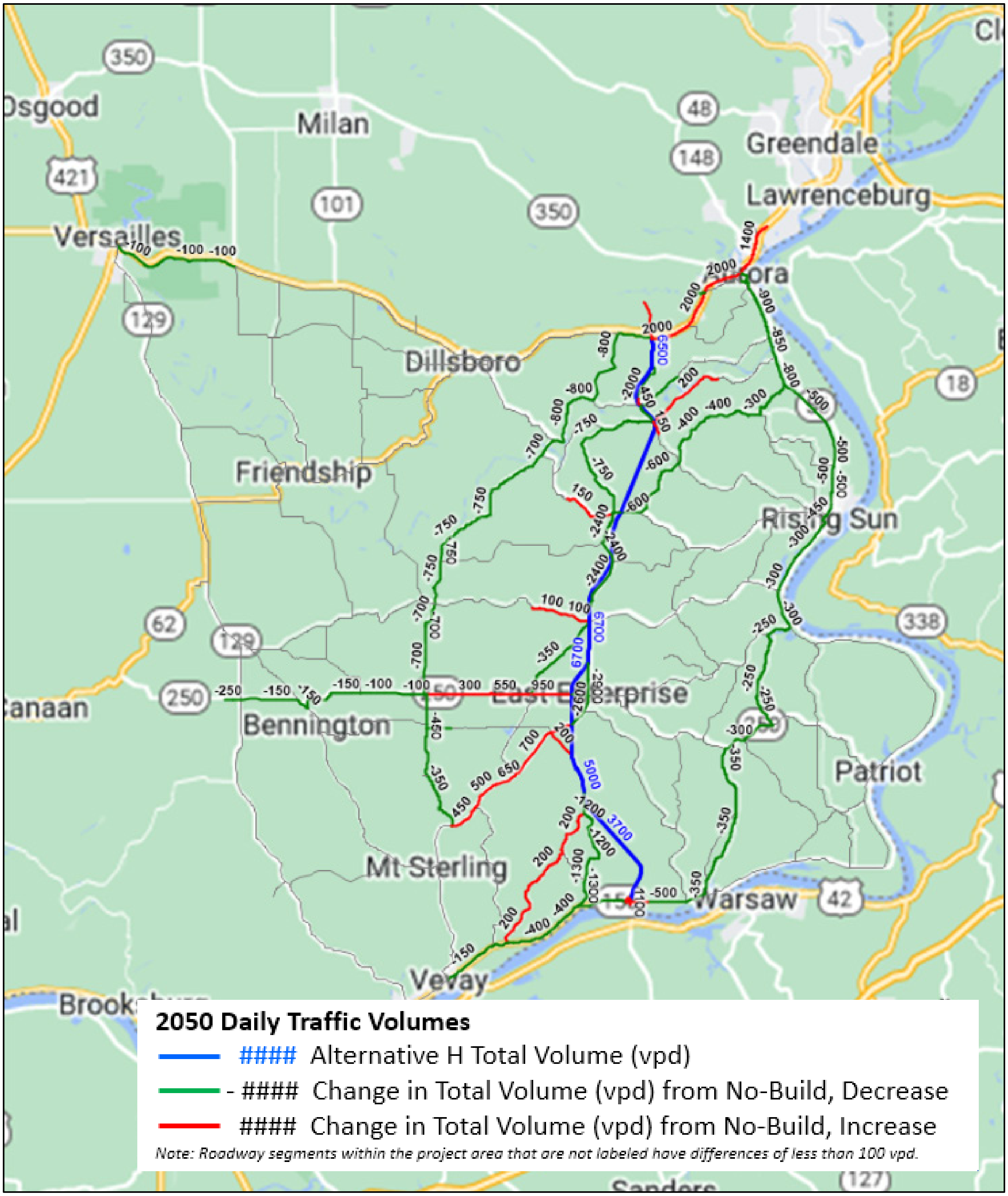
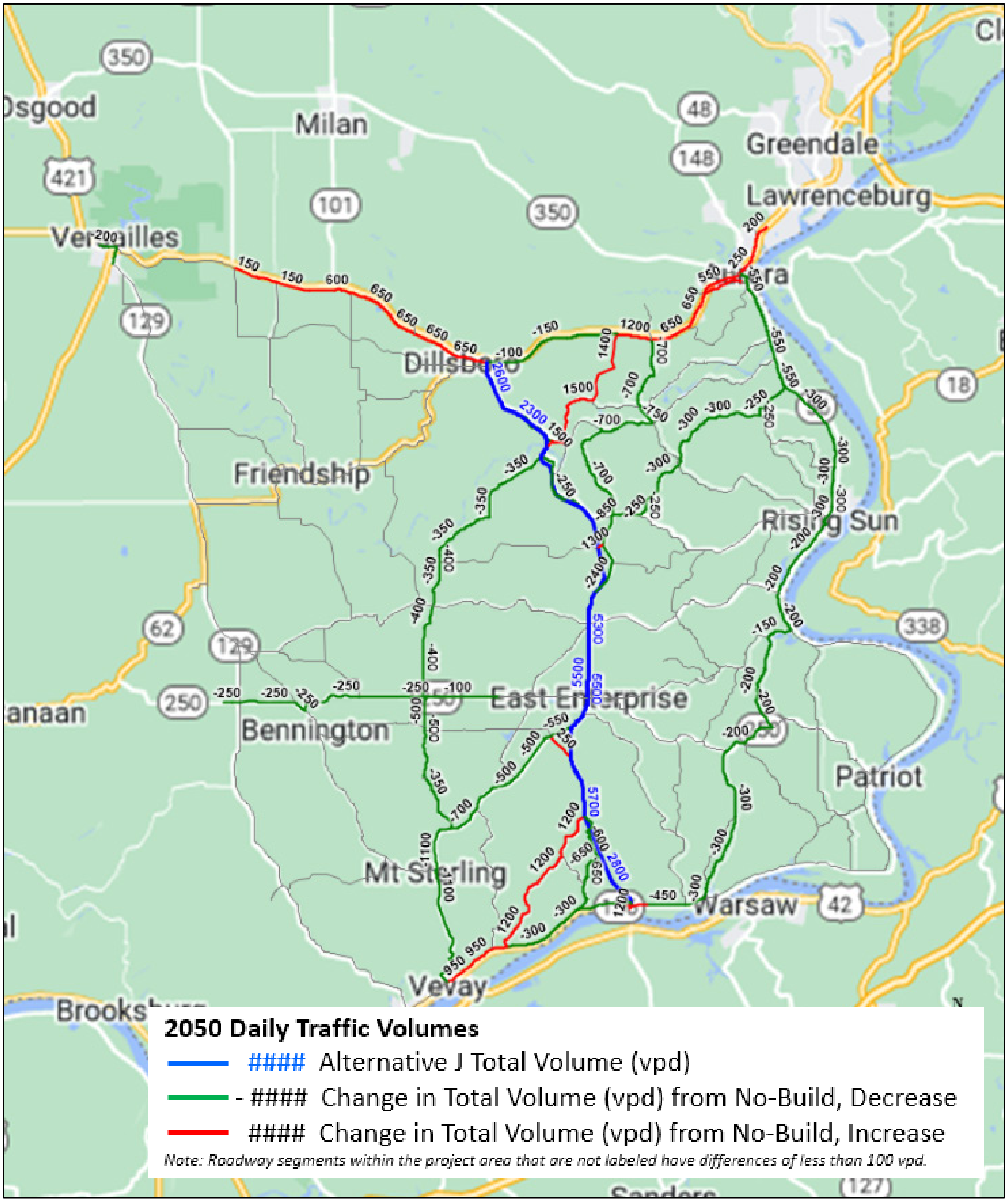


Figure A-20. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative I

Figure A-21. Project Area Roadway Volume Changes (Daily Two-Way) – Alternative J



APPENDIX B. DAILY TRIPS WITHIN AND THROUGH THE PROJECT AREA

Table B-1. 2050 Daily Trips Through the Project Area

2050 Daily Trips Through Project Area, All Vehicles											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (All Vehicles)	110,300	111,100	110,600	110,700	110,600	110,800	110,500	110,800	110,900	110,600	110,700
External-External	700	1,400	1,400	1,400	1,700	700	900	800	1,600	1,400	1,500
% External-External	0.6%	1.3%	1.3%	1.3%	1.5%	0.6%	0.8%	0.7%	1.4%	1.3%	1.4%

Table B-2. 2050 Daily Trips within Project Area

2050 Daily Trips in Project Area, All Vehicles											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (All Vehicles)	110,300	111,100	110,600	110,700	110,600	110,800	110,500	110,800	110,900	110,600	110,700
Internal-Internal	53,000	52,500	52,700	52,800	53,100	53,300	53,100	53,400	52,700	52,800	52,800
% Internal-Internal	48%	47%	48%	48%	48%	48%	48%	48%	48%	48%	48%
2050 Daily Trips in Project Area, Autos											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (Autos Only)	106,800	107,600	107,200	107,300	107,100	107,400	107,000	107,400	107,500	107,200	107,200
Internal-Internal	51,500	51,000	51,200	51,300	51,500	51,800	51,500	51,800	51,200	51,300	51,300
% Internal-Internal	48%	47%	48%	48%	48%	48%	48%	48%	48%	48%	48%
2050 Daily Trips in Project Area, Trucks											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (Trucks Only)	3,400	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Internal-Internal	1,600	1,500	1,600	1,600	1,600	1,600	1,600	1,600	1,500	1,600	1,600
% Internal-Internal	47%	43%	46%	46%	46%	46%	46%	46%	43%	46%	46%

Table B-3. Change in 2050 Daily Trips within Project Area vs. No-Build

Percent Change in 2050 Daily Trips in Project Area, vs. No-Build											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
All Vehicles	-										
Total	-	0.7%	0.3%	0.4%	0.3%	0.5%	0.2%	0.5%	0.5%	0.3%	0.4%
Internal-Internal	-	-0.9%	-0.6%	-0.4%	0.2%	0.6%	0.2%	0.8%	-0.6%	-0.4%	-0.4%
Autos Only	-										
Total	-	0.7%	0.4%	0.5%	0.3%	0.6%	0.2%	0.6%	0.7%	0.4%	0.4%
Internal-Internal	-	-1.0%	-0.6%	-0.4%	0.0%	0.6%	0.0%	0.6%	-0.6%	-0.4%	-0.4%
Trucks Only	-										
Total	-	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%
Internal-Internal	-	-6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-6.3%	0.0%	0.0%

APPENDIX C. DAILY VMT AND VHT IN THE REGION

Table C-1. 2050 Daily VMT in Region

2050 Daily VMT in Region, All Vehicles											
Project Area VMT	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (All Vehicles)	157,343,000	157,348,000	157,336,000	157,333,000	157,342,000	157,339,000	157,339,000	157,354,000	157,344,000	157,334,000	157,339,000
Total (Autos Only)	137,268,000	137,273,000	137,267,000	137,256,000	137,264,000	137,267,000	137,261,000	137,278,000	137,266,000	137,258,000	137,261,000
Total (Trucks Only)	20,074,000	20,075,000	20,069,000	20,077,000	20,078,000	20,072,000	20,078,000	20,076,000	20,078,000	20,075,000	20,078,000

Table C-2. Change in 2050 Daily VMT in Region, vs. No-Build

Percent Change in 2050 Daily VMT in Region, All Vehicles, vs. No-Build											
Project Area VMT	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (All Vehicles)	-	0.00%	0.00%	-0.01%	0.00%	0.00%	0.00%	0.01%	0.00%	-0.01%	0.00%
Total (Autos Only)	-	0.00%	0.00%	-0.01%	0.00%	0.00%	-0.01%	0.01%	0.00%	-0.01%	-0.01%
Total (Trucks Only)	-	0.00%	-0.02%	0.01%	0.02%	-0.01%	0.02%	0.01%	0.02%	0.00%	0.02%

Note: Negative values indicate a savings over the No-Build Alternative.

Table C-3. 2050 Daily VHT in Region

2050 Daily VHT in Region, All Vehicles											
Project Area VHT	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (All Vehicles)	4,807,000	4,806,000	4,806,000	4,806,000	4,806,000	4,806,000	4,807,000	4,806,000	4,806,000	4,806,000	4,806,000
Total (Autos Only)	4,320,000	4,319,000	4,319,000	4,319,000	4,319,000	4,319,000	4,319,000	4,319,000	4,319,000	4,319,000	4,319,000
Total (Trucks Only)	487,000	487,000	487,000	487,000	487,000	487,000	487,000	487,000	487,000	487,000	487,000

Table C-4. Change in 2050 Daily VHT in Region, vs. No-Build

Percent Change in 2050 Daily VHT in Region, All Vehicles, vs. No-Build											
Project Area VHT	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
Total (All Vehicles)	-	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	0.00%	-0.02%	-0.02%	-0.02%	-0.02%
Total (Autos Only)	-	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%	-0.02%
Total (Trucks Only)	-	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Note: Negative values indicate a savings over the No-Build Alternative.

APPENDIX D. SCREEN LINE EVALUATION OF FORECAST DAILY VOLUMES

Figure D-1. Screen Line Locations

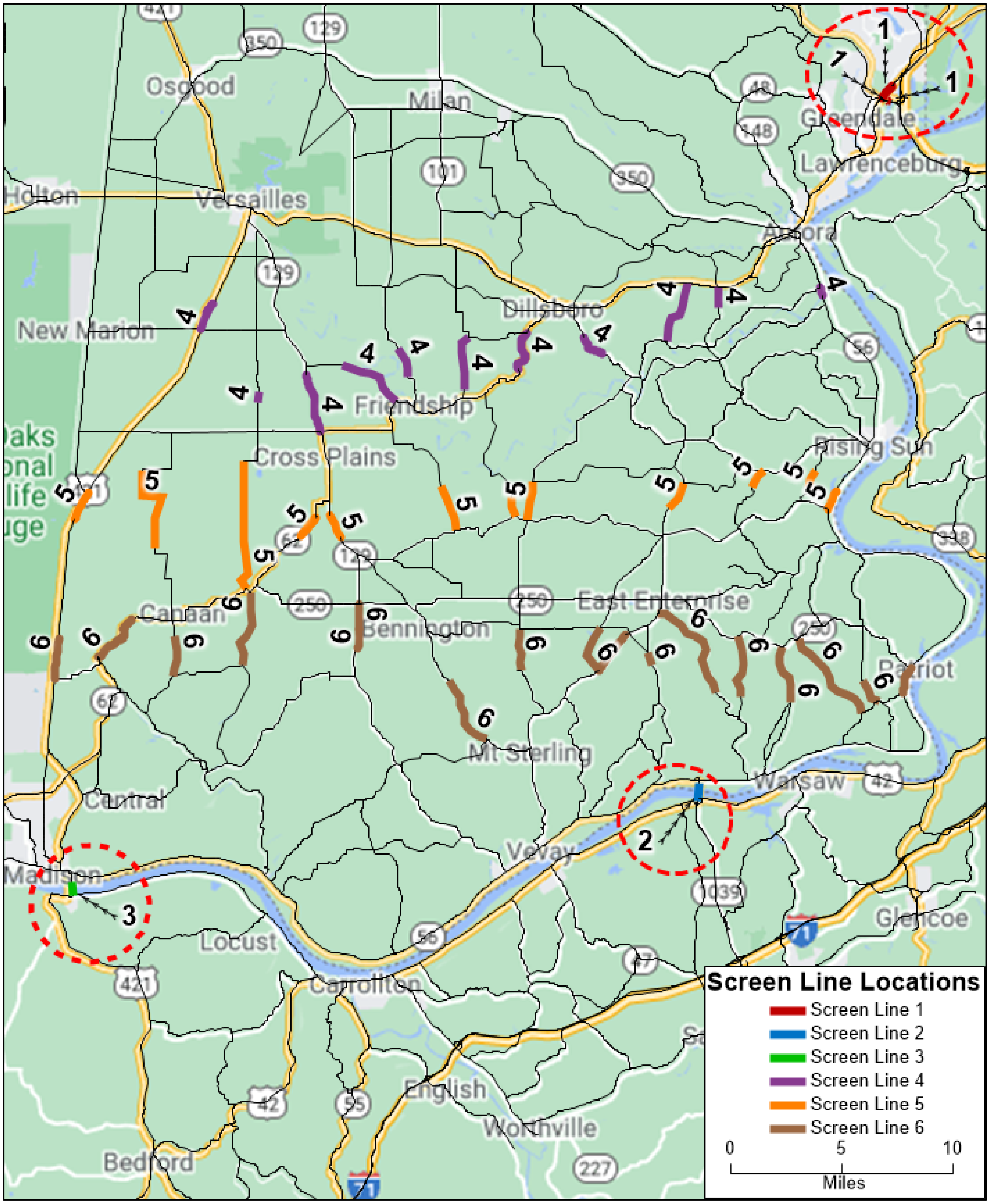
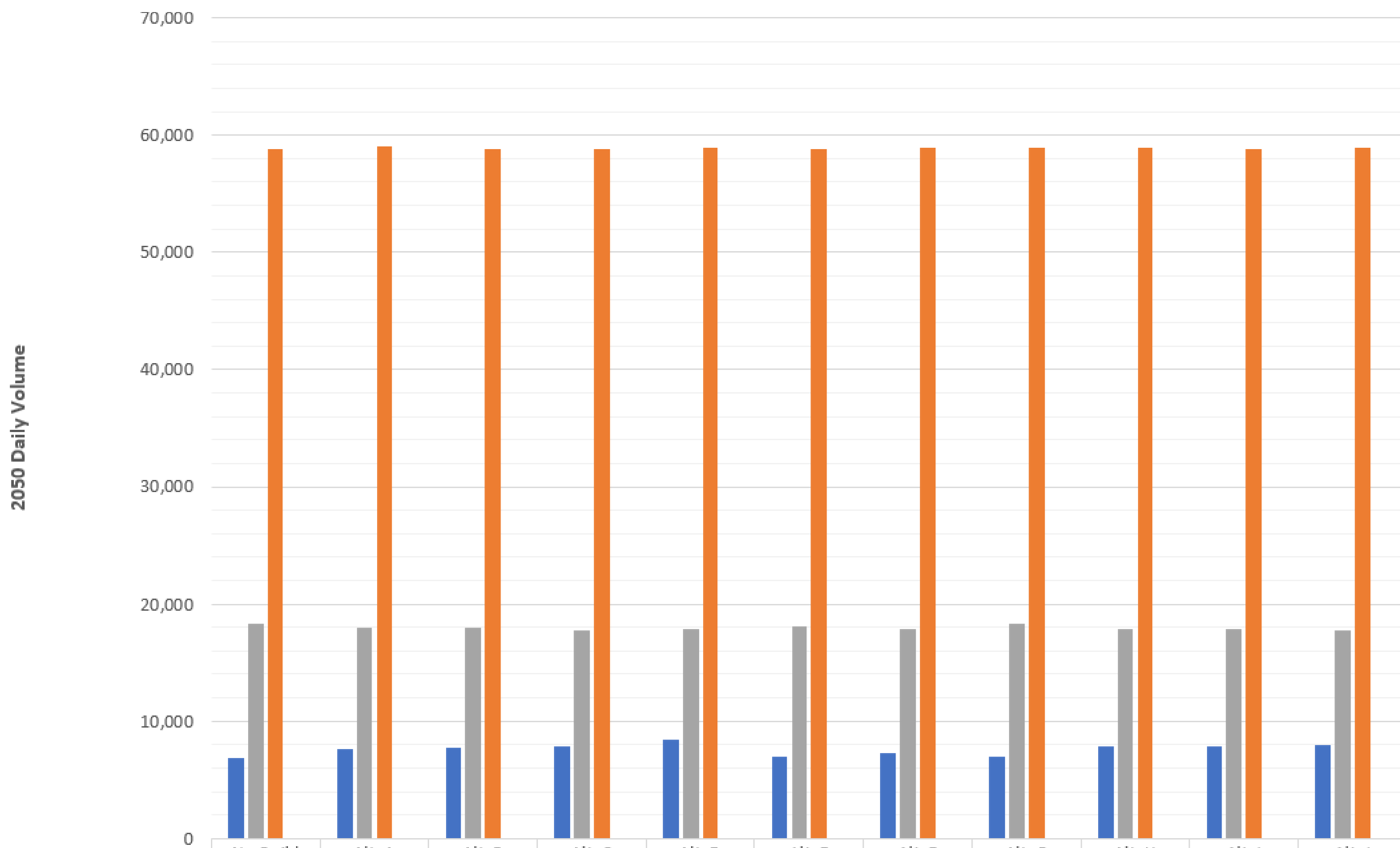


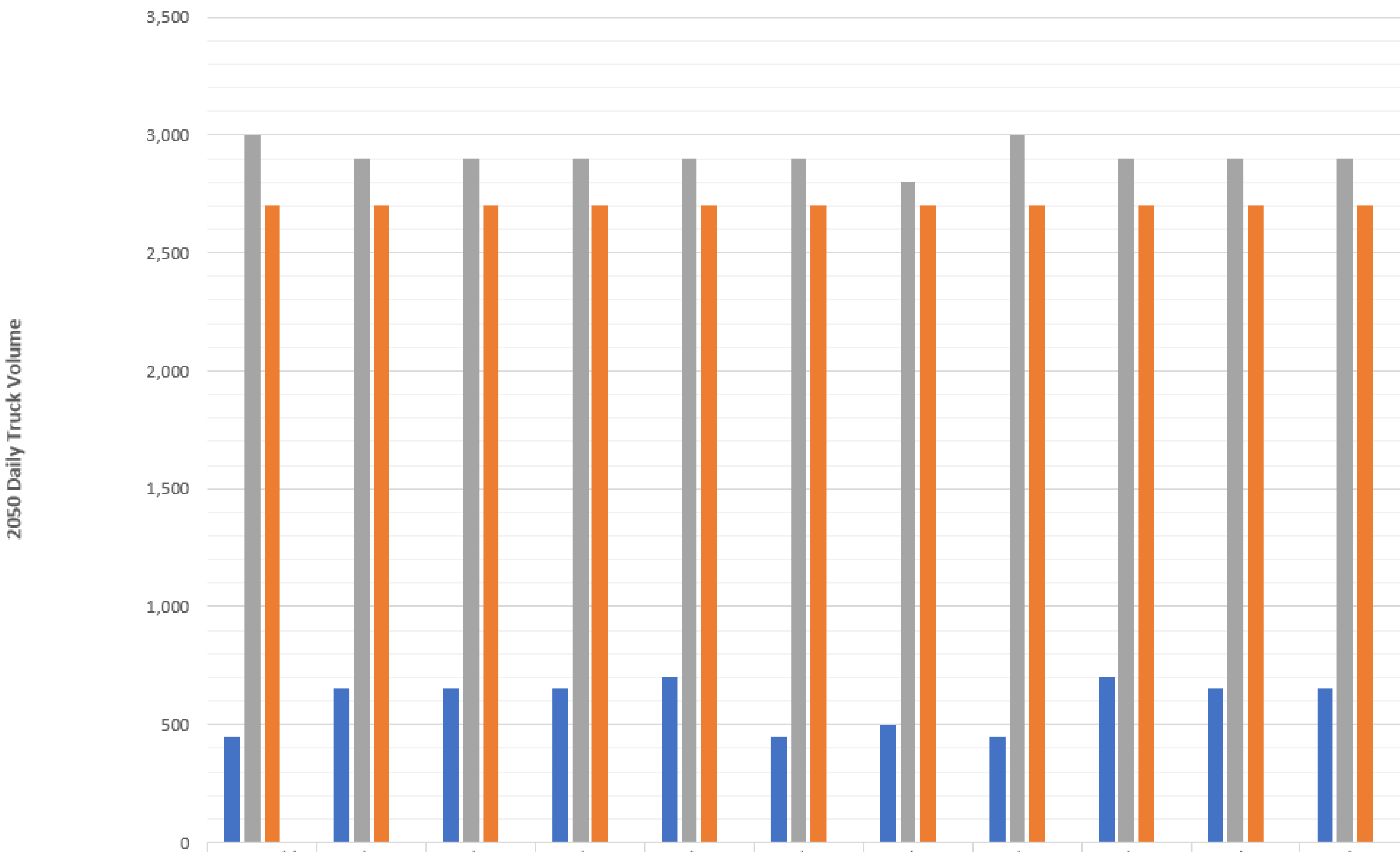
Figure D-2. Forecast Daily Volumes Across Screen Lines 1, 2, and 3 (Border Crossings), All Vehicles



	No-Build	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I	Alt. J
Markland Dam Bridge	6,800	7,600	7,800	7,900	8,400	7,000	7,300	7,000	7,900	7,900	8,000
US 421 Bridge	18,300	18,000	18,000	17,700	17,800	18,100	17,800	18,300	17,800	17,900	17,700
IN/OH Border	58,800	59,100	58,800	58,800	58,900	58,800	58,900	58,900	58,900	58,800	58,900
Total	83,900	84,700	84,600	84,400	85,100	83,900	84,000	84,200	84,600	84,600	84,600

Markland Dam Bridge US 421 Bridge IN/OH Border

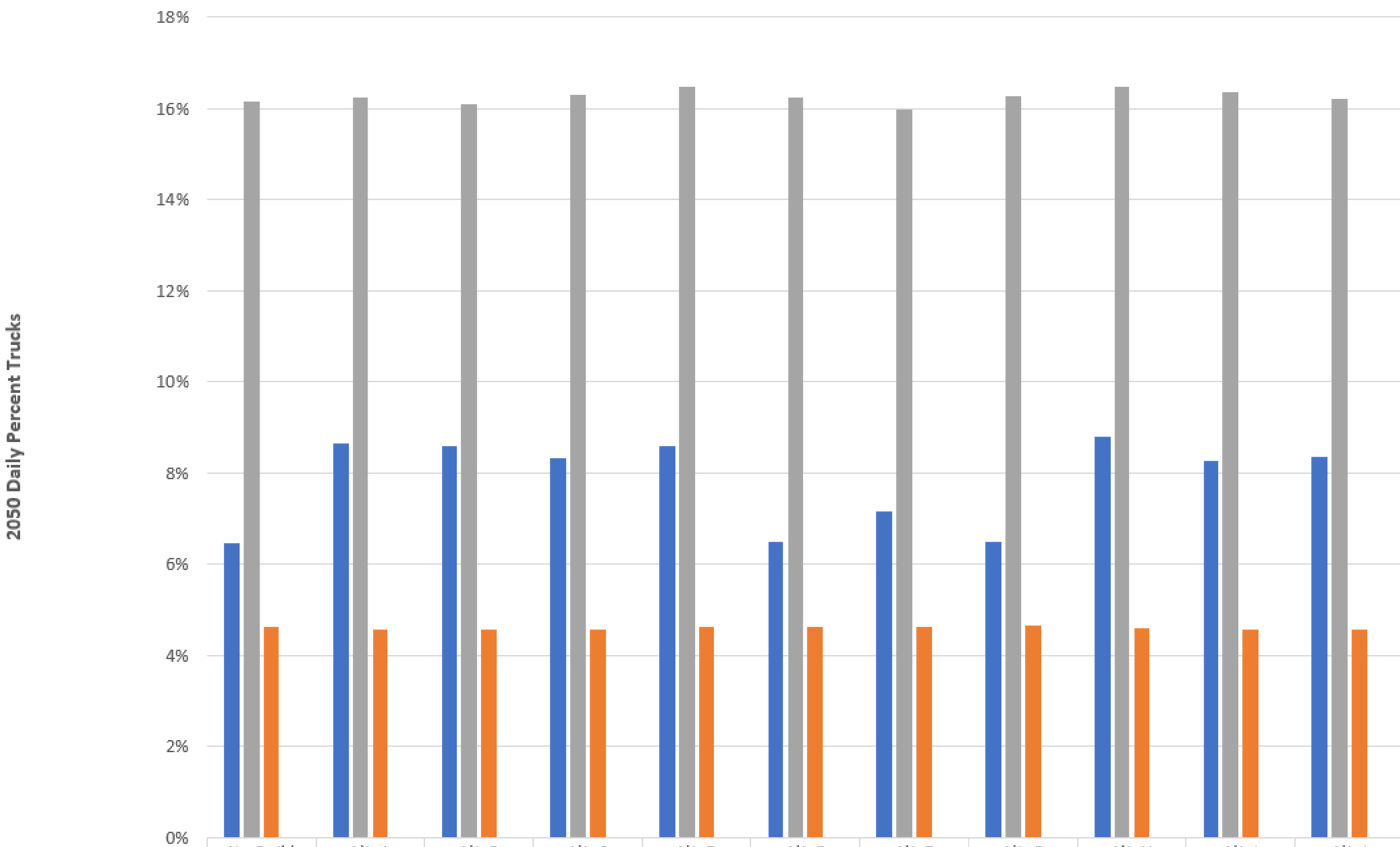
Figure D-3. Forecast Daily Volumes Across Screen Lines 1, 2, and 3 (Border Crossings), Trucks Only



	No-Build	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I	Alt. J
Markland Dam Bridge	450	650	650	650	700	450	500	450	700	650	650
US 421 Bridge	3,000	2,900	2,900	2,900	2,900	2,900	2,800	3,000	2,900	2,900	2,900
IN/OH Border	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700
Total	6,150	6,250	6,250	6,250	6,300	6,050	6,000	6,150	6,300	6,250	6,250

Markland Dam Bridge | US 421 Bridge | IN/OH Border

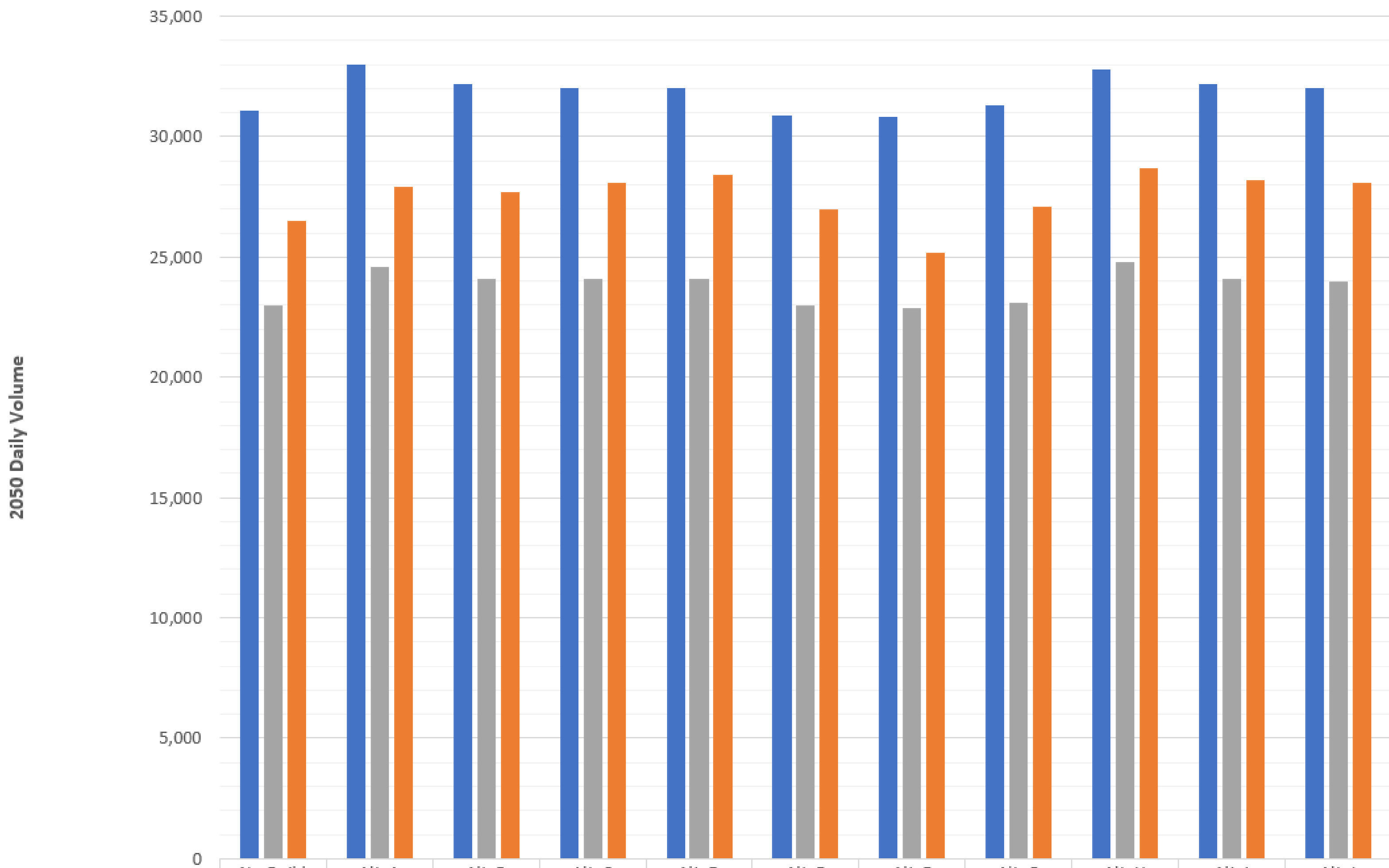
Figure D-4. Forecast Daily Volumes Across Screen Lines 1, 2, and 3 (Border Crossings), Percent Trucks



	No-Build	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I	Alt. J
Markland Dam Bridge	6%	9%	9%	8%	9%	6%	7%	6%	9%	8%	8%
US 421 Bridge	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%
IN/OH Border	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Total	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%

■ Markland Dam Bridge ■ US 421 Bridge ■ IN/OH Border

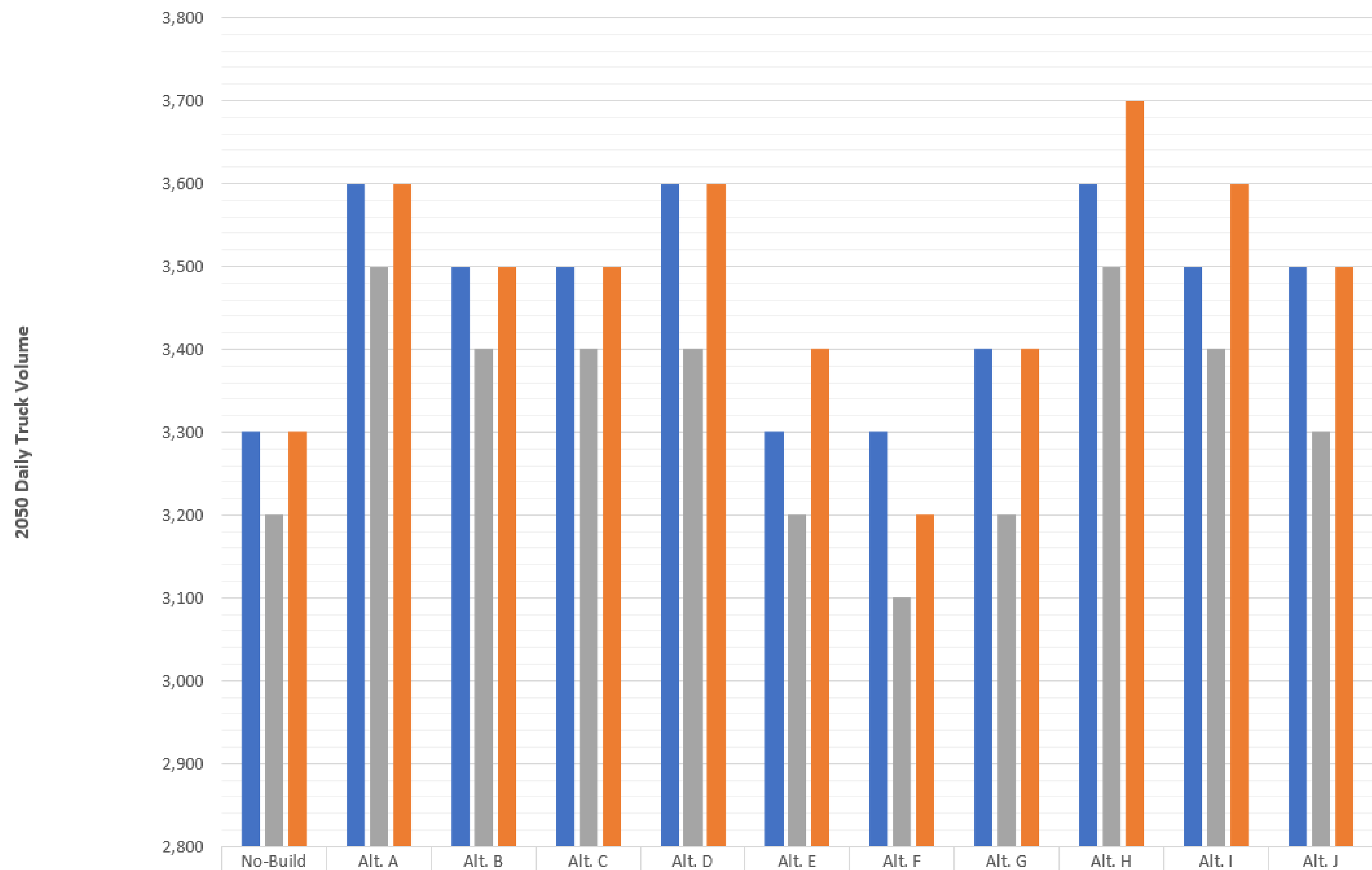
Figure D-5. Forecast Daily Volumes Across Screen Lines 4, 5, and 6, All Vehicles



	No-Build	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I	Alt. J
South of US 50	31,100	33,000	32,200	32,000	32,000	30,900	30,800	31,300	32,800	32,200	32,000
North of SR 250 / SR 56	23,000	24,600	24,100	24,100	24,100	23,000	22,900	23,100	24,800	24,100	24,000
South of SR 250	26,500	27,900	27,700	28,100	28,400	27,000	25,200	27,100	28,700	28,200	28,100

South of US 50 · North of SR 250 / SR 56 · South of SR 250

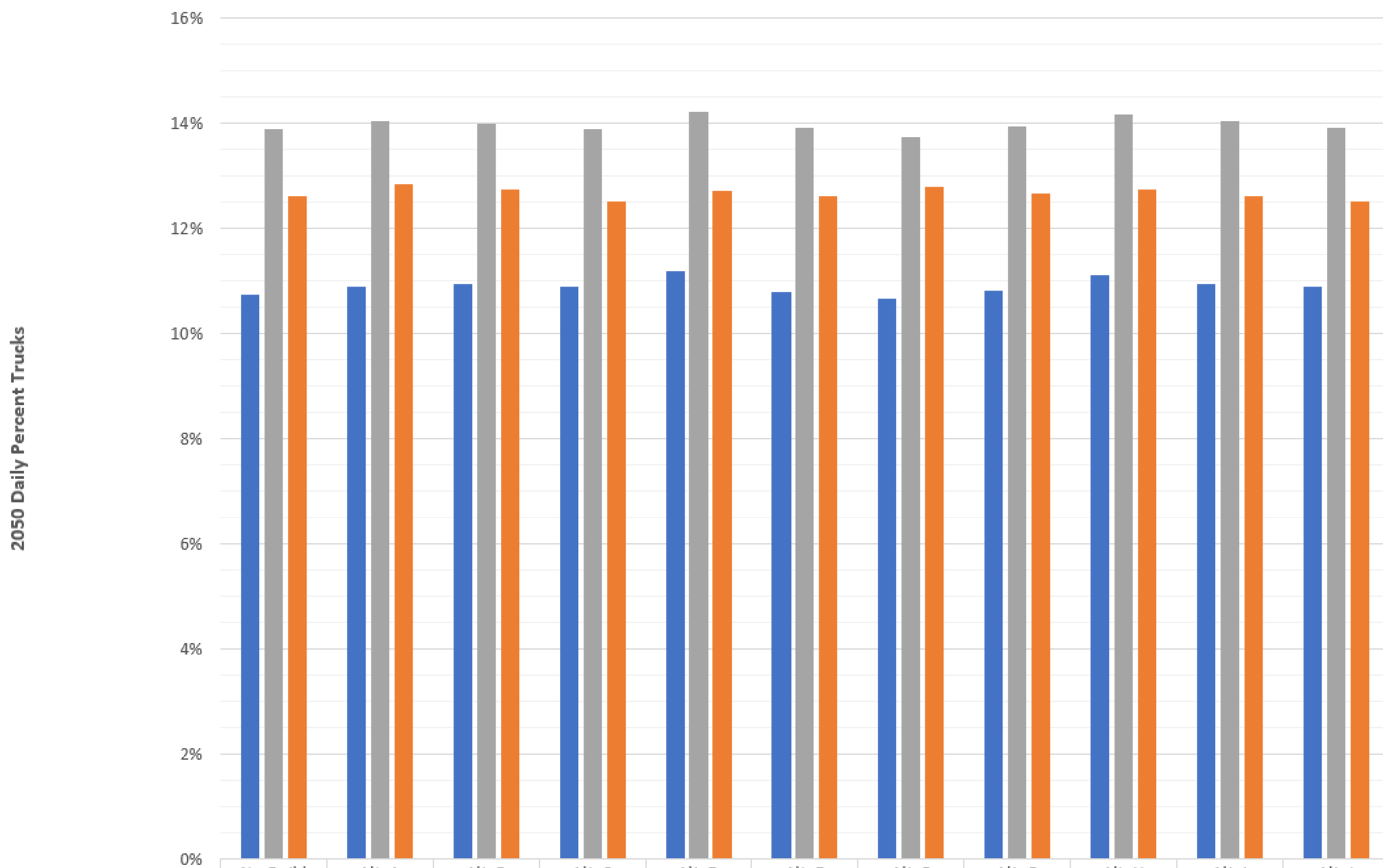
Figure D-6. Forecast Daily Volumes Across Screen Lines 4, 5, and 6, Trucks Only



	No-Build	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I	Alt. J
South of US 50	3,300	3,600	3,500	3,500	3,600	3,300	3,300	3,400	3,600	3,500	3,500
North of SR 250 / SR 56	3,200	3,500	3,400	3,400	3,400	3,200	3,100	3,200	3,500	3,400	3,300
South of SR 250	3,300	3,600	3,500	3,500	3,600	3,400	3,200	3,400	3,700	3,600	3,500

South of US 50 · North of SR 250 / SR 56 · South of SR 250

Figure D-7. Forecast Daily Volumes Across Screen Lines 4, 5, and 6, Percent Trucks



	No-Build	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G	Alt. H	Alt. I	Alt. J
South of US 50	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%	11%
North of SR 250 / SR 56	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%
South of SR 250	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%

South of US 50 North of SR 250 / SR 56 South of SR 250

APPENDIX E. DAILY VMT ON ELEVATED CRASH SEGMENTS IN THE PROJECT AREA

Table E-1. 2050 Daily VMT on Roadway Segments Identified as Elevated Crash Locations in Project Area

2050 Daily VMT on Roadway Segments Identified as Elevated Crash Locations in Project Area											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
VMT (All Vehicles)	274,600	238,200	269,600	267,100	267,900	258,800	269,000	252,000	247,100	261,500	264,000
VMT (Autos)	249,900	214,300	244,200	242,000	243,500	234,900	245,200	229,300	222,900	236,600	238,900
VMT (Trucks)	24,700	23,900	25,400	25,200	24,400	23,800	23,800	22,700	24,300	24,900	25,200

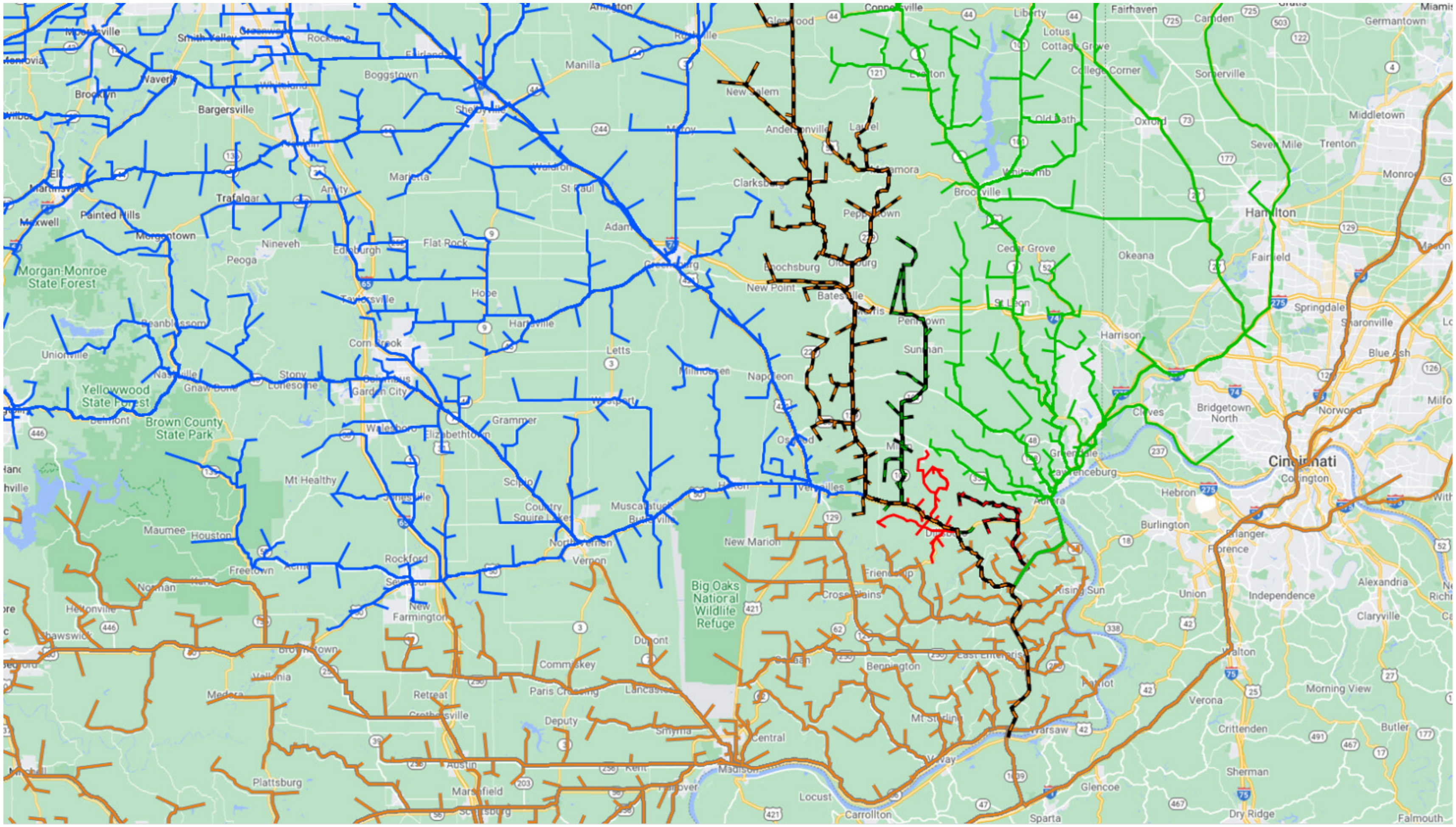
Table E-2. Change in 2050 Daily VMT on Roadway Segments Identified as Elevated Crash Locations in Project Area, vs. No-Build

Percent Change in 2050 Daily VMT on Roadway Segments Identified as Elevated Crash Locations in Project Area, vs. No-Build											
Project Area Trips	No-Build	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G	Alt H	Alt I	Alt J
VMT (All Vehicles)	-	-13.3%	-1.8%	-2.7%	-2.4%	-5.8%	-2.0%	-8.2%	-10.0%	-4.8%	-3.9%
VMT (Autos)	-	-14.2%	-2.3%	-3.2%	-2.6%	-6.0%	-1.9%	-8.2%	-10.8%	-5.3%	-4.4%
VMT (Trucks)	-	-3.2%	2.8%	2.0%	-1.2%	-3.6%	-3.6%	-8.1%	-1.6%	0.8%	2.0%

Note: Negative values indicate a reduction in aggregate VMT on the elevated crash segments compared to the No-Build Alternative.

APPENDIX F. FULL-LENGTH TRIPS TO US 50 DESTINATIONS AND BEYOND

Figure F-1. Alternative A Full-Length Trips to US 50 Destinations and Beyond

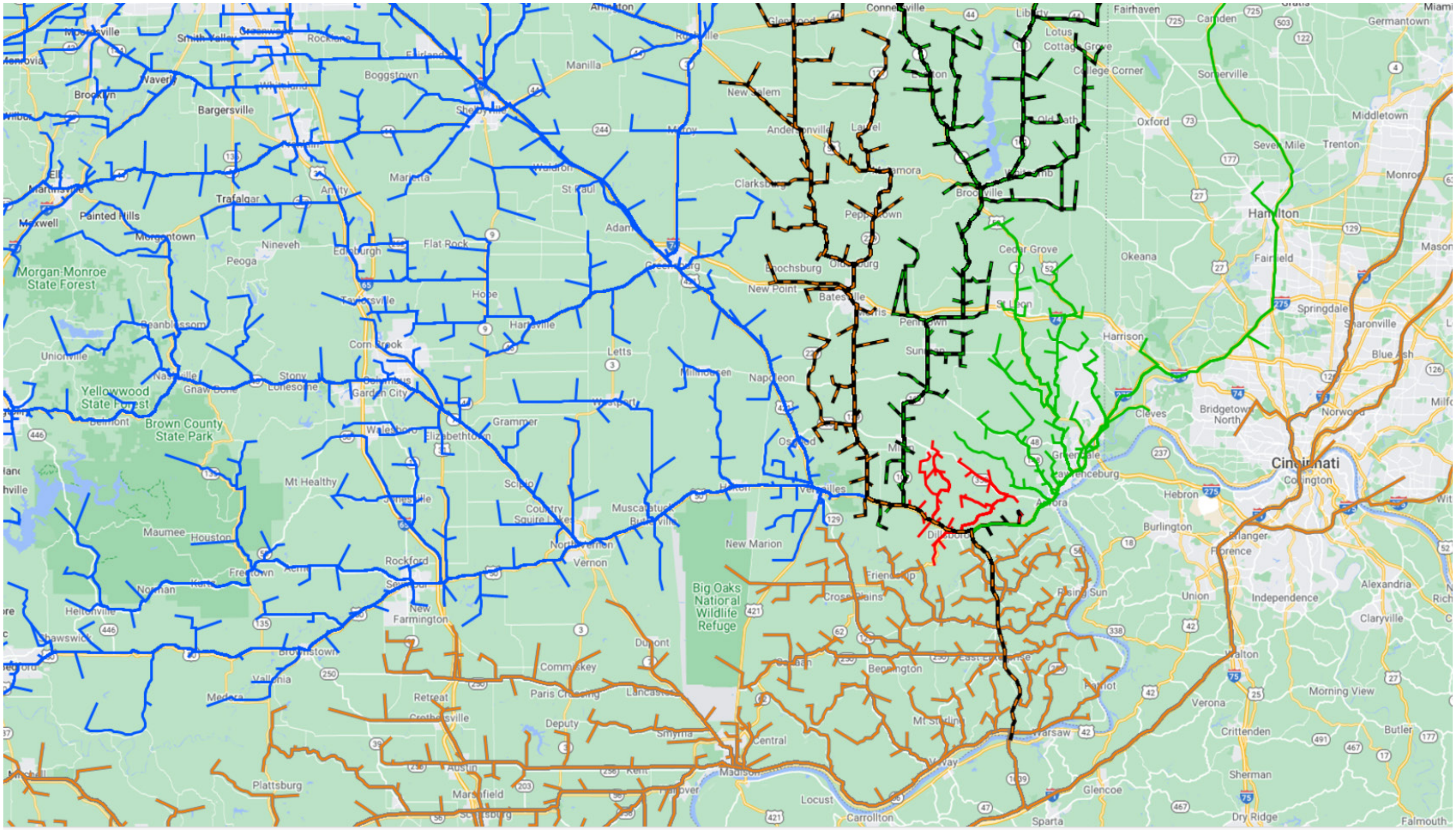


ALTERNATIVE A
Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-2. Alternative B Full-Length Trips to US 50 Destinations and Beyond



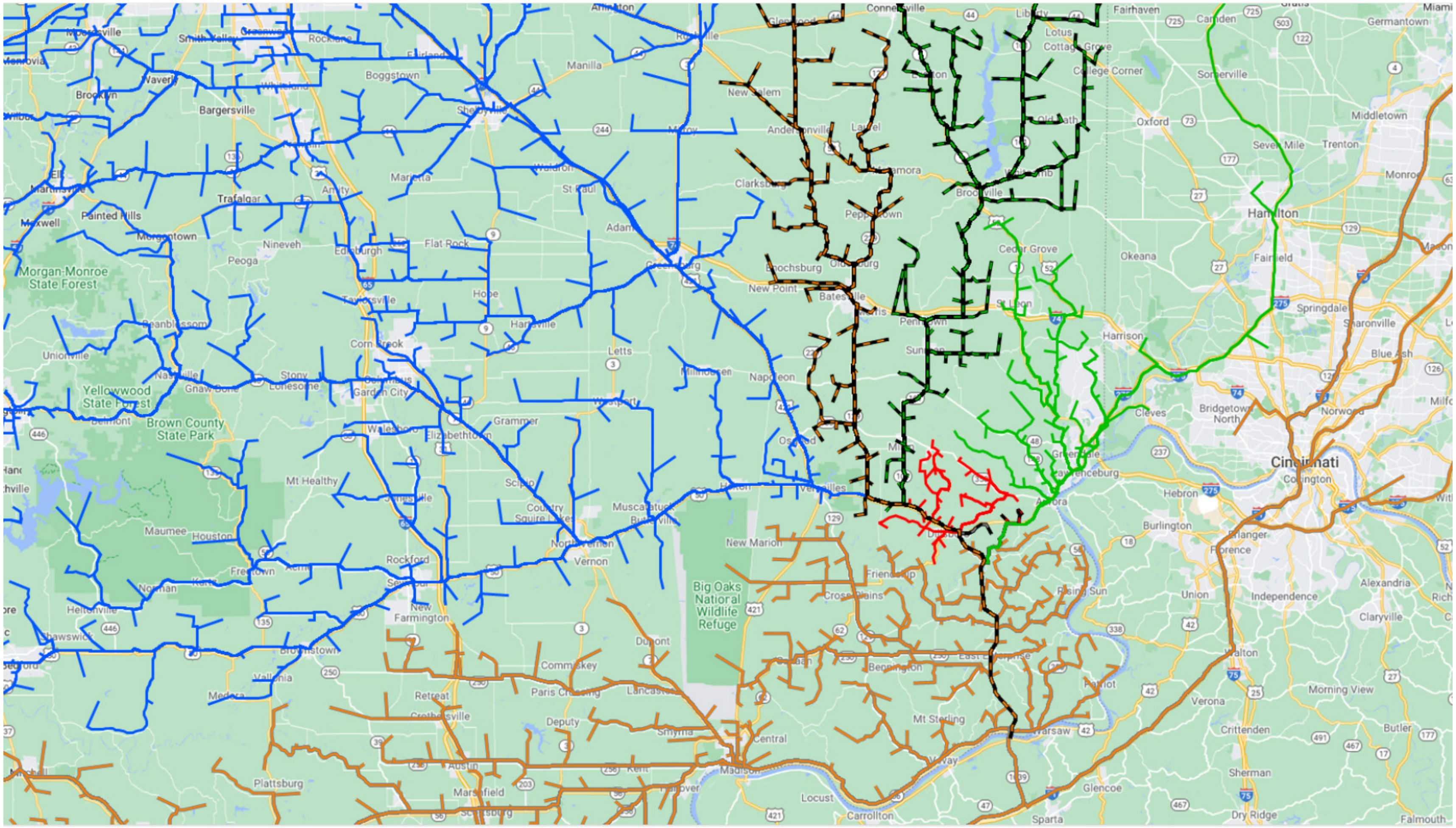
ALTERNATIVE B

Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-3. Alternative C Full-Length Trips to US 50 Destinations and Beyond



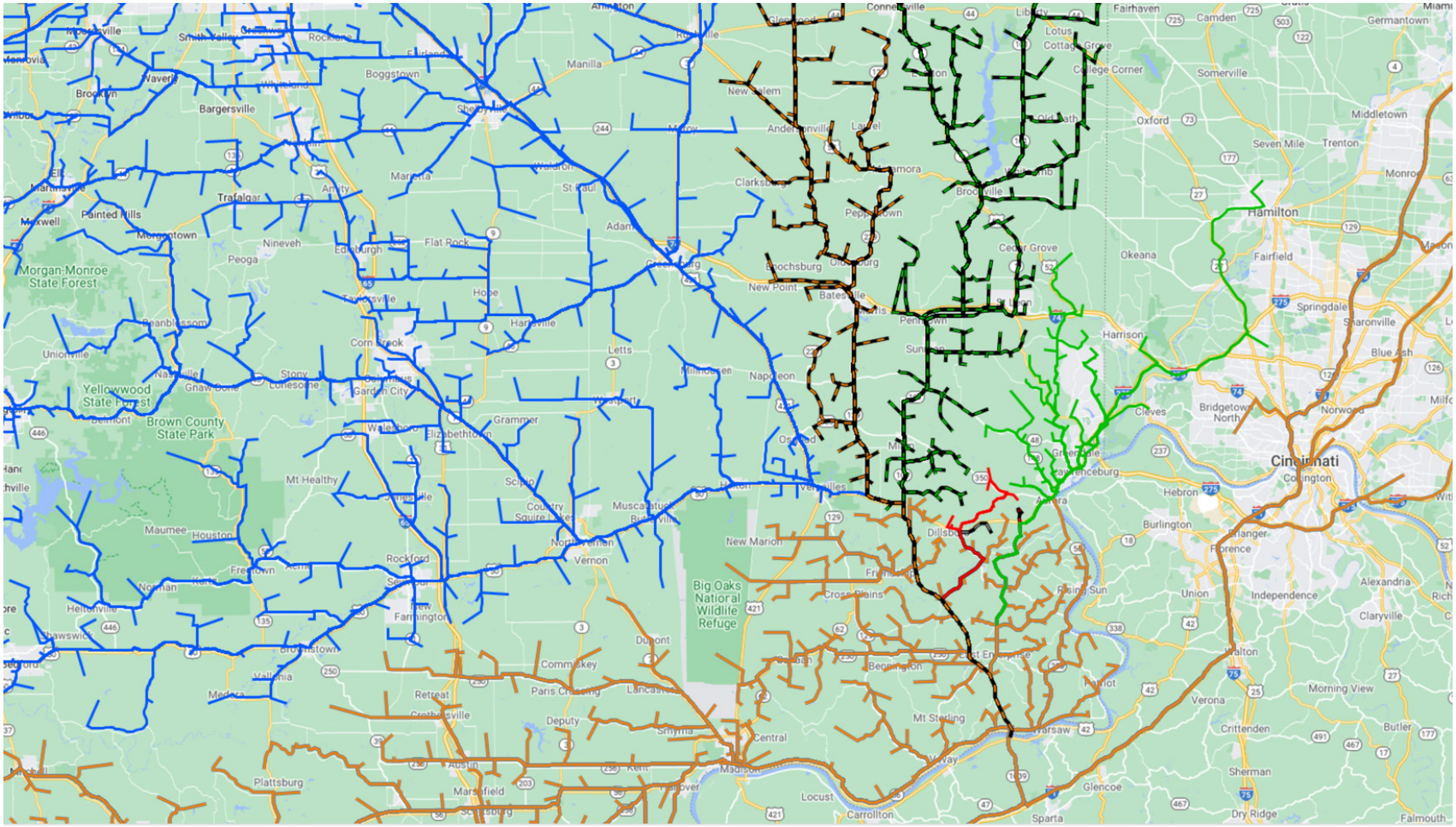
ALTERNATIVE C

Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-4. Alternative D Full-Length Trips to US 50 Destinations and Beyond



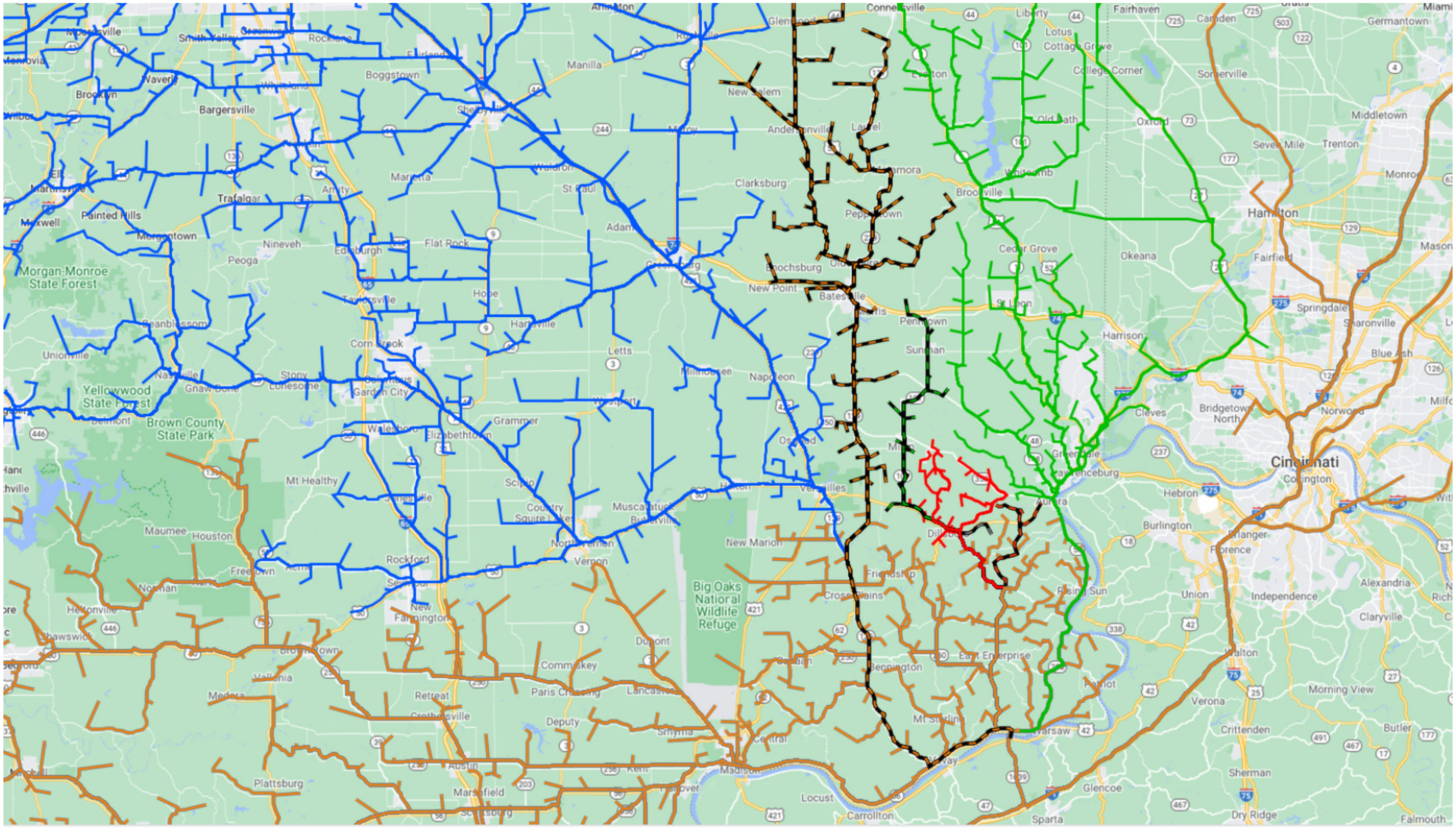
ALTERNATIVE D

Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-5. Alternative E Full-Length Trips to US 50 Destinations and Beyond



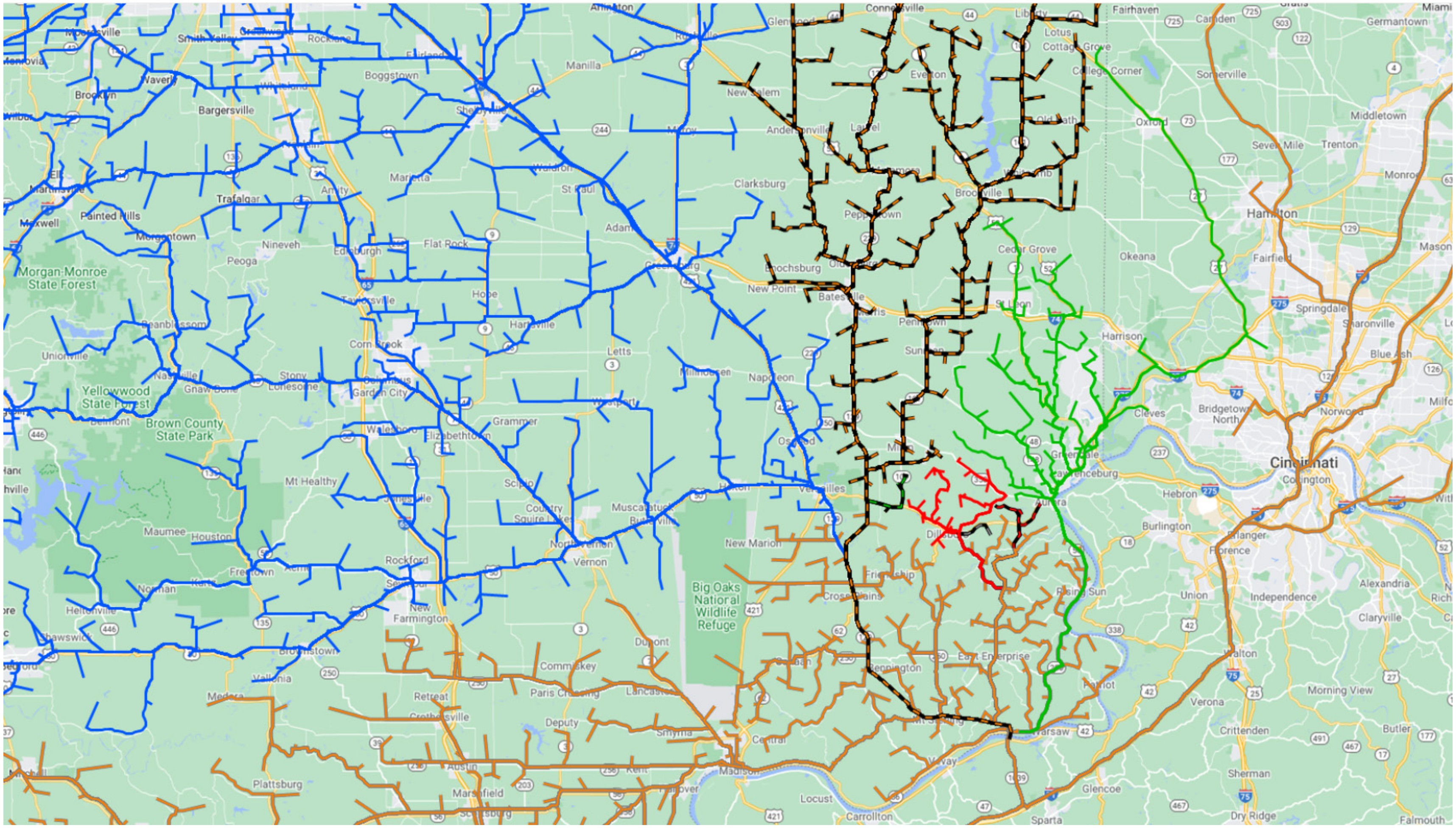
ALTERNATIVE E

Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-6. Alternative F Full-Length Trips to US 50 Destinations and Beyond

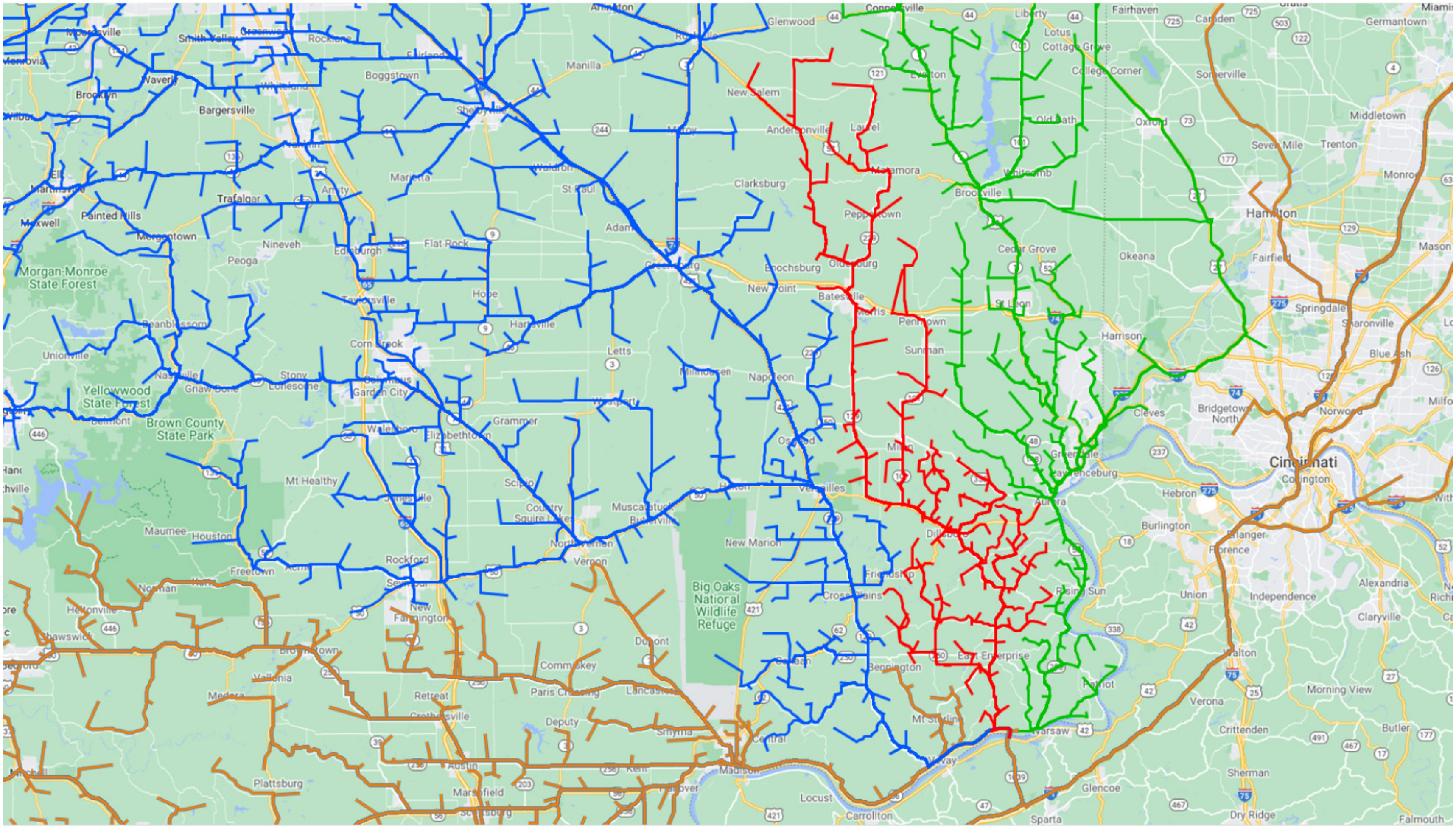


ALTERNATIVE F
Full-Length Trips to US 50 Destinations and Beyond

- Versailles
- SR 101
- 1 Mile East of Dillsboro
- Aurora
- SR 129, East of Versailles
- Dillsboro
- Cole Lane
- Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-7. Alternative G Full-Length Trips to US 50 Destinations and Beyond

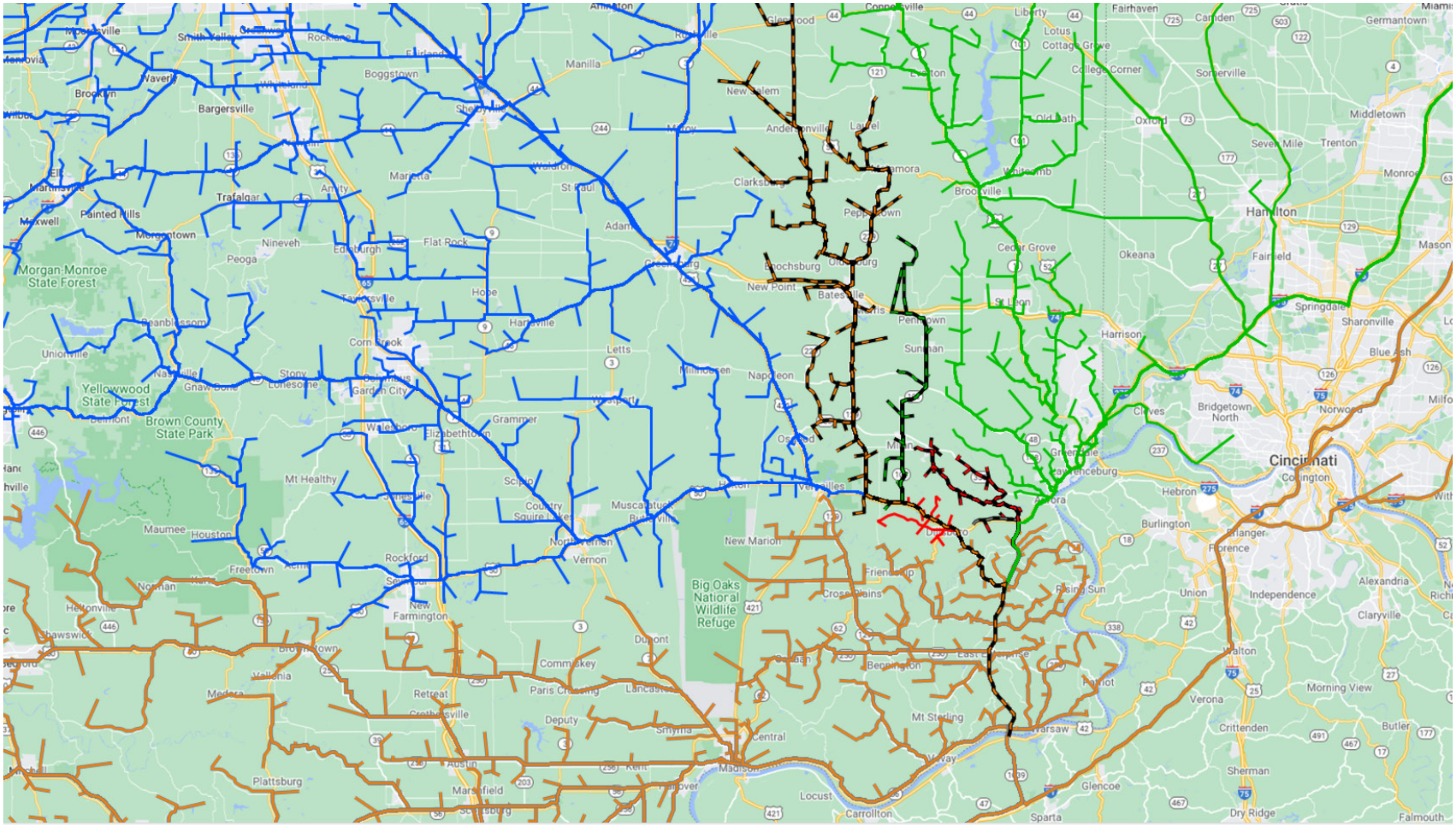


ALTERNATIVE G
Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-8. Alternative H Full-Length Trips to US 50 Destinations and Beyond



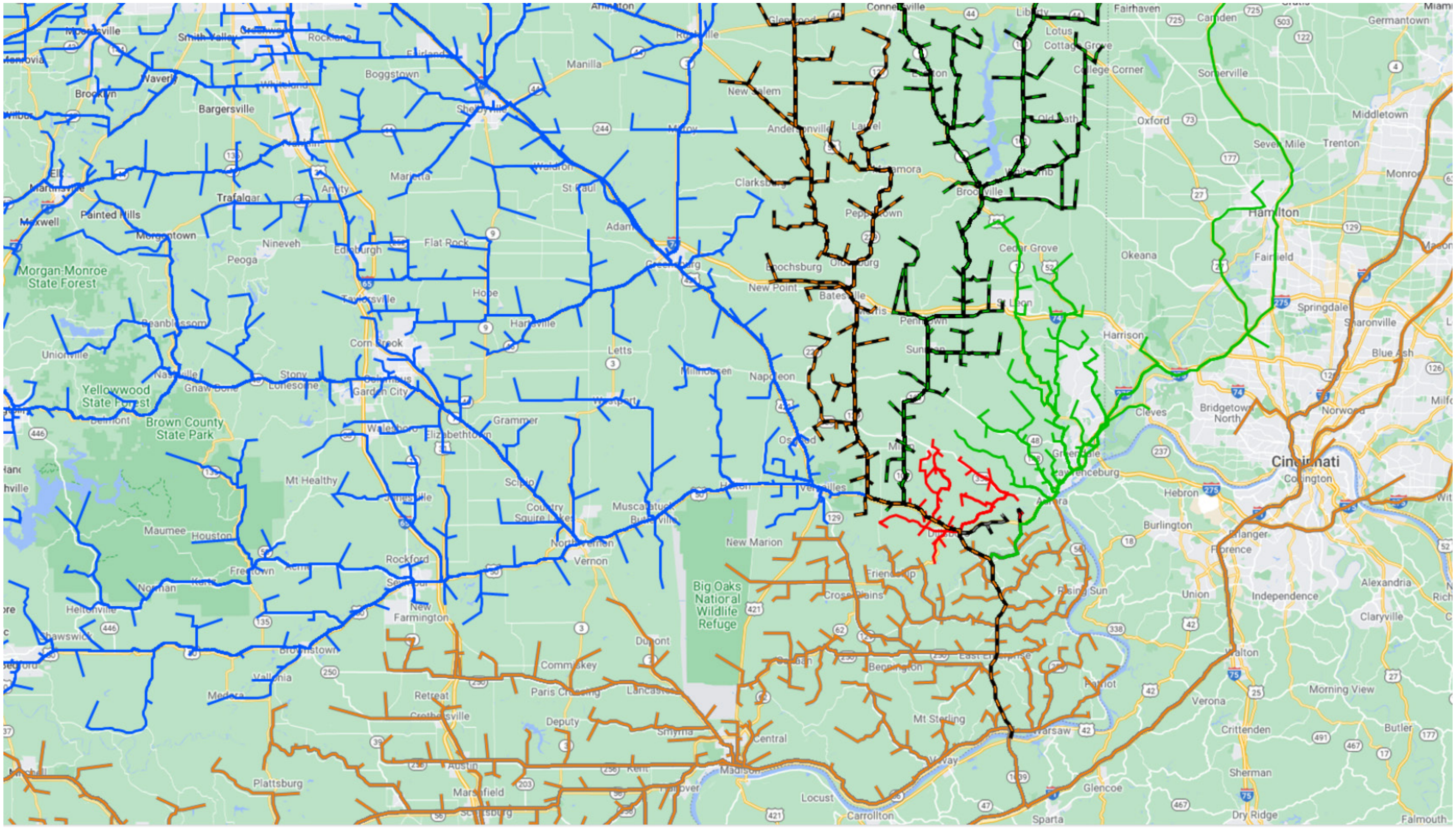
ALTERNATIVE H

Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-9. Alternative I Full-Length Trips to US 50 Destinations and Beyond



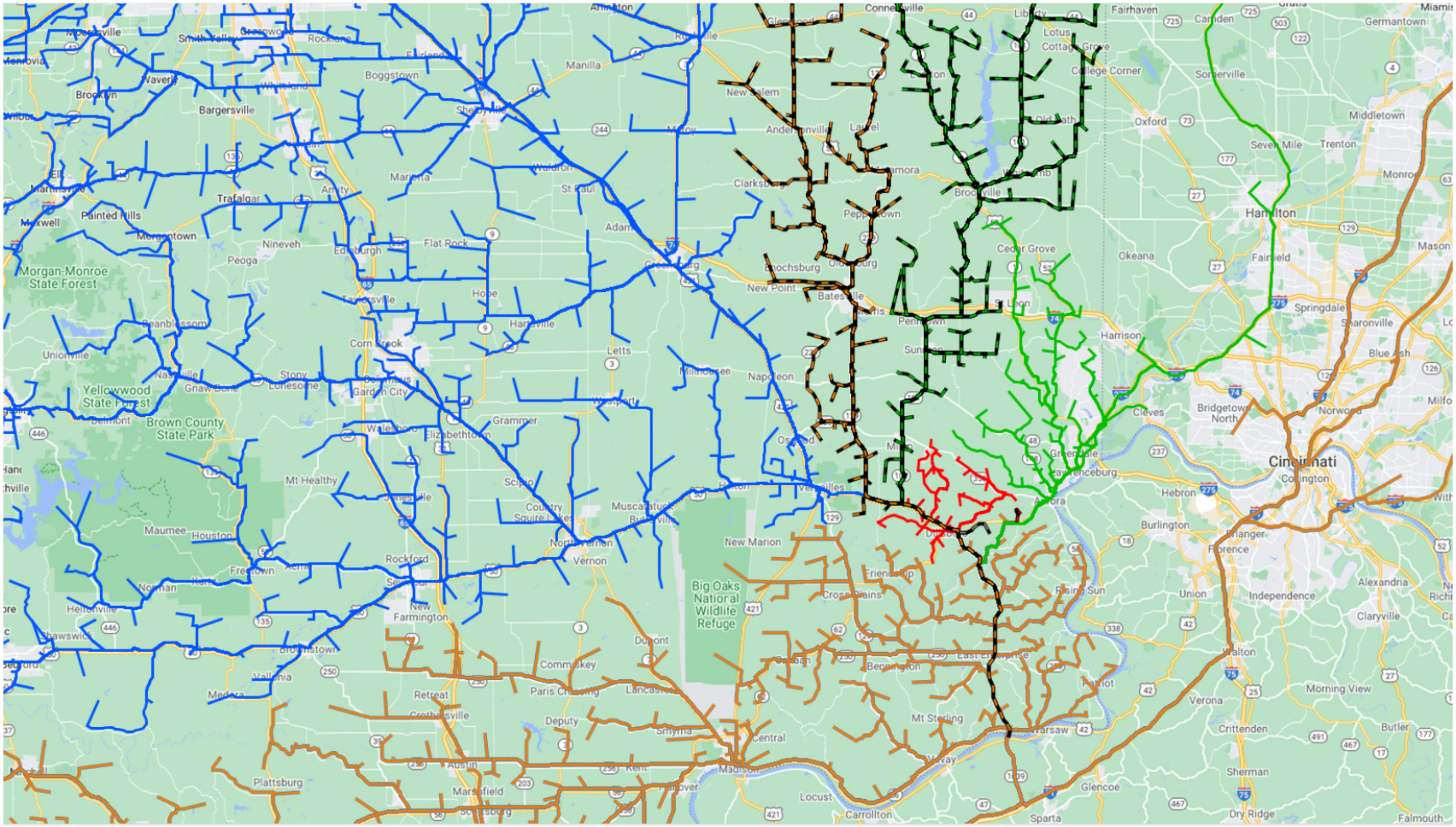
ALTERNATIVE I

Full-Length Trips to US 50 Destinations and Beyond

Versailles	SR 101	1 Mile East of Dillsboro	Aurora
SR 129, East of Versailles	Dillsboro	Cole Lane	Non-US 50 Destination

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

Figure F-10. Alternative J Full-Length Trips to US 50 Destinations and Beyond



ALTERNATIVE J
Full-Length Trips to US 50 Destinations and Beyond

Note: Full-length trips are vehicles traveling north across the Markland Dam bridge to each of the identified destinations along US 50 and beyond based on the shortest travel path.

APPENDIX G. POTENTIAL LOS-DEFICIENT LOCATIONS BY ALTERNATIVE

The planning-level Level of Service (LOS) was assessed using the forecast daily traffic volumes from the Link 101 Model and Table F-1, which contains maximum service volumes (daily) for different LOS categories. Note the LOS thresholds are provided for both two-lane and four-lane facilities as these describe most of the roadway network in the project area. Within the Link 101 project area, the four-lane configuration would apply only to US 50 whereas all other facilities in the project area ascribe to the two-lane configuration.

Table F-1. Maximum Average Daily Traffic Volumes (Two-Way) and Levels of Service

CONFIGURATION	LOS A-C	LOS D	LOS E
Two Lanes[1]	7,100	13,100	24,900
Four Lanes[2]	36,800	45,600	52,000

Source: NCHRP Report 825 Planning and Preliminary Engineering Applications Guide to the Highway Capacity Manual (2016).

[1] Assumes a Class II Highway Type on rolling terrain with a base free-flow speed of 50 mph and 60% no-passing zones.

[2] Assumes rolling terrain with a free-flow speed of 60 mph, 12% trucks, 0% buses, and 0% recreational vehicles.

The figures on the following pages illustrate the application of the forecast daily volumes against the maximum service volume LOS thresholds shown in Table F-1 for the No-Build Alternative and each preliminary alternative. The red and blue links indicate locations where the forecast volumes may pose a congestion concern and therefore potentially warrant more detailed analysis to see if the roadway cross-section can accommodate the forecast volume. Presence of a red or blue link should not be considered fatal to the evaluation; it is instead a screening tool.

The red and blue colors reflect the different LOS standards applicable to rural and urban areas. As previously stated in the report, according to INDOT, for rural roadways, LOS A, B, and C is considered acceptable while LOS D, E, and F is unacceptable. For roads in urbanized areas, the acceptable threshold is LOS D and above.

Figure G-1. No-Build Alternative Potential Level of Service-Deficient Locations

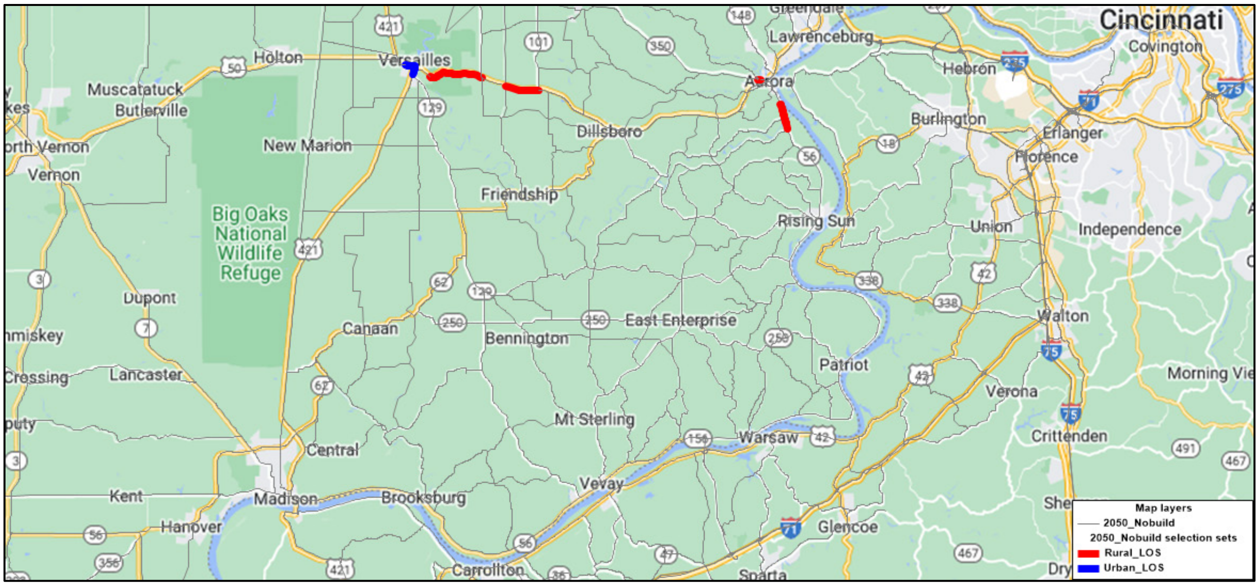


Figure G-2. Alternative A Potential Level of Service-Deficient Locations

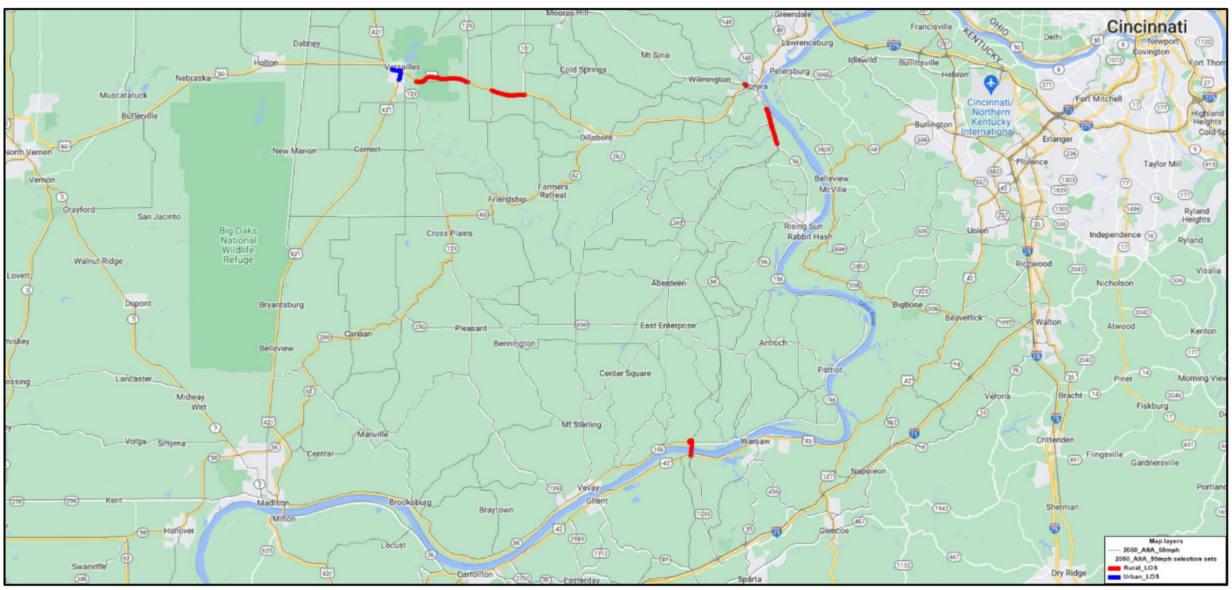


Figure G-3. Alternative B Potential Level of Service-Deficient Locations

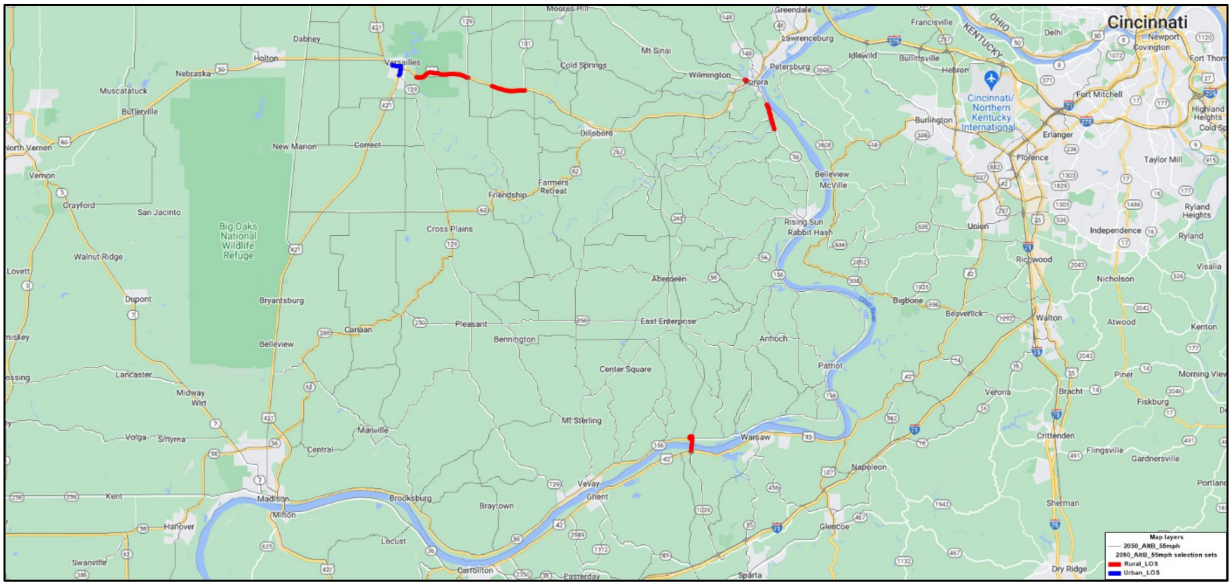


Figure G-4. Alternative C Potential Level of Service-Deficient Locations

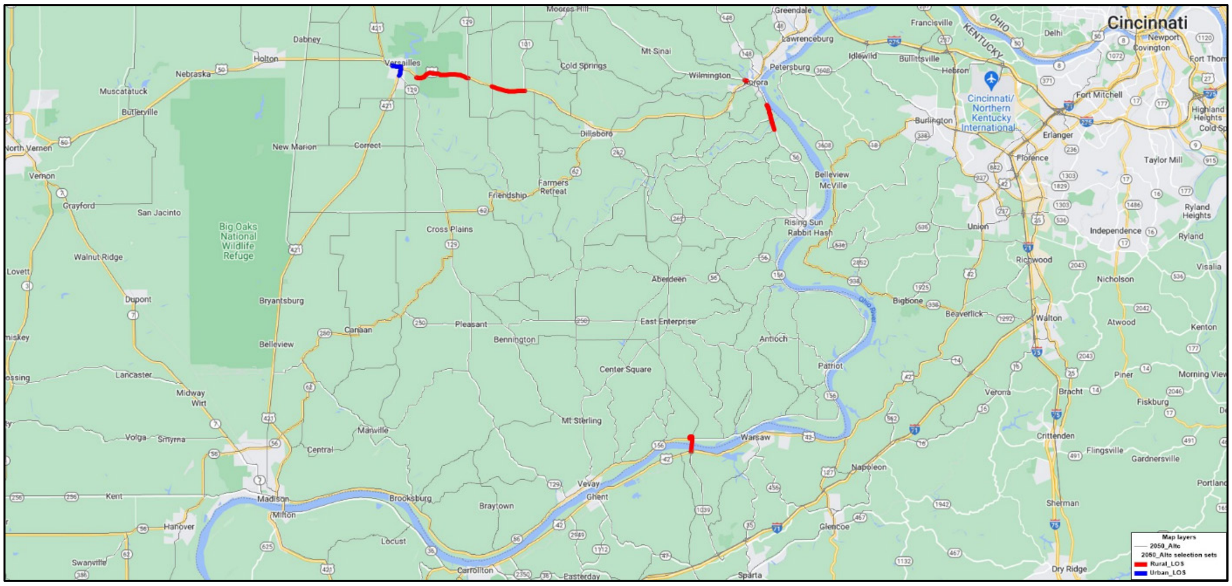


Figure G-5. Alternative D Potential Level of Service-Deficient Locations

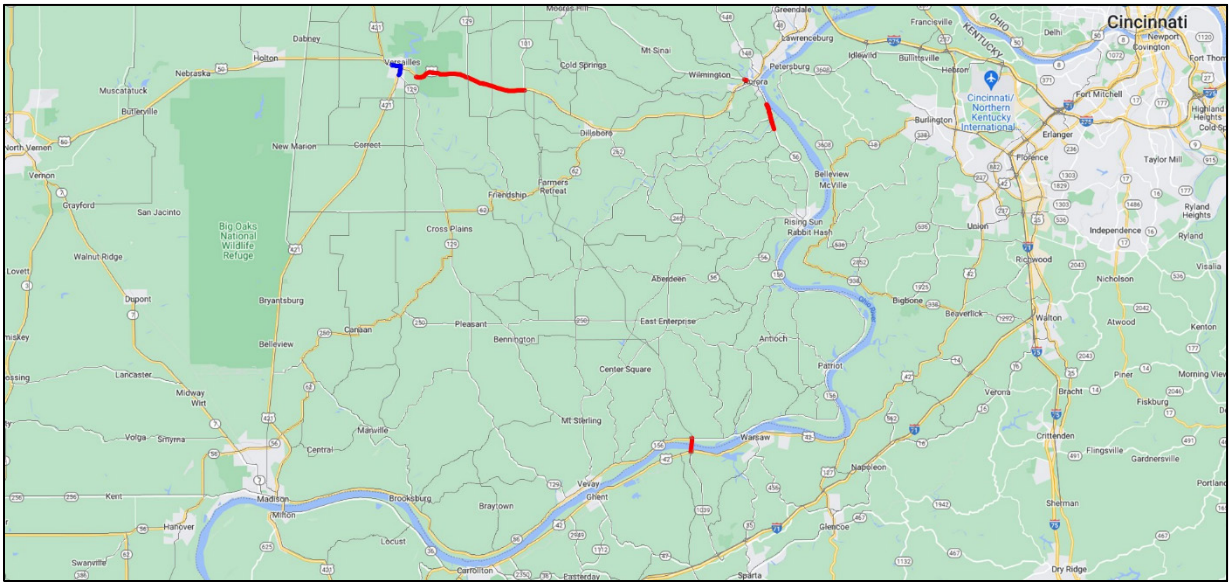


Figure G-6. Alternative E Potential Level of Service-Deficient Locations

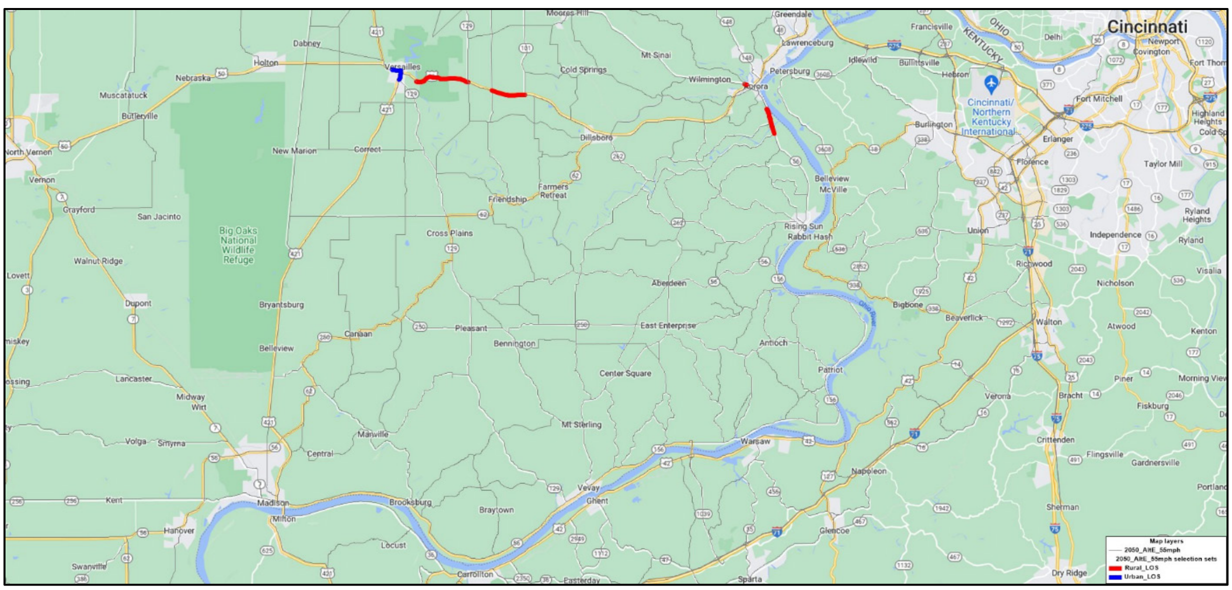


Figure G-7. Alternative F Potential Level of Service-Deficient Locations

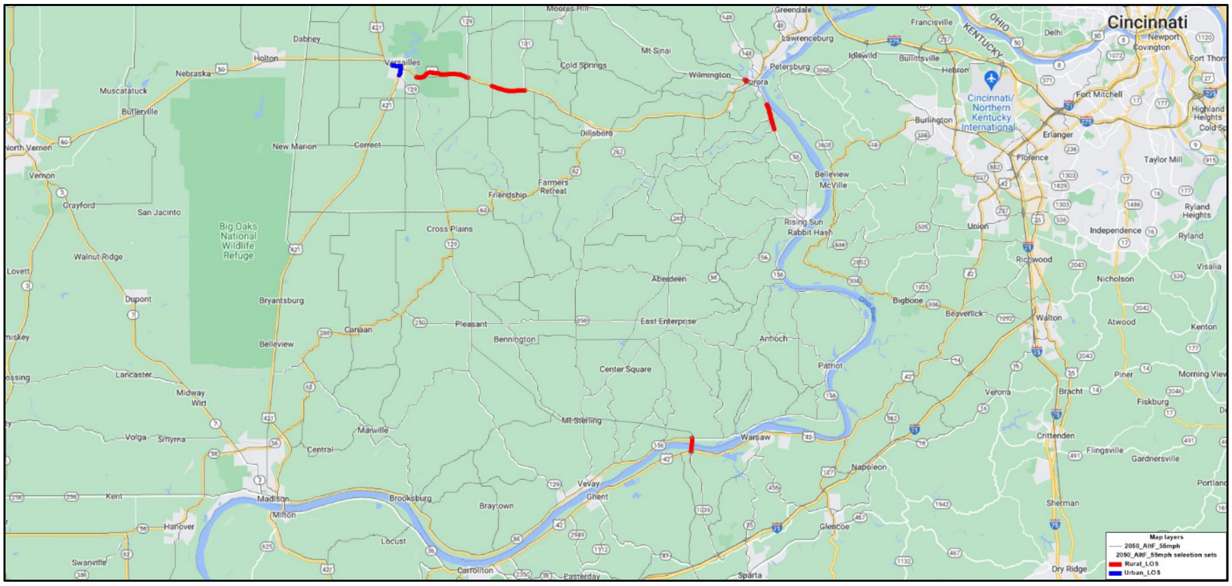


Figure G-8. Alternative G Potential Level of Service-Deficient Locations

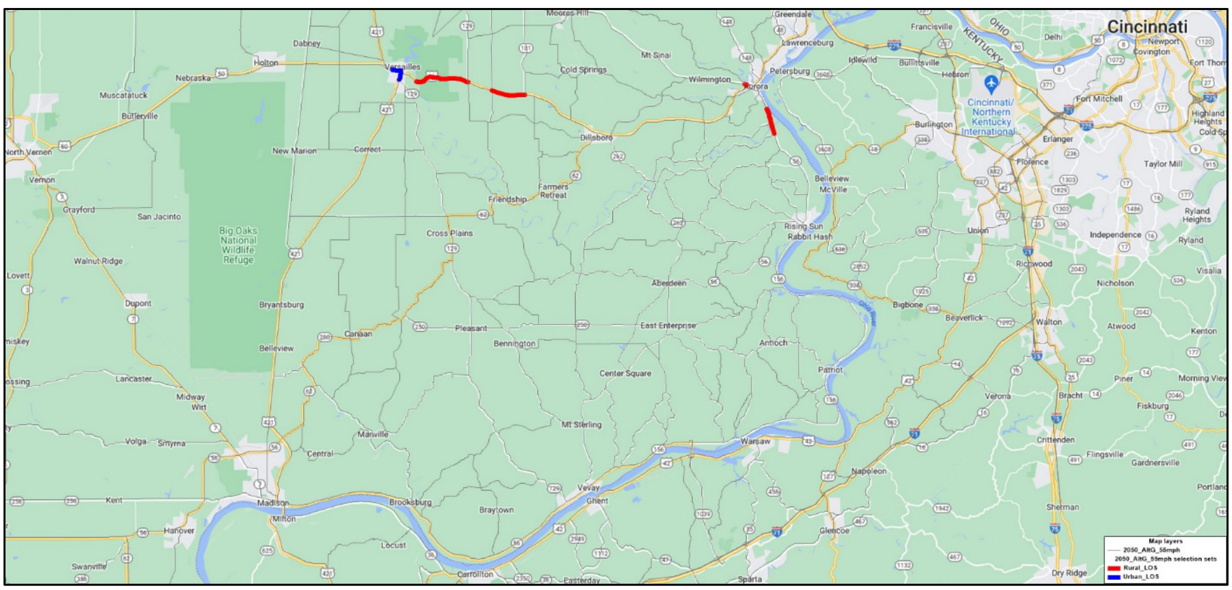


Figure G-10. Alternative H Potential Level of Service-Deficient Locations

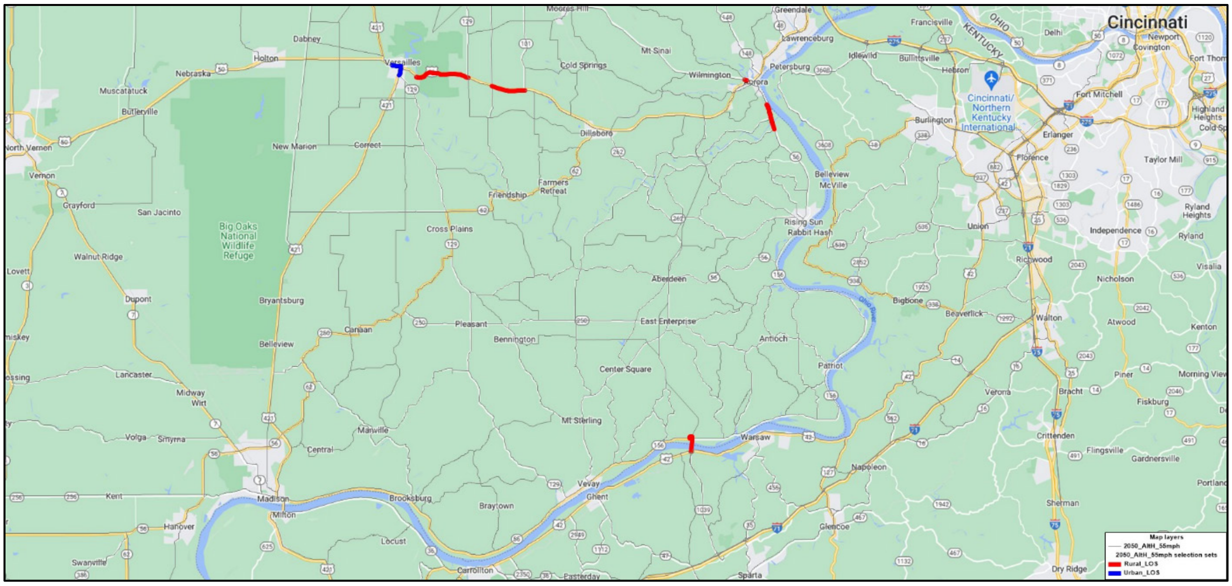


Figure G-11. Alternative I Potential Level of Service-Deficient Locations

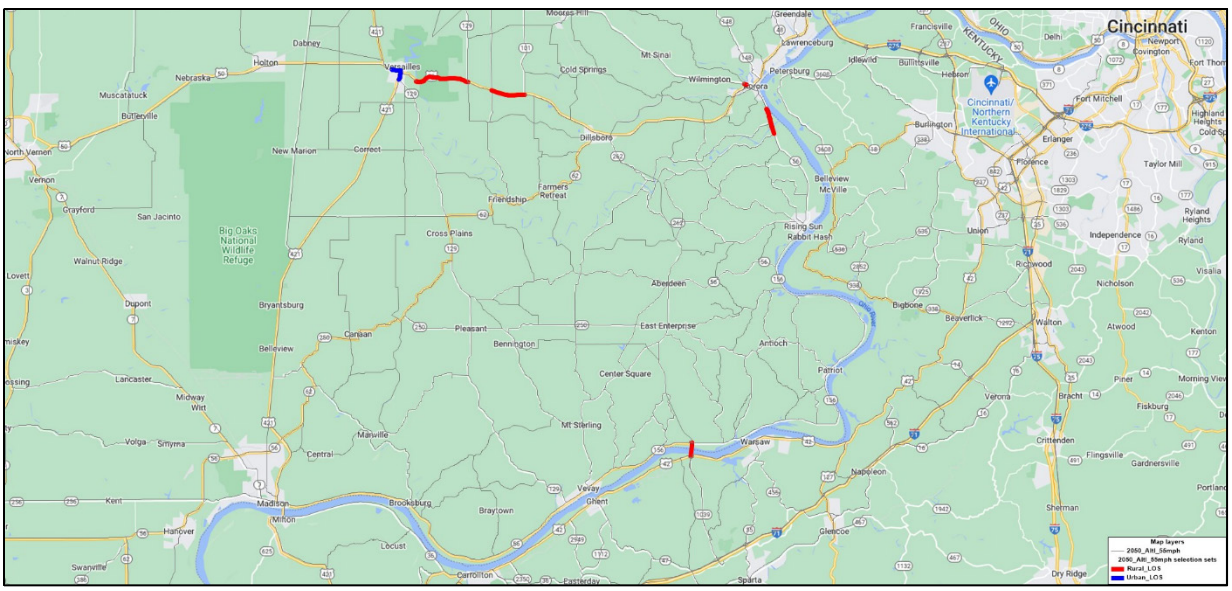


Figure G-12. Alternative J Potential Level of Service-Deficient Locations