

Executive Summary

Staff of the Charlottesville-Albemarle Metropolitan Planning Organization (MPO) has developed this report as part of the Federal Highway Administration's (FHWA) Eco-Logical grant project titled the Free Bridge Area Congestion Relief project. For this report, staff analyzed project alternatives using the MPO's traffic forecasting tool, the *2040 Travel Demand Model*. This analysis uses the travel demand model to assess project alternatives previously considered for easing congestion issues at Free Bridge. The goal of this analysis is to review these previously considered alternatives and compare them to see what they have in common regarding Free Bridge.



It should be noted that the Travel Demand Model tool has limitations. This analysis can only go as far as the tool's capabilities. Despite these limitations, MPO staff feels that this analysis does offer valuable insight into the project's alternatives that have previously been considered regarding congestion issues at Free Bridge.

This analysis begins with a section that focuses on how the MPO's Travel Demand Model functions. This section describes the tool used to achieve this analysis. It also discusses the purpose of the model and how it should be used. This section is followed by the core modeling analysis, which focuses on daily travel demand for Free Bridge and how project alternatives affect that demand. Finally, the appendix to this report includes the maps and modeling data that were used by MPO staff to develop this analysis. The appendix also includes information about how to interpret the various maps and data created for each modeling scenario.

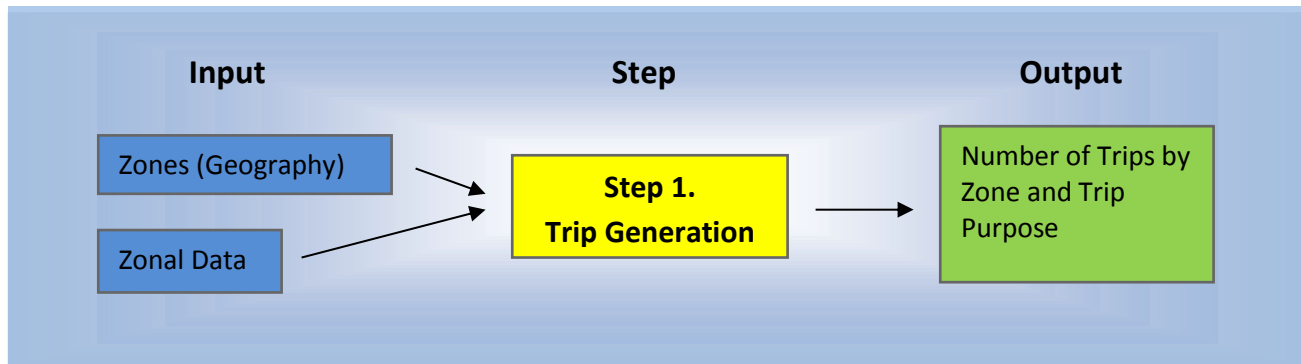
To reiterate, this analysis was developed to consider and compare previously presented project alternatives for relieving congestion on US 250 at Free Bridge. It was meant to provide a common ground to options which have been previously considered, and an opportunity to give this new project a fresh "jumping off point" to discuss potential alternatives for improving congestion issues at Free Bridge.

How the MPO Travel Demand Model Works

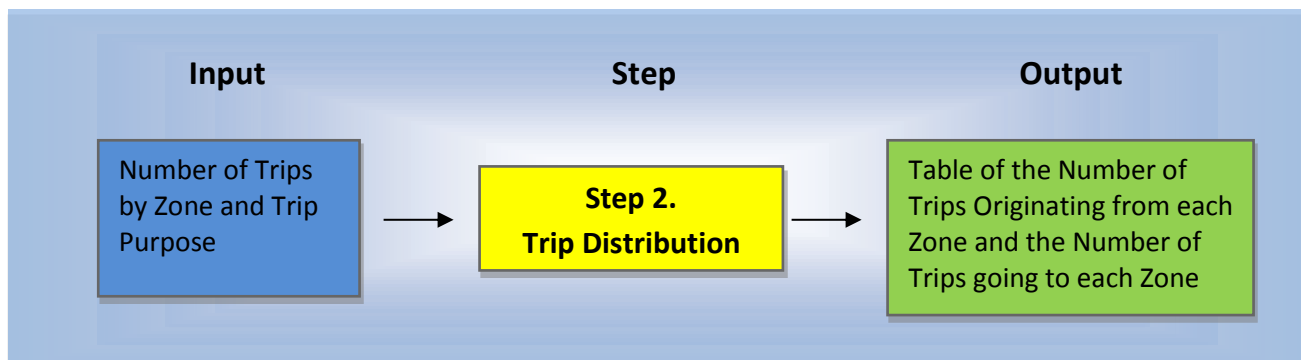
The Charlottesville-Albemarle MPO travel demand model is a traditional four-step model, meaning that the model runs through four general steps to calculate the demand on the region's road network. Each step requires input data (blue boxes in diagrams), which is processed during that step and produces output data (green boxes in diagrams).

Step 1. Trip Generation – How many trips start in each zone and how many trips end in each zone?

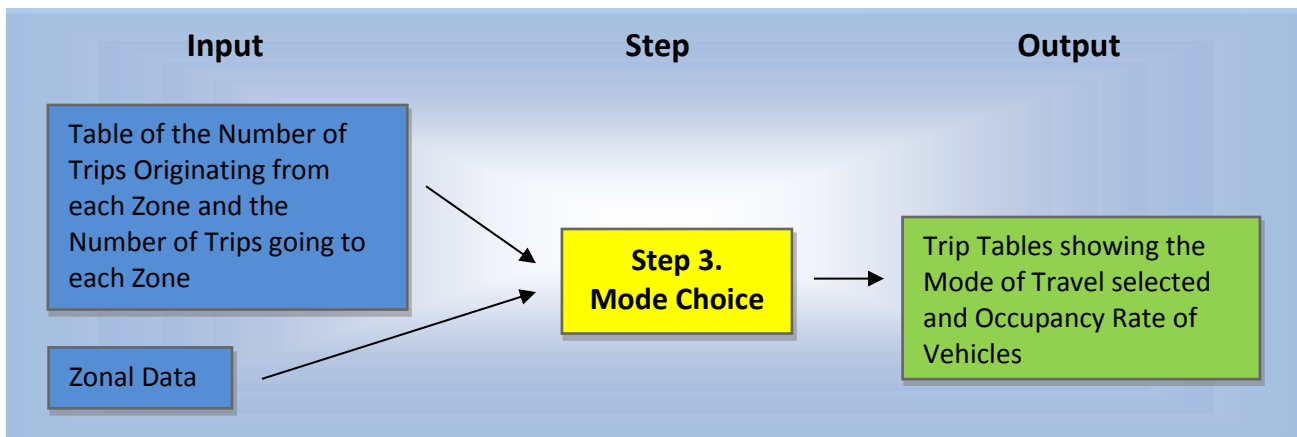
In the Travel Demand Model, the MPO area is divided into zones and each zone includes the following data: total population, total households, income level (indicated by car ownership), total school enrollment, and total employment. This data is used to determine the number of trips that start and end in each zone. This step indicates how many trips start in each zone and how many end in each zone, but not where the trips come from or go to.



Step 2. Trip Distribution – Where do trips travel to? Once the number of trips starting and ending in each zone is calculated, the model determines how they are distributed, or when a trip leaves a zone for a particular purpose, which zone is it most likely to travel to for that purpose. The output from Trip Generation (Step 1) is used to create a table that shows how many of the trips go to each zone once they leave their originating zone. This step indicates the zones that people travel between, but not the mode they use or the route they take, to get to their destination.

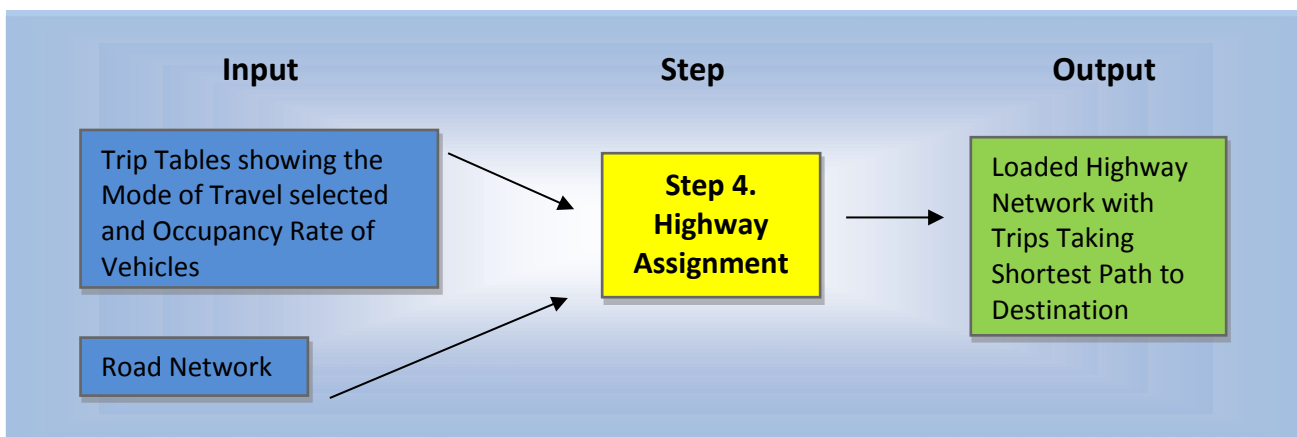


Step 3. Mode Choice – What mode will people use to make their trip (car, bus, bike, or walk)? Once trips are distributed to the appropriate destinations, the model uses survey data to calculate which mode they will take. The model takes the Trip Distribution table from Step 2, along with the zonal data, to make these modal calculations. The model breaks trips into Vehicle Trips (drive alone, 2-person carpool, and 3+ persons carpool), Transit Trips (with an option to walk or drive to transit), and Non-motorized Trips (walk or bike only).



Step 4. Highway Assignment – What route will trips take to reach their destination?

Once the mode of travel is determined by the model, the vehicular trips are assigned to the road network. All trips are initially assigned using the shortest travel time path. The initial assignment does not, however, consider congestion. This results in a network that is heavily congested on some roads and underutilized on others. As some roads become too congested to travel at the posted speed limit, vehicles will look for alternate routes to reach their destination more quickly. The model reiterates this process of highway assignment, and reroutes trips to less congested roads until each trip arrives at its destination using the fastest or “least cost” path in terms of travel time. Once a shorter path cannot be identified for any trip, the model generates a loaded network that indicates the number of vehicles expected to use each road segment.



When the model creates the loaded network, it calculates congestion by first, determining the capacity of each road link, and second, estimating the volume of trips likely to take each link. This information is used to determine the volume to capacity (v/c) ratio for each link. When the volume expected on the road consumes 85% - 100% of its available capacity, it is considered to be at capacity or at level of service (LOS) E, and will likely experience congestion during peak-hour travel times when volume is heaviest. When the volume expected on the link exceeds the capacity of the link, the road experiences congestion and is considered failing with a LOS F.

| What the Model <u>Does</u> Do: | What the Model <u>Does Not</u> Do: |
|---|---|
| <ul style="list-style-type: none"> • Work well in identifying major shifts in traffic that are expected to occur with the addition or closure of various transportation projects. It is useful in estimating the degree to which projects may improve or worsen travel conditions. | <ul style="list-style-type: none"> • Identify exactly how many cars will cross each link every day, or the amount of congestion that roads, at present or in the future, will experience. |
| <ul style="list-style-type: none"> • Assign trips to the shortest path in terms of travel time. If a road is heavily congested and moving slowly, it will reassign trips to a faster route. | <ul style="list-style-type: none"> • Predict exactly which routes drivers will choose to take in real time. |
| <ul style="list-style-type: none"> • Work at a very large scale, focusing on the demand for the region's roads. | <ul style="list-style-type: none"> • Account for intersection delay or delay at interchanges. This would need to be done with a different tool at a smaller scale. |
| <ul style="list-style-type: none"> • Estimate the demand on the roads over the course of an entire day. | <ul style="list-style-type: none"> • Estimate the hourly demand on a road. Although more vehicles travel on the road during rush hour and less during midday or evening hours, the model cannot estimate this variation in demand. |

While Travel Demand Models are useful tools for regional transportation planning, their capabilities are limited. MPO staff recognizes these limitations, and relies on other sources, most notably public input, in order to plan transportation improvements most effectively.

Free Bridge Travel Demand Model Analysis

2010 Base

The model estimates that approximately 52,250 vehicles crossed Free Bridge daily in the year 2010. However, Free Bridge is only designed to carry roughly 45,600 vehicles per day. There is insufficient capacity for 13% of the trips crossing Free Bridge (6,650 daily trips). That is, we don't have the capacity available for one of every eight cars that use this bridge every day. Note: This is over the course of an entire day. During peak-hour travel this is intensified as more traffic travels during this time than during off-peak hours.

Nearly two-thirds of all daily trips crossing Free Bridge are local trips, traveling to/from areas within the Metropolitan Planning Organization (MPO) region, rather than external trips that travel to/from areas outside the MPO region. (Figure 1).

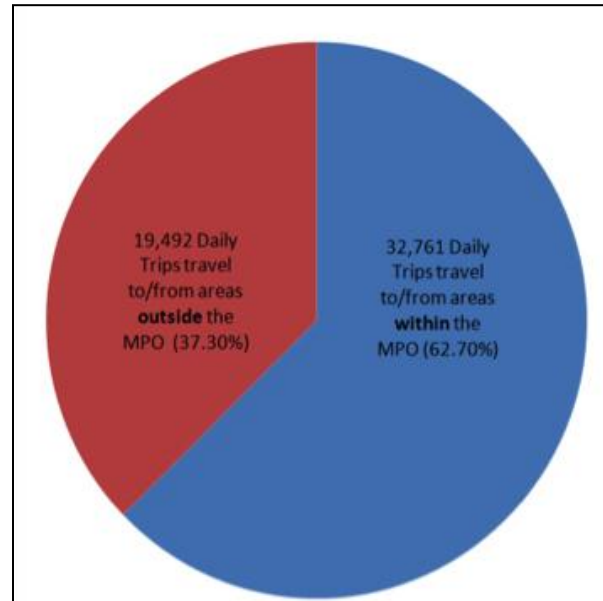


Figure 1. 2010 Local/External Volume of Trips

| Table 1. 2010 Free Bridge Daily Volume and Capacity Data | | | |
|---|--------|--------|-----------------|
| Daily Volume | 52,253 | | |
| <i>Eastbound</i> | 26,967 | 51.61% | of daily volume |
| <i>Westbound</i> | 25,286 | 48.39% | of daily volume |
| Daily Capacity | 45,600 | | |
| Daily Trips over Capacity | 6,653 | 12.73% | of daily volume |
| Volume to Capacity Ratio | 1.15 | | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | | |
| Daily trips traveling to/from areas within the MPO | 32,761 | 62.70% | of daily volume |
| Daily trips traveling to/from areas outside the MPO | 19,492 | 37.30% | of daily volume |

2040 Existing and Committed (E+C) Base

At present, nine major roadway projects are committed to be built by the year 2040. This group includes both state-funded and developer-funded roadways. These projects are important because they affect traffic movement throughout the entire regional system. These projects are listed below with brief descriptions.

| PROJECT | DESCRIPTION |
|---|---|
| US 29 Western Bypass | 6.24 miles of 4-lane limited access road, which bypasses US 29 from the South Fork of the Rivanna River to the US 250 Bypass at Leonard Sandridge Road. |
| US 29 Widening | Widening of US 29 to 6-lanes, between the South Fork of the Rivanna River to Timberwood Boulevard. |
| Hillsdale Drive Extended | 2-lane road that would parallel US 29 on its east side, beginning at Hydraulic Road and connecting with the existing Hillsdale Drive in Albemarle County. |
| John Warner Parkway/ McIntire Road; Ext./US 250 Interchange at McIntire Road | Two separate roadways, one in the City and one in the County that connect. Also a new interchange at McIntire Road and Route 250. |
| Best Buy Ramp | Ramp improvements and additional lane capacity along US 29, extending from slightly north of Angus Road to the US 250 Bypass. |
| North Pointe Boulevard | Developer road that would serve as the spine road for the North Pointe development located on the east side of US 29, just north of Proffit Road. The road would intersect with Proffit Rd and parallel US 29 intersecting US 29 at the Lewis and Clark Drive signal. |
| US 29 Widening north of Airport | Widening of US 29 from Airport Road to Lewis and Clark Drive from 4-lanes to 6-lanes. |
| Innovation Drive | Connects south terminus of Lewis and Clark Drive with Airport Road and Hollymead Town Center. |
| Bent Creek Drive | Developer road that would facilitate traffic into the Fifth Street Station development. It would intersect 5 th Street and then travel east paralleling Moore's Creek and intersecting with Avon Street. |

The model estimates that in 2040, 67,922 vehicles will cross Free Bridge daily. Meaning, an additional 15,669 daily trips will traverse Free Bridge from the 2010 figure of 52,253. This will bring the bridge to 22,000 daily trips (33%) over capacity. That is, we won't have the capacity available for one of every three cars that use this bridge every day.

More than two-thirds of all daily trips crossing Free Bridge are expected to be local trips (trips that start and end in the MPO region) which are expected to increase at a faster rate than external trips (trips that start or end outside the MPO region). (Figure 2).

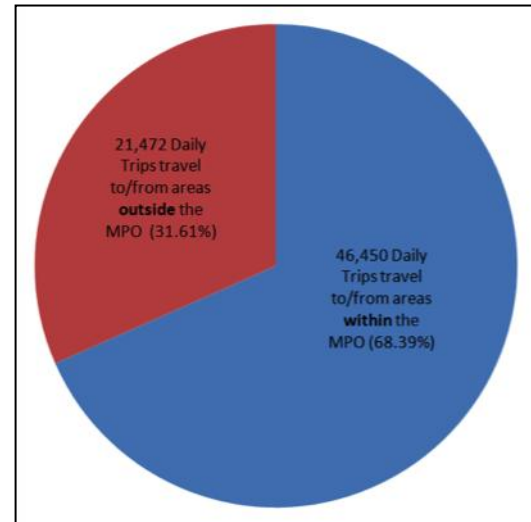


Figure 2. 2040 E+C Base Local/External Volume of Trips

Table 2. 2010/2040 Free Bridge Daily Volume Comparison

| | 2010 Data | 2040 Data | Increase in Daily Demand |
|---------------------------|-----------|-----------|--------------------------|
| Daily Volume | 52,253 | 67,922 | 15,669 |
| Eastbound | 26,967 | 34,310 | 7,343 |
| Westbound | 25,286 | 33,612 | 8,326 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 6,653 | 22,322 | 15,669 |
| Volume to Capacity Ratio | 1.15 | 1.49 | |

Table 3. 2040 Free Bridge Daily Volume and Capacity Data

| | | |
|---|--------|------------------------|
| Daily Volume | 67,922 | |
| Eastbound | 34,310 | 50.51% of daily volume |
| Westbound | 33,612 | 49.49% of daily volume |
| Daily Capacity | 45,600 | |
| Daily Trips over Capacity | 22,322 | 32.86% of daily volume |
| Volume to Capacity Ratio | 1.49 | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | |
| Daily trips traveling to/from areas within the MPO | 46,450 | 68.39% of daily volume |
| Daily trips traveling to/from areas outside the MPO | 21,472 | 31.61% of daily volume |

To better determine where trips crossing Free Bridge were traveling, the MPO region was divided into four general areas: the City, the Pantops area, the northern part of the county, and other areas of the county (Figure 3). Figure 4 shows the anticipated breakdown of trips crossing Free Bridge in 2040 that originate from and travel to each of these four areas.

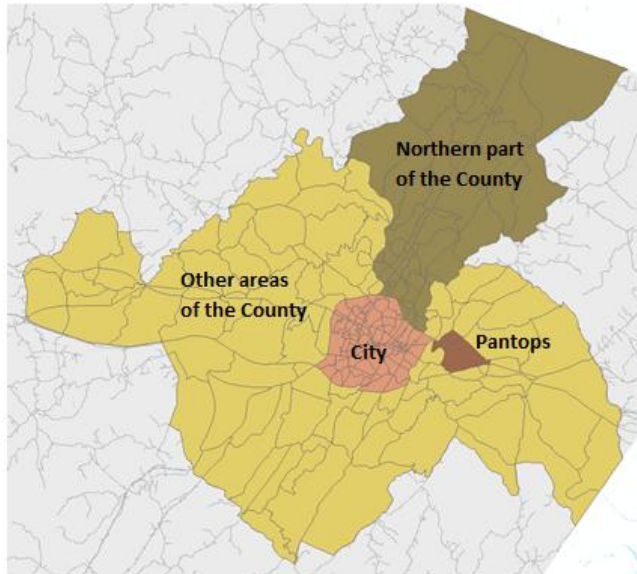


Figure 3. Map of the MPO region divided into four general areas for study.

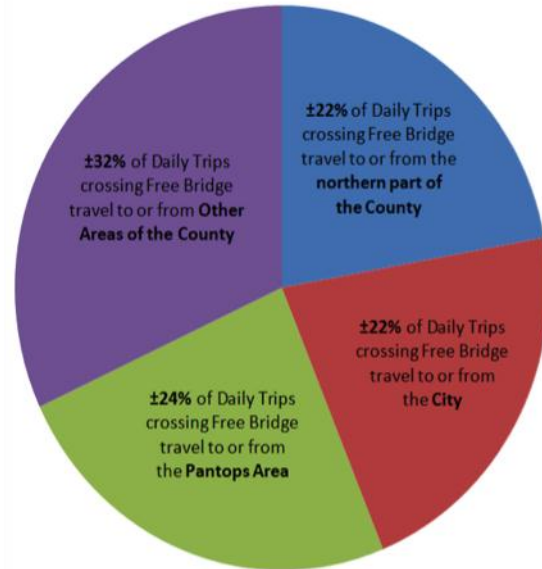


Figure 4. 2040 E+C Base Origin and Destination Areas of Trips crossing Free Bridge

The following sections describe potential connections and how they would perform with the Existing and Committed Base Scenario Projects in the year 2040.

2040 E+C Base with South Pantops Connector

Description

The South Pantops Drive Connector would cross the Rivanna River south of Free Bridge, connecting South Pantops Drive with East High Street. The purpose of this connector is to provide an alternate east-west route over the river between the Pantops area and the City. The image to the right shows the concept behind this connector road, not a proposed alignment.



Figure 5. Conceptual location of South Pantops Drive Connector

Findings

The South Pantops Drive Connector decreases the number of trips expected on Free Bridge by nearly 10,000 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would need to be diverted from Free Bridge to reduce the volume to match available capacity (Table 4). As noted in the “How the Model Works” section, when a road’s volume is equal to its capacity, the road is still operating at a level of service F, or a volume to capacity ratio of 1.00. Ideally, a road should function at a level of service E or better, which means that the volume on the roadway has to be less than 85% of the roadway’s capacity. This is important to remember for all the project options considered in this document.

Without this additional connection there would not be enough capacity for one in every three daily vehicles expected to use Free Bridge in 2040. With this additional connection, however, there would still not be enough capacity for one of every five daily vehicles expected to use Free Bridge in 2040.

| Table 4. 2040 Free Bridge Daily Volume Comparison | | | |
|---|-----------------------|----------------------------------|-----------------------------|
| | 2040 E+C Base Data | With South Pantops Drive Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 58,181 | -9,741 |
| Eastbound | 34,310 | 29,211 | -5,099 |
| Westbound | 33,612 | 28,970 | -4,642 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 12,581 | -9,741 |
| Volume to Capacity Ratio | 1.49 | 1.28 | |

| Table 5. 2040 Free Bridge Daily Volume and Capacity Data | | | |
|---|--------|------------------------|--|
| Daily Volume | 58,181 | | |
| Eastbound | 29,211 | 50.21% of daily volume | |
| Westbound | 28,970 | 49.79% of daily volume | |
| Daily Capacity | 45,600 | | |
| Daily Trips over Capacity | 12,581 | 21.62% of daily volume | |
| Volume to Capacity Ratio | 1.28 | | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | | |
| Daily trips traveling to/from areas within the MPO | 35,358 | 60.77% of daily volume | |
| Daily trips traveling to/from areas outside the MPO | 22,823 | 39.23% of daily volume | |

Mapping of these changes in volume indicated that the South Pantops Drive Connector would attract east-west trips from Interstate 64 onto this road, as well as trips from Free Bridge. The trips remaining on Free Bridge tend to be regional in nature, and are traveling between eastern and northern destinations, or between eastern and western destinations. In contrast, the South Pantops Drive Connector draws more local traffic, particularly between the Pantops area and the City (Figure 6).

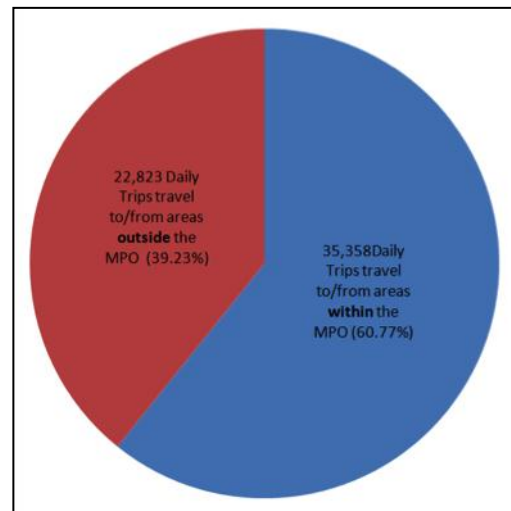


Figure 6. 2040 Local/External Volume of Trips with South Pantops Drive Connector

2040 E+C Base with State Farm Boulevard Connector

Description

The State Farm Boulevard Connector would cross the Rivanna River south of Free Bridge, connecting State Farm Boulevard with East Market Street. The purpose of this connector is to provide an alternate east-west route over the river between the Pantops area and the City. Figure 7 shows the concept behind this connector road, not a proposed alignment.



Figure 7. Conceptual location of State Farm Boulevard Connector

Findings

The State Farm Boulevard Connector decreases the number of trips expected on Free Bridge by nearly 6,300 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would have to be diverted from Free Bridge to reduce the volume to match available capacity (Table 6). Even with this additional connection, however, there would still not be enough capacity for one of every four daily vehicles expected to use Free Bridge in 2040.

| Table 6. 2040 Free Bridge Daily Volume Comparison | | | |
|---|-----------------------|-----------------------------------|-----------------------------|
| | 2040 E+C Base Data | With State Farm Boulevard Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 61,664 | -6,258 |
| Eastbound | 34,310 | 30,909 | -3,401 |
| Westbound | 33,612 | 30,755 | -2,857 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 16,064 | -6,258 |
| Volume to Capacity Ratio | 1.49 | 1.35 | |

| Table 7. 2040 Free Bridge Daily Volume and Capacity Data | | |
|---|--------|------------------------|
| Daily Volume | 61,664 | |
| Eastbound | 30,909 | 50.12% of daily volume |
| Westbound | 30,755 | 49.88% of daily volume |
| Daily Capacity | 45,600 | |
| Daily Trips over Capacity | 16,064 | 26.05% of daily volume |
| Volume to Capacity Ratio | 1.35 | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | |
| Daily trips traveling to/from areas within the MPO | 38,817 | 62.95% of daily volume |
| Daily trips traveling to/from areas outside the MPO | 22,847 | 37.05% of daily volume |

Mapping of these changes in volume indicated that the State Farm Boulevard Connector attracts east-west trips from Interstate 64 onto this road as well as drawing trips from Free Bridge. The trips remaining on Free Bridge tend to be regional in nature, and are traveling between eastern and the western destinations, or between eastern and northern destinations. In contrast, the State Farm Boulevard Connector draws more local traffic, particularly between the Pantops area and the City (Figure 8).

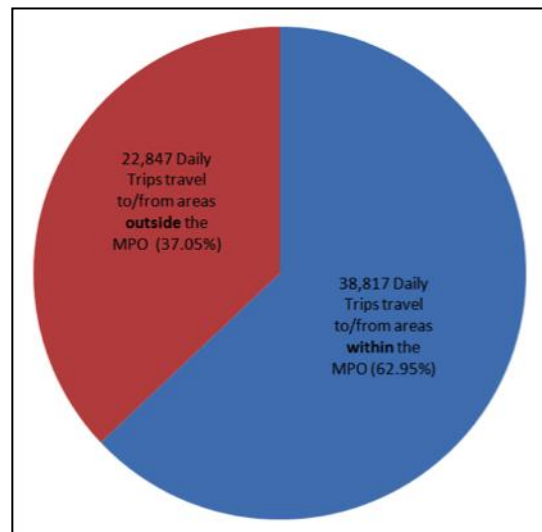


Figure 8. 2040 Local/External Volume of Trips with State Farm Boulevard Connector

2040 E+C Base with 2-lane Eastern Connector

Description

The 2-lane Eastern Connector would cross the Rivanna River north of Free Bridge, connecting Route 20/Stony Point Road with Rio Road. The purpose of this connector is to provide an alternate east-west route across the river for trips traveling from the eastern area of the Metropolitan Planning Organization (MPO) region to destinations on US 29 North. Figure 9 shows the concept behind this connector road, not a proposed alignment.



Figure 9. Conceptual location of 2-lane Eastern Connector

Findings

The 2-lane Eastern Connector decreases the number of trips expected on Free Bridge by approximately 8,500 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would have to be diverted from Free Bridge to reduce the volume to available capacity (Table 8). Even with this additional connection, however, there would not be enough capacity for one of every four daily vehicles expected to use Free Bridge in 2040.

| Table 8. 2040 Free Bridge Daily Volume Comparison | | | |
|---|-----------------------|---------------------------------------|-----------------------------|
| | 2040 E+C Base Data | With 2-lane Eastern Connector Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 59,393 | -8,529 |
| Eastbound | 34,310 | 29,951 | -4,359 |
| Westbound | 33,612 | 29,443 | -4,169 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 13,793 | -8,529 |
| Volume to Capacity Ratio | 1.49 | 1.30 | |

| Table 9. 2040 Free Bridge Daily Volume and Capacity Data | | |
|---|--------|------------------------|
| Daily Volume | 59,393 | |
| Eastbound | 29,951 | 50.43% of daily volume |
| Westbound | 29,443 | 49.57% of daily volume |
| Daily Capacity | 45,600 | |
| Daily Trips over Capacity | 13,793 | 23.22% of daily volume |
| Volume to Capacity Ratio | 1.30 | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | |
| Daily trips traveling to/from areas within the MPO | 39,373 | 66.29% of daily volume |
| Daily trips traveling to/from areas outside the MPO | 20,020 | 33.71% of daily volume |

Mapping of these changes in volume indicated that the 2-lane Eastern Connector attracts east-west trips from Interstate 64 and US 250 onto this road, as well as drawing trips from Free Bridge. The trips remaining on Free Bridge tend to be regional in nature and are traveling between eastern and western destinations. In contrast, the 2-lane Eastern Connector tends to draw more local traffic, particularly between the Pantops area northern area destinations (Figure 10).

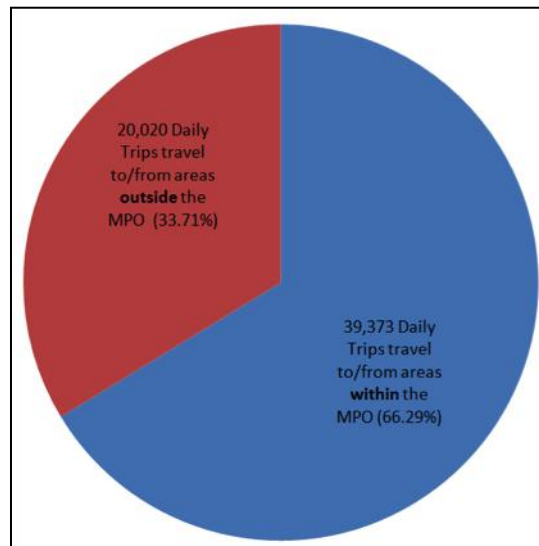


Figure 10. 2040 Local/External Volume of Trips with the 2-lane Eastern Connector

2040 E+C Base with 4-lane Eastern Connector

Description

The 4-lane Eastern Connector would cross the Rivanna River north of Free Bridge, connecting Route 20/Stony Point Road with Rio Road. The purpose of this connector is to provide an alternate east-west route across the river for trips traveling from the eastern area of the Metropolitan Planning Organization (MPO) region to destinations on US 29 North. The image below shows the concept behind this connector road, not a proposed alignment.



Figure 11. Conceptual location of 4-lane Eastern Connector

Findings

The 4-lane Eastern Connector decreases the number of trips expected on Free Bridge by approximately 12,600 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would have to be diverted from Free Bridge to reduce the volume to the available capacity (Table 10). Even with this additional connection, however, there would not be enough capacity for one of every six daily vehicles expected to use Free Bridge in 2040.

| Table 10. 2040 Free Bridge Daily Volume Comparison | | | |
|--|-----------------------|---------------------------------------|-----------------------------|
| | 2040 E+C Base Data | With 4-lane Eastern Connector Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 55,330 | -12,592 |
| Eastbound | 34,310 | 27,739 | -6,571 |
| Westbound | 33,612 | 27,591 | -6,021 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 9,730 | -12,592 |
| Volume to Capacity Ratio | 1.49 | 1.21 | |

| Table 11. 2040 Free Bridge Daily Volume and Capacity Data | | | |
|---|--------|--------|-----------------|
| Daily Volume | 55,330 | | |
| Eastbound | 27,739 | 50.13% | of daily volume |
| Westbound | 27,591 | 49.87% | of daily volume |
| Daily Capacity | 45,600 | | |
| Daily Trips over Capacity | 9,730 | 17.59% | of daily volume |
| Volume to Capacity Ratio | 1.21 | | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | | |
| Daily trips traveling to/from areas within the MPO | 38,234 | 69.10% | of daily volume |
| Daily trips traveling to/from areas outside the MPO | 17,096 | 30.90% | of daily volume |

Mapping of these changes in volume indicates that the 4-lane Eastern Connector attracts east-west trips from Interstate 64, US 250, and John Warner Parkway onto this road as well as drawing trips from Free Bridge. The trips remaining on Free Bridge tend to be regional in nature and are traveling between the eastern and the western destinations. Similarly, the 4-lane Eastern Connector tends to draw more regional traffic, particularly to and from eastern destinations. This differs from the traffic using the 2-lane Eastern Connector, which tends to draw local traffic. The additional lanes and capacity provided with the 4-lane Eastern Connector make it more attractive to regional traffic.

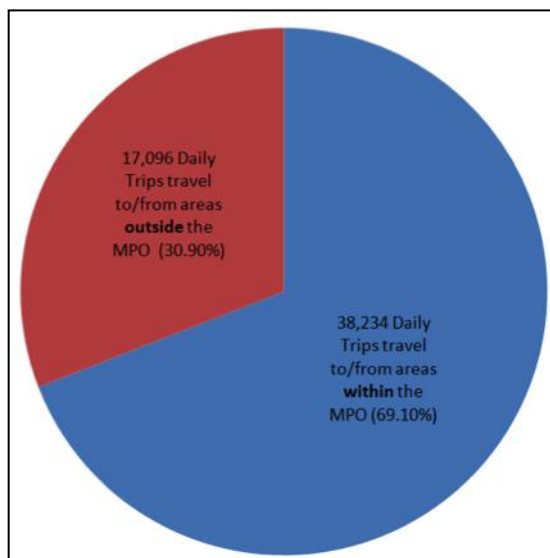


Figure 12. 2040 Local/External Volume of Trips with the 4-lane Eastern Connector

2040 E+C Base with Limited Access on US 250

Description

The Limited Access on US 250 explores the option of limiting automobile access to US 250 between Free Bridge and US 29 by removing the existing access at Locust Avenue, Park Street, Rugby Avenue, Dairy Road, and Hydraulic Road. These locations are indicated with the red dots in Figure 13. As a result of removing four access points, only three would remain open on this section of US 250: High Street, John Warner Parkway, and US 29 (indicated by the green dots in Figure 13). The purpose of this approach is to limit the number of trips crossing Free Bridge by encouraging trips using US 250 to select an alternate route.



Figure 13. Limited Access on US 250

Findings

Limiting the access points on US 250 decreases the number of trips expected on Free Bridge by approximately 2,200 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would have to be diverted from Free Bridge to reduce the volume to the available capacity (Table 12). Even with this additional connection, however, there would not be enough capacity for three of every ten daily vehicles expected to use Free Bridge in 2040.

| Table 12. 2040 Free Bridge Daily Volume Comparison | | | |
|--|-----------------------|---------------------------------------|-----------------------------|
| | 2040 E+C Base Data | With US 250 Limited Access Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 65,679 | -2,243 |
| Eastbound | 34,310 | 33,513 | -797 |
| Westbound | 33,612 | 32,166 | -1,446 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 20,079 | -2,243 |
| Volume to Capacity Ratio | 1.49 | 1.44 | |

| Table 13. 2040 Free Bridge Daily Volume and Capacity Data | | |
|---|--------|------------------------|
| Daily Volume | 65,679 | |
| Eastbound | 33,513 | 51.03% of daily volume |
| Westbound | 32,166 | 48.97% of daily volume |
| Daily Capacity | 45,600 | |
| Daily Trips over Capacity | 20,079 | 30.57% of daily volume |
| Volume to Capacity Ratio | 1.44 | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | |
| Daily trips traveling to/from areas within the MPO | 46,213 | 70.36% of daily volume |
| Daily trips traveling to/from areas outside the MPO | 19,466 | 29.64% of daily volume |

Mapping of these changes in volume indicated that the limited access on US 250 reduces the number of daily trips using US 250 between Locust Avenue and Park Street by 7,930 daily trips. The trips remaining on Free Bridge tend to be regional in nature, traveling between eastern and the western destinations.

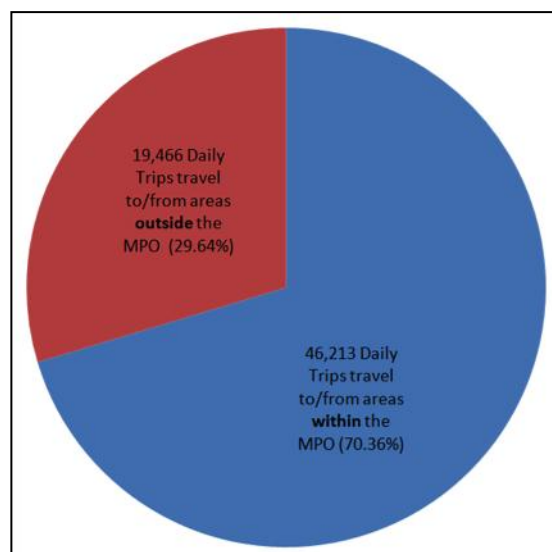


Figure 14. 2040 Local/External Volume of Trips with Limited Access on US 250

2040 E+C Base with US 29/US 250 & Interstate 64 Widening

Description

Trips traveling east-west in the MPO region and crossing the Rivanna River have two high-capacity routes available to choose from: 1) Interstate 64 to US 29/US 250; and 2) US 250. The model indicates that if only the existing and committed projects (discussed in the 2040 existing and committed base section) are built by 2040, that these two key regional connections will be heavily congested. The congested sections of these routes run on US 29/US 250 from Interstate 64 north to Leonard Sandridge Drive and on US 250 from North Milton Road east to Locust Avenue. Despite heavy congestion on both these links, the second option is a more desirable alternative because it is a shorter connection by distance. The US 29/US 250 and Interstate 64 Widening project explores the option of widening US 29/US 250 to eight lanes from Interstate 64 north to Fontaine Avenue and to six lanes from Fontaine Avenue north to Barracks Road. In addition, Interstate 64 would be widened to six lanes between exits 124 and 118. The purpose of this approach is to alleviate the congestion anticipated on US 29/US 250 to make this a faster and more attractive route than using US 250 and Free Bridge. Additional capacity would be provided on Interstate 64 to accommodate the extra trips diverting from US 250 and Free Bridge.



Figure 15. US 29/US 250 & Interstate 64 Widening

Findings

Widening US 29/US 250 and Interstate 64 decreases the number of trips expected on Free Bridge by approximately 2,300 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would have to be diverted from Free Bridge to reduce the volume to the available capacity (Table 14). Even with this additional connection, however, there would not be enough capacity for three of every ten daily vehicles expected to use Free Bridge in 2040.

| Table 14. 2040 Free Bridge Daily Volume Comparison | | | |
|--|-----------------------|---|-----------------------------|
| | 2040 E+C Base Data | With US 29/US 250 & I-64 Widening Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 65,583 | -2,339 |
| Eastbound | 34,310 | 33,443 | -867 |
| Westbound | 33,612 | 32,140 | -1,472 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 19,983 | -2,339 |
| Volume to Capacity Ratio | 1.49 | 1.44 | |

| Table 15. 2040 Free Bridge Daily Volume and Capacity Data | | |
|---|--------|------------------------|
| Daily Volume | 65,583 | |
| Eastbound | 33,443 | 50.99% of daily volume |
| Westbound | 32,140 | 49.01% of daily volume |
| Daily Capacity | 45,600 | |
| Daily Trips over Capacity | 19,983 | 30.47% of daily volume |
| Volume to Capacity Ratio | 1.44 | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | |
| Daily trips traveling to/from areas within the MPO | 46,517 | 70.93% of daily volume |
| Daily trips traveling to/from areas outside the MPO | 19,066 | 29.07% of daily volume |

Mapping of these changes in volume indicated that the US 29/US 250 and Interstate 64 widening reduces the number of daily trips using US 250 between Locust Avenue and Park Street by nearly 1,800 daily trips. The trips remaining on Free Bridge tend to be regional in nature and are traveling between eastern and the western destinations.

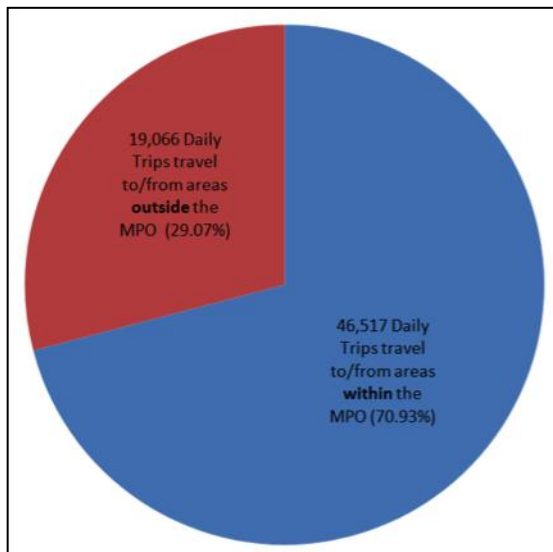


Figure 16. 2040 Local/External Volume of Trips with US 29/US 250 and Interstate 64 Widening

2040 E+C Base with the South Pantops Drive Connector and 2-lane Eastern Connector

Description

The South Pantops Drive Connector would cross the Rivanna River south of Free Bridge, connecting South Pantops Drive with East High Street. The 2-lane Eastern Connector would cross the Rivanna River north of Free Bridge, connecting Route 20/Stony Point Road with Rio Road. The purpose of these connectors is to provide alternate east-west routes across the river for trips traveling from the eastern side of the Metropolitan Planning Organization (MPO) region to the destinations in the western and northern areas of the MPO region. The image below shows the concept behind these connector roads, not the proposed alignments.

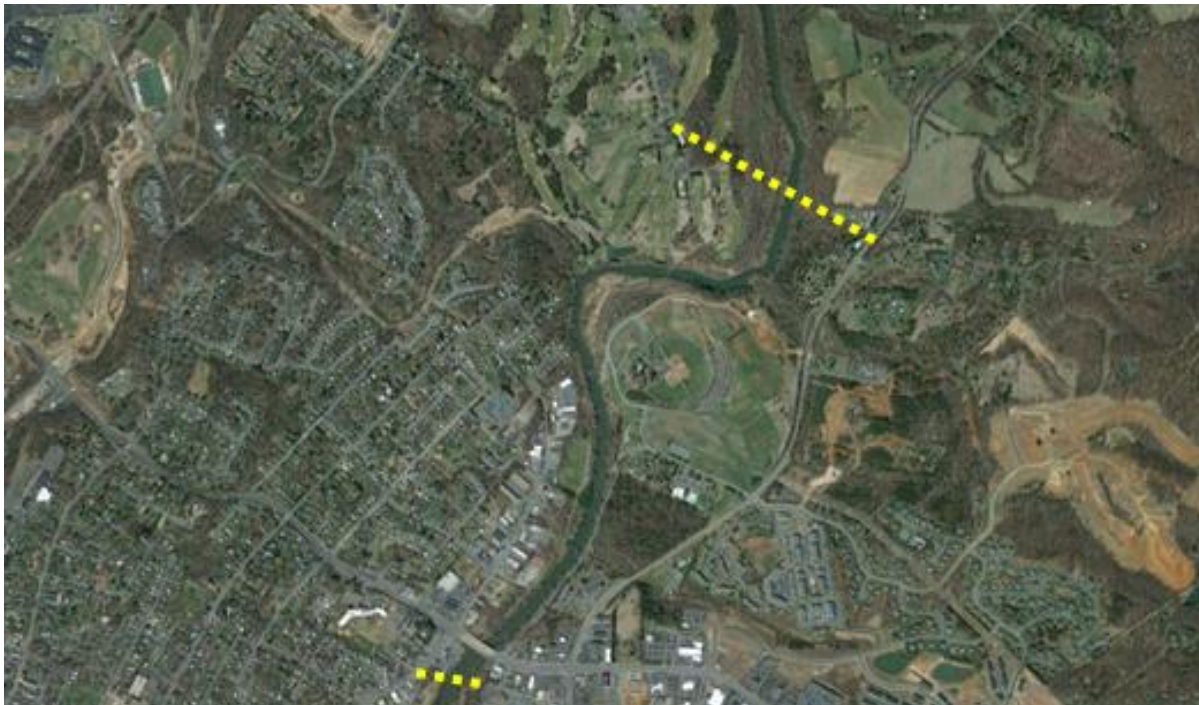


Figure 17. Conceptual location of South Pantops Drive Connector and the 2-lane Eastern Connector

Findings

The South Pantops Drive Connector and 2-lane Eastern Connector decrease the number of trips expected on Free Bridge by approximately 15,300 daily trips. This connection is still insufficient, though, as more than 22,000 daily trips would have to be diverted from Free Bridge to reduce the volume to the available capacity (Table 16). Even with this additional connection, however, there would not be enough capacity for one of every eight daily vehicles expected to use Free Bridge in 2040.

| Table 16. 2040 Free Bridge Daily Volume Comparison | | | |
|--|-----------------------|--|-----------------------------|
| | 2040 E+C Base Data | With South Pantops Drive & 2-lane Eastern Connector Data | Increase in Daily Demand |
| Daily Volume | 67,922 | 52,653 | -15,269 |
| Eastbound | 34,310 | 26,482 | -7,828 |
| Westbound | 33,612 | 26,171 | -7,441 |
| Daily Capacity | 45,600 | 45,600 | |
| Daily Trips over Capacity | 22,322 | 7,053 | -15,269 |
| Volume to Capacity Ratio | 1.49 | 1.15 | |

| Table 17. 2040 Free Bridge Daily Volume and Capacity Data | | | |
|---|--------|------------------------|--|
| Daily Volume | 52,653 | | |
| Eastbound | 26,482 | 50.30% of daily volume | |
| Westbound | 26,171 | 49.70% of daily volume | |
| Daily Capacity | 45,600 | | |
| Daily Trips over Capacity | 7,053 | 13.40% of daily volume | |
| Volume to Capacity Ratio | 1.15 | | |
| Trips traveling <i>within</i> the MPO vs. Trips traveling to/from areas <i>outside</i> the MPO | | | |
| Daily trips traveling to/from areas within the MPO | 31,009 | 58.89% of daily volume | |
| Daily trips traveling to/from areas outside the MPO | 21,644 | 41.11% of daily volume | |

Mapping of these changes in volume indicated that the South Pantops Drive Connector and the 2-lane Eastern Connector attract east-west trips from Interstate 64 and US 250 onto these roads as well as drawing trips from Free Bridge. The trips remaining on Free Bridge tend to be regional in nature and are traveling between eastern and the western destinations. In contrast, the South Pantops Drive Connector draws more local traffic, particularly between the Pantops area and the City. The 2-lane Eastern Connector also tends to draw more local traffic, particularly between the Pantops area and northern destinations.

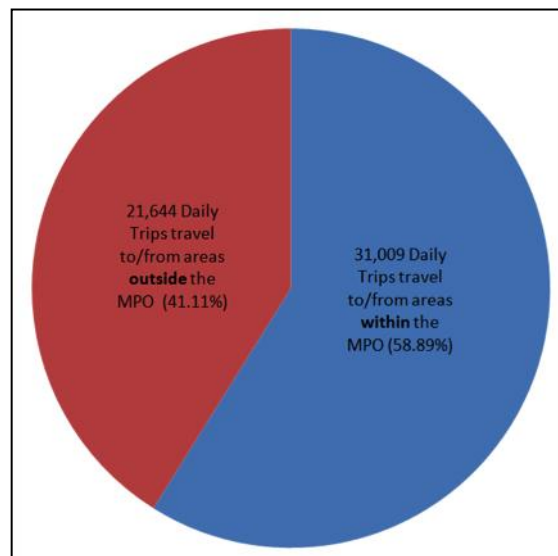


Figure 18. 2040 Local/External Volume of Trips with the South Pantops Drive Connector and the 2-lane Eastern Connector

Conclusions from Travel Demand Modeling Analysis

As noted in the Travel Demand Modeling Analysis, Free Bridge currently carries approximately 52,250 vehicles a day although it only has the capacity to carry 45,600 vehicles daily. (Refer to Figure 19). By 2040 this is expected to increase to approximately 67,922 vehicles daily. (Refer to Figure 20).

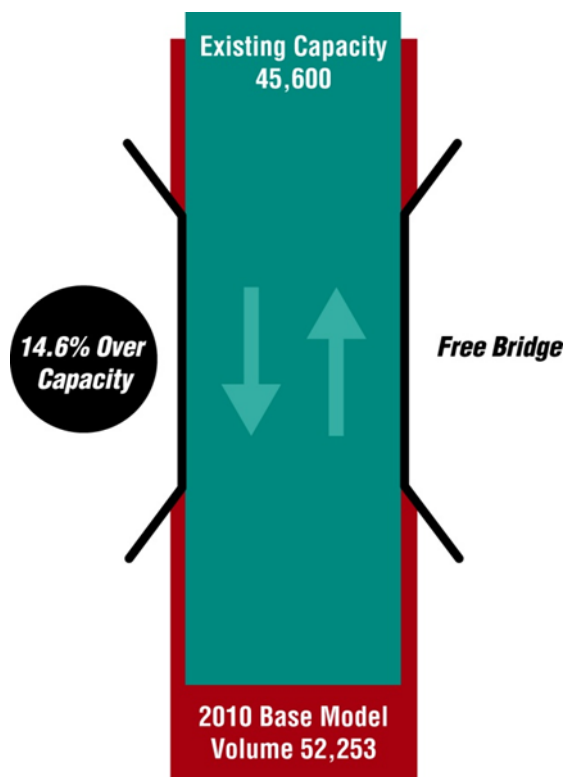


Figure 19. 2010 Conditions on Free Bridge.

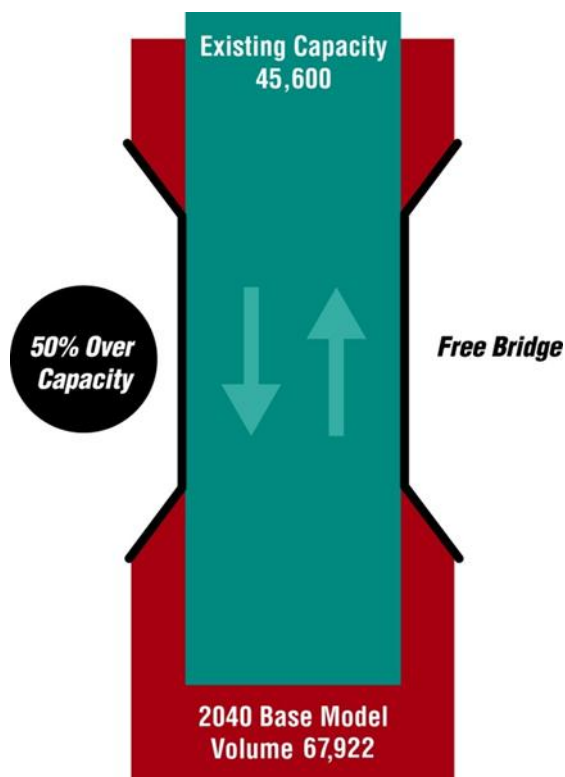


Figure 10. 2040 Anticipated Conditions on Free Bridge.

Several proposed alternatives to reduce the anticipated demand on Free Bridge were studied including; a South Pantops Drive Connector; a State Farm Boulevard Connector; a 2-lane and 4-lane Eastern Connector; limiting access on US 250; widening Interstate 64 and US 29/US 250; and, a combination of both the South Pantops Drive Connector and the 2-lane Eastern Connector. While all of these alternatives reduced traffic to a degree, none of these options reduced the expected demand on Free Bridge to a congestion-free level, meaning that none of the alternatives studied resulted in the volume on Free Bridge being less than the available capacity (Refer to Table 18, next page).

| Table 18. Volume and Capacity Comparison for Free Bridge Congestion Relief Project: Previously Considered Alternatives | | | | | | | | | | | |
|--|-------------------------|-------------|-------------|----------------------------|-----------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------------|---|--------|
| | | 2010 Base | 2040 Base | OPTION 1 | OPTION 2 | OPTION 3 | OPTION 4 | OPTION 5 | OPTION 6 | OPTION 7 | |
| | | | | <i>S Pantops Connector</i> | <i>State Farm Connector</i> | <i>2-lane Eastern Connector</i> | <i>4-lane Eastern Connector</i> | <i>Limited Access on US 250</i> | <i>Widening I-64 and US 250/US 29</i> | <i>S Pantops Connector & 2-lane Eastern Connector</i> | |
| Free Bridge | Volume | 52,253 | 68,569 | 58,181 | 61,664 | 59,393 | 55,330 | 65,679 | 65,583 | 52,653 | |
| | Eastbound | 26,967 | 34,574 | 29,211 | 30,909 | 29,951 | 27,740 | 33,513 | 33,443 | 26,482 | |
| | Westbound | 25,286 | 33,995 | 28,970 | 30,755 | 29,443 | 27,591 | 32,166 | 32,140 | 26,171 | |
| | Capacity | 45,600 | 45,600 | 45,600 | 45,600 | 45,600 | 45,600 | 45,600 | 45,600 | 45,600 | |
| | v/c Ratio | 1.15 | 1.50 | 1.28 | 1.35 | 1.30 | 1.21 | 1.44 | 1.44 | 1.15 | |
| | Not enough capacity for | 1 of 8 cars | 1 of 3 cars | 1 of 5 cars | 1 of 4 cars | 1 of 4 cars | 1 of 6 cars | 3 of 10 cars | 3 of 10 cars | 1 of 8 cars | |
| | | | | | | | | | <i>S Pantops</i> | <i>Eastern Connector</i> | |
| Proposed Connector | Volume | | | 16,558 | 14,697 | 17,025 | 24,734 | | | 11,849 | 15,883 |
| | Eastbound | | | 8,465 | 7,735 | 8,538 | 12,624 | | | 5,837 | 8,163 |
| | Westbound | | | 8,093 | 6,962 | 8,487 | 12,109 | | | 6,012 | 7,720 |
| | Capacity | | | 17,000 | 17,000 | 17,000 | 34,000 | | | 17,000 | 17,000 |
| | v/c Ratio | | | 0.97 | 0.86 | 1.00 | 0.73 | | | 0.70 | 0.93 |
| | Total Trips | 52,253 | 68,569 | 74,739 | 76,361 | 76,418 | 80,064 | 65,679 | 65,583 | 80,385 | |