Davidson County, Tennessee Auto Travel Analysis

Tennessee Department of Transportation

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Long Range Planning Division
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The purpose of this analysis is to provide a detailed visual of the auto trips that are made within Davidson County. This analysis breaks up Davidson County into 10 zones in order to get a more detailed representation of the auto trips, which was then compared to the number of bus routes that serve each zone to determine if auto trips decrease when public transit is provided.
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ACKNOWLEDGEMENT

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CHAPTER 1. INTRODUCTION

The purpose of this report is to evaluate the auto travel patterns for the anticipated 2020 year. Davidson County is a county located in the U.S. state of Tennessee. According to the United States Census Bureau, Davidson County had an estimated population of 691,243. Its county seat is Nashville, the state capital. The reasoning for evaluating the auto trips in Davidson County is because as Nashville continues to grow there is going to be an increase in the number of residents who are moving into Davidson County, which overall means there will be an increase in the number of vehicle trips being made.

This analysis targets to find out where the auto trips are being generated from and where the major destinations are for 2020. In order to determine where the major attraction and production locations in Davidson County are located. In order to get a better evaluation of the auto trips in Davidson County, the county was split up into 10 zones based on the current traffic analysis zones and the zip codes in Davidson County. Davidson County has 231 traffic analysis zones that were used for this report. Figure 1.0 represents the 10 zones that were created for the analysis of Davidson County.
Within this analysis there will be two major components that help shape the results of this analysis. The following components are:

- Current Commuting Pattern Analysis
- Future Commuting Pattern Analysis

Using these two pieces in this analysis it will be easy to determine which zones in Davidson County are producing the most auto trips and which zones are attracting the most auto trips. After figuring out which zones have the highest rate of auto trips, the next step will be to compare these zones with the current bus system that serves Davidson County. The reasoning for comparing the zones to the bus system is to determine if there is an increase in the number of auto trips being made in locations that are not served by public transportation.

With this analysis it will most likely be anticipated that the zones that are further away from downtown Nashville will have more auto trips than the zones that are closer to Nashville. The reasoning for this is because these zones are not as served with public transportation as the zones that are closer to Nashville.
CHAPTER 2. DAVIDSON COUNTY CHARACTERISTICS

Chapter 2 is designed to provide the basic background information on Davidson County. The background information will cover the demographic information of each of the zones that Davidson County was broken up into. Along with the demographic background, there will be brief background coverage on the transportation in Davidson County.

Section 2.1. Davidson County Demographic Background

Referring back to figure 1.0 the zones that Davidson County was broken up into for this analysis. Each of these 10 analysis zones will be analyzed using the Tennessee Statewide Model, using desire lines. An important factor for these zones in determining where the major flow of traffic is going to be made to will be based on the demographic factors of the zone, as each zone is relatively different. Table 2.0 shows the basic demographic factors for 2016, for each of the 10 zones that are being analyzed in Davidson County.

<table>
<thead>
<tr>
<th>Davidson County</th>
<th>Population</th>
<th>Households</th>
<th>Household Size</th>
<th>Household Income</th>
<th>Total Employment</th>
<th>Average Number of Workers Household</th>
<th>Average Vehicles per Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>8,971</td>
<td>4,093</td>
<td>1.5</td>
<td>$37,642</td>
<td>67,672</td>
<td>2.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Zone 2</td>
<td>64,095</td>
<td>28,119</td>
<td>2.4</td>
<td>$119,991</td>
<td>21,243</td>
<td>1.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Zone 3</td>
<td>38,481</td>
<td>13,886</td>
<td>2.5</td>
<td>$52,960</td>
<td>19,057</td>
<td>3.2</td>
<td>2.1</td>
</tr>
<tr>
<td>Zone 4</td>
<td>104,544</td>
<td>44,965</td>
<td>2.1</td>
<td>$74,607</td>
<td>174,507</td>
<td>2.1</td>
<td>1.7</td>
</tr>
<tr>
<td>Zone 5</td>
<td>96,336</td>
<td>39,662</td>
<td>2.4</td>
<td>$42,308</td>
<td>63,131</td>
<td>2.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Zone 6</td>
<td>109,427</td>
<td>44,646</td>
<td>2.5</td>
<td>$62,743</td>
<td>363,340</td>
<td>1.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Zone 7</td>
<td>88,641</td>
<td>34,860</td>
<td>2.4</td>
<td>$55,793</td>
<td>57,980</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Zone 8</td>
<td>52,851</td>
<td>23,175</td>
<td>2.3</td>
<td>$61,875</td>
<td>61,600</td>
<td>2.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Zone 9</td>
<td>39,121</td>
<td>16,489</td>
<td>2.4</td>
<td>$43,959</td>
<td>23,072</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Zone 10</td>
<td>24,200</td>
<td>9,597</td>
<td>2.5</td>
<td>$53,154</td>
<td>10,659</td>
<td>2.0</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Table 2.0. Demographic Factors for Davidson County 10 Analysis Zones

Looking at the statistic in table 2.0 there is a clear indication that zone 1; the zone that contains Nashville has the lowest household income. This can be anticipated that this zone will produce lower auto trips. The reasoning for this is because, with this zone having the lowest household income, there is a greater chance that the people living here do not own vehicles and rely more on
public transportation for their daily commutes. Where zone 2 has the highest household income, it could be assumed that auto trips will be the opposite then what will show in zone 1.

Section 2.2. Transportation Characteristics

One of the most important understanding with the number of auto trips being produced and the population in each of the zones, is getting an understanding of the number of trips that are made daily per person. The will allow for an understanding of how many auto trips are being made per person in a day. Table 2.1 shows the number of auto trips with the population in each zone determining the number of trips per person.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Auto Trips</th>
<th>Population</th>
<th>Auto Trips/Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>65,593</td>
<td>8,971</td>
<td>7.31</td>
</tr>
<tr>
<td>Zone 2</td>
<td>67,612</td>
<td>64,095</td>
<td>1.05</td>
</tr>
<tr>
<td>Zone 3</td>
<td>61,087</td>
<td>38,481</td>
<td>1.59</td>
</tr>
<tr>
<td>Zone 4</td>
<td>193,096</td>
<td>104,544</td>
<td>1.85</td>
</tr>
<tr>
<td>Zone 5</td>
<td>139,951</td>
<td>96,336</td>
<td>1.45</td>
</tr>
<tr>
<td>Zone 6</td>
<td>101,790</td>
<td>109,427</td>
<td>0.93</td>
</tr>
<tr>
<td>Zone 7</td>
<td>82,802</td>
<td>88,641</td>
<td>0.93</td>
</tr>
<tr>
<td>Zone 8</td>
<td>71,145</td>
<td>52,851</td>
<td>1.35</td>
</tr>
<tr>
<td>Zone 9</td>
<td>43,882</td>
<td>39,121</td>
<td>1.12</td>
</tr>
<tr>
<td>Zone 10</td>
<td>41,381</td>
<td>24,200</td>
<td>1.71</td>
</tr>
<tr>
<td>Davidson County</td>
<td>868,339</td>
<td>626,667</td>
<td>1.39</td>
</tr>
</tbody>
</table>

*Table 2.1. Auto Trips to Population Ratio*

One of the important things to remember when looking at the origin and destination matrix for the auto trips in Davidson County is that it is using a balanced table meaning that the productions are equal to the attractions. Referring to table 2.1 there is an average of 1.39 auto trips made per person that is living within Davidson County. This is calculated using the total trips that are made whether the trips are a work trips or a non-work trip.
Table 2.0 illustrates the 10 zones that will be used for this analysis along with the major cities in Davidson County that fall within each of those zones. Showing where the location of major cities in Davidson County is important because these are the major locations for employment and shopping which are two of the major drivers that influence auto travel amongst individuals. *Table 2.2* shows the number of auto trips that are made within Davidson County based on the number of employment opportunities that are within each of the 10 zones in the county.


<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Auto Trips</th>
<th>Employment</th>
<th>Auto Trips/Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>65,593</td>
<td>67,672</td>
<td>0.97</td>
</tr>
<tr>
<td>Zone 2</td>
<td>67,612</td>
<td>21,243</td>
<td>3.18</td>
</tr>
<tr>
<td>Zone 3</td>
<td>61,087</td>
<td>19,057</td>
<td>3.21</td>
</tr>
<tr>
<td>Zone 4</td>
<td>193,096</td>
<td>174,507</td>
<td>1.11</td>
</tr>
<tr>
<td>Zone 5</td>
<td>139,951</td>
<td>63,131</td>
<td>2.22</td>
</tr>
<tr>
<td>Zone 6</td>
<td>101,790</td>
<td>363,340</td>
<td>0.28</td>
</tr>
<tr>
<td>Zone 7</td>
<td>82,802</td>
<td>57,980</td>
<td>1.43</td>
</tr>
<tr>
<td>Zone 8</td>
<td>71,145</td>
<td>61,600</td>
<td>1.15</td>
</tr>
<tr>
<td>Zone 9</td>
<td>43,882</td>
<td>23,072</td>
<td>1.90</td>
</tr>
<tr>
<td>Zone 10</td>
<td>41,381</td>
<td>10,659</td>
<td>3.88</td>
</tr>
<tr>
<td>Davidson County</td>
<td>868,339</td>
<td>862,261</td>
<td>1.01</td>
</tr>
</tbody>
</table>

Table 2.2. Auto Trips to Employment Ratio

Based on the data provided in *table 2.2* there is an average of 1.01 trips made per each employment opportunity. *Figure 2.1* uses the InfoGroup data from 2013 to determine how many firms are in each of the zones that Davidson County is broken up into. This will most likely play a critical role when evaluating how many auto trips are being made to each of the zones in Davidson County.
From the statistics provided in the InfoGroup data on the number of firms in Davidson County, there is a clear indication that the eastern part of Davidson County has the vast majority of the firms in Davidson County. From this data is can be suggested that there will be more auto trips made to this region of Davidson County because of the number of employment firms that are located in this area.
CHAPTER 3. CURRENT COMMUTING PATTERN ANALYSIS

Chapter 3 is designed to provide a visual of the auto travel patterns in Davidson County using various techniques. The first visualization will use desire lines to create a visual between the 10 zones, illustrating the amount of auto trips that each zone is producing and attracting. The second set of data will look at the travel times of commuting trips in Davidson County, and the final set of data will be to show the traffic volume on the interstates, expressways, and arterials that run through Davidson County.

Section 3.1. Desire Line Analysis

Section 3.1 is designed to create 10 sets of desire lines based on the auto trips that are made to each of the zones in Davidson County. The origin and destination matrix was created by using the existing traffic analysis zones that were selected in each of the zones and joining them into one group and summing the total trips created to each zone. The desire lines are created to show that with the thicker the line the more auto trips that are made to that zone. Figure 3.0 through figure 3.9 shows the desire lines from each of the zones in Davidson County to the other zones. As the desire lines don’t illustrate an exact table 3.0 provides the origin and destination matrix for the auto trips between the 10 created zones in Davidson County.

<table>
<thead>
<tr>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
<th>Zone 7</th>
<th>Zone 8</th>
<th>Zone 9</th>
<th>Zone 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>-</td>
<td>3,222</td>
<td>4,016</td>
<td>28,737</td>
<td>14,404</td>
<td>5,628</td>
<td>3,485</td>
<td>3,650</td>
<td>1,452</td>
</tr>
<tr>
<td>Zone 2</td>
<td>3,222</td>
<td>-</td>
<td>2,120</td>
<td>41,440</td>
<td>3,845</td>
<td>11,865</td>
<td>2,728</td>
<td>1,745</td>
<td>378</td>
</tr>
<tr>
<td>Zone 3</td>
<td>4,016</td>
<td>2,120</td>
<td>-</td>
<td>26,606</td>
<td>13,861</td>
<td>2,754</td>
<td>1,364</td>
<td>2,858</td>
<td>3,317</td>
</tr>
<tr>
<td>Zone 4</td>
<td>28,737</td>
<td>41,440</td>
<td>26,606</td>
<td>-</td>
<td>30,750</td>
<td>33,800</td>
<td>14,134</td>
<td>8,745</td>
<td>5,474</td>
</tr>
<tr>
<td>Zone 5</td>
<td>14,404</td>
<td>3,845</td>
<td>13,861</td>
<td>30,750</td>
<td>-</td>
<td>14,818</td>
<td>13,303</td>
<td>19,490</td>
<td>20,595</td>
</tr>
<tr>
<td>Zone 6</td>
<td>5,628</td>
<td>11,865</td>
<td>2,754</td>
<td>33,800</td>
<td>14,818</td>
<td>-</td>
<td>26,340</td>
<td>5,408</td>
<td>817</td>
</tr>
<tr>
<td>Zone 7</td>
<td>3,485</td>
<td>2,728</td>
<td>1,364</td>
<td>14,134</td>
<td>13,303</td>
<td>26,340</td>
<td>-</td>
<td>18,957</td>
<td>1,558</td>
</tr>
<tr>
<td>Zone 8</td>
<td>3,650</td>
<td>1,745</td>
<td>2,858</td>
<td>8,745</td>
<td>19,490</td>
<td>5,408</td>
<td>18,957</td>
<td>-</td>
<td>10,291</td>
</tr>
<tr>
<td>Zone 9</td>
<td>1,452</td>
<td>378</td>
<td>3,317</td>
<td>5,474</td>
<td>20,954</td>
<td>817</td>
<td>1,558</td>
<td>10,291</td>
<td>-</td>
</tr>
<tr>
<td>Zone 10</td>
<td>999</td>
<td>269</td>
<td>4,191</td>
<td>3,410</td>
<td>8,886</td>
<td>360</td>
<td>933</td>
<td>3,425</td>
<td>18,907</td>
</tr>
</tbody>
</table>

Table 3.0. Davidson County 10 Zones Origin and Destination Matrix
Figure 3.0. Auto Trips Originating in Zone 1

Traffic Flow between Zone 1 and Davidson County
Traffic Flow between Zone 2 and Davidson County

Figure 3.1. Auto Trips Originating in Zone 2
Figure 3.2. Auto Trips Originating in Zone 3
Figure 3.3. Auto Trips Originating in Zone 4
Figure 3.4. Auto Trips Originating in Zone 5
Figure 3.5. Auto Trips Originating in Zone 6
Figure 3.6. Auto Trips Originating in Zone 7
Figure 3.7. Auto Trips Originating in Zone 8
Figure 3.8. Auto Trips Originating in Zone 9
With the desire lines shown for each of the zones in Davidson County and the origin and destination matrix in table 3.0 illustrates that zone 3 and zone 5 attract the highest number of auto trips for Davidson County, with 45% of the total 201,039 daily trips. Comparing this to figure 3.1 the major cities in Davidson County, there are one main city in each zone. Table 3.1 shows how many trips each zone attracts and the percentage of total trips that destined there. Since this origin and destination matrix is a balanced table with auto trips the number of trips that is attracted to a zone is also the same number of trips that is produced to that zone.
Table 3.1. Highest to Lowest Trips Attraction and Production

<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Attracted Trips</th>
<th>Percentage of Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75180</td>
<td>6%</td>
</tr>
<tr>
<td>2</td>
<td>72734</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>273859</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>224863</td>
<td>17%</td>
</tr>
<tr>
<td>5</td>
<td>202231</td>
<td>15%</td>
</tr>
<tr>
<td>6</td>
<td>134721</td>
<td>10%</td>
</tr>
<tr>
<td>7</td>
<td>104257</td>
<td>8%</td>
</tr>
<tr>
<td>8</td>
<td>107250</td>
<td>8%</td>
</tr>
<tr>
<td>9</td>
<td>93913</td>
<td>7%</td>
</tr>
<tr>
<td>10</td>
<td>64655</td>
<td>5%</td>
</tr>
</tbody>
</table>

Section 3.2. Home Based Work Trips vs Home Based Other Trips

The following section breaks apart the commuting trips that are made within Davidson County to determine how many of them are home based work trips and how many are home based other trips. A home based work trips is any trips in which one end of the trip is home and the other is work, where a home based other trip is a trip in which one end is a home trips and the other end is any trip besides work. This is important because it will allow for an understanding of whether or not the trips that are being made within Davidson County are for work or for another purpose. 

*Table 3.2* shows the origin and destination matrix for home based work trips, showing that on average about 42% of the trips that are being made within Davidson County are connected to work. Where looking at *table 3.3* the origin and destination matrix for home based other trips, where an average of 58% of the trips connects to another location besides work.
Section 3.3. Traffic Volume Analysis

Section 3.3 addresses the traffic volume on the major roads in Davidson County. The reasoning for visualizing the traffic volume is to determine which roads in Davidson County are being utilized the most by auto vehicle traffic. Within this section only certain roads will be used to analyze the traffic volume, these roads are the interstates, the expressways, and the minor and major arterials. Figure 3.10 shows the roads in Davidson County that will be analyzed for the traffic volume.
Knowing where the major roads are at in Davidson County from *figure 3.10*, the next step is to determine what the travel volume is for auto trips on these roads. The travel volume will be broken up into three different categories, such as: auto travel volume in the morning, auto travel volume in the afternoon, and finally the total auto volume. *Figure 3.11* though *figure 3.13* shows the travel volume for Davidson Counties main roads.
AM Auto Traffic Volume in Davidson County

Figure 3.11. Morning Auto Traffic Volume
Figure 3.12. Afternoon Auto Traffic Volume
Evaluating the three different travel volume times, there is a clear common characteristic between the three visuals, and that is that the interstates are the main road that is used for auto travel in Davidson County. The smaller arterial produce little travel volume compared to the rest of Davidson County. This could show that once the vehicles make it to the smaller arterial they are more disperse than they are on the interstates.

Section 3.4. Travel Time Analysis

The last section for the future 2020 year is to look at the travel time in Davidson County for auto trips. The analysis done on the travel time will look at two sets of data; the first will be the free-flow running time, which represents the travel time with no traffic. The second will be the average daily congestion time. Figure 3.14 will show the daily free-flow running time and Figure 3.15 will shows the average daily congestion for Davidson County.
Figure 3.14. Davidson County Daily Free-Flow Travel Time
Figure 3.15. Davidson County Daily Average Congestion Travel Time

According to the 2020 free flow travel time there is little to no delays in the traffic flow, and that a large majority of Davidson County travels at less than 2 minutes. However there are the occasional roads where the travel time is over 2 minutes, but there are no location in Davidson County that have a free-flow travel time of over 4 minutes. When looking at the average congestion travel time in Davidson County, there is very little travel delay in time. There are however the few locations that have a travel time of over 6 minutes, but these are at a minimum.
CHAPTER 4. FUTURE COMMUTING PATTERN ANALYSIS

Chapter 4 is designed similar to chapter 3; however, it is going to look at the future 2040 commuting patterns for Davidson County. The first visualization will use desire lines to create a visual between the 10 zones, illustrating the amount of auto trips that each zone is producing and attracting. The second set of data will look at the travel times of commuting trips in Davidson County, and the final set of data will be to show the traffic volume on the interstates, expressways, and arterials that run through Davidson County.

Section 4.1. Desire Lines

Section 4.1 is designed to create 10 sets of desire lines based on the auto trips that are made to each of the zones in Davidson County. The origin and destination matrix was created by using the existing traffic analysis zones that were selected in each of the zones and joining them into one group and summing the total trips created to each zone. The desire lines are created to show that with the thicker the line the more auto trips that are made to that zone. Figure 4.0 through figure 4.9 shows the desire lines from each of the zones in Davidson County to the other zones. As the desire lines don’t illustrate an exact table 4.0 provides the origin and destination matrix for the auto trips between the 10 created zones in Davidson County.

<table>
<thead>
<tr>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
<th>Zone 7</th>
<th>Zone 8</th>
<th>Zone 9</th>
<th>Zone 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>-</td>
<td>3,335</td>
<td>4,157</td>
<td>29,743</td>
<td>14,908</td>
<td>5,825</td>
<td>3,607</td>
<td>3,778</td>
<td>1,503</td>
</tr>
<tr>
<td>Zone 2</td>
<td>3,335</td>
<td>-</td>
<td>2,194</td>
<td>42,890</td>
<td>3,980</td>
<td>12,280</td>
<td>2,823</td>
<td>1,806</td>
<td>391</td>
</tr>
<tr>
<td>Zone 3</td>
<td>4,157</td>
<td>2,194</td>
<td>-</td>
<td>27,537</td>
<td>14,346</td>
<td>2,850</td>
<td>1,412</td>
<td>2,958</td>
<td>3,433</td>
</tr>
<tr>
<td>Zone 4</td>
<td>29,743</td>
<td>42,890</td>
<td>27,537</td>
<td>-</td>
<td>31,826</td>
<td>34,983</td>
<td>14,629</td>
<td>9,051</td>
<td>5,666</td>
</tr>
<tr>
<td>Zone 5</td>
<td>14,908</td>
<td>3,980</td>
<td>14,346</td>
<td>31,826</td>
<td>-</td>
<td>15,337</td>
<td>13,769</td>
<td>20,172</td>
<td>21,316</td>
</tr>
<tr>
<td>Zone 6</td>
<td>5,825</td>
<td>12,280</td>
<td>2,850</td>
<td>34,983</td>
<td>15,337</td>
<td>-</td>
<td>27,262</td>
<td>5,597</td>
<td>846</td>
</tr>
<tr>
<td>Zone 7</td>
<td>3,607</td>
<td>2,823</td>
<td>1,412</td>
<td>14,629</td>
<td>13,769</td>
<td>27,262</td>
<td>-</td>
<td>19,620</td>
<td>1,613</td>
</tr>
<tr>
<td>Zone 8</td>
<td>3,778</td>
<td>1,806</td>
<td>2,958</td>
<td>9,051</td>
<td>20,172</td>
<td>5,597</td>
<td>19,620</td>
<td>-</td>
<td>10,651</td>
</tr>
<tr>
<td>Zone 9</td>
<td>1,503</td>
<td>391</td>
<td>3,433</td>
<td>5,666</td>
<td>21,687</td>
<td>846</td>
<td>1,613</td>
<td>10,651</td>
<td>-</td>
</tr>
<tr>
<td>Zone 10</td>
<td>1,034</td>
<td>278</td>
<td>4,338</td>
<td>3,529</td>
<td>9,197</td>
<td>373</td>
<td>966</td>
<td>3,545</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 4.0. Davidson County 10 Zones Origin and Destination Matrix
Figure 4.0. Auto Trips Originating in Zone 1
Figure 4.1. Auto Trips Originating in Zone 2
Figure 4.2. Auto Trips Originating in Zone 3
Figure 4.3. Auto Trips Originating in Zone 4
Figure 4.4. Auto Trips Originating in Zone 5
Figure 4.5. Auto Trips Originating in Zone 6
Figure 4.6. Auto Trips Originating in Zone 7
Figure 4.7. Auto Trips Originating in Zone 8
Figure 4.8. Auto Trips Originating in Zone 9
With the desire lines shown for each of the zones in Davidson County and the origin and destination matrix in table 4.0 illustrates that zone 3 and zone 4 attract the highest number of auto trips for Davidson County, with 49% of the total 8,418 daily trips. Table 4.1 shows how many trips each zone attracts and the percentage of total trips that destined there. Since this origin and destination matrix is a balanced table with auto trips the number of trips that is attracted to a zone is also the same number of trips that is produced to that zone.
<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Attracted Trips</th>
<th>Percentage of Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>83638</td>
<td>6%</td>
</tr>
<tr>
<td>2</td>
<td>87557</td>
<td>7%</td>
</tr>
<tr>
<td>3</td>
<td>78219</td>
<td>6%</td>
</tr>
<tr>
<td>4</td>
<td>267716</td>
<td>21%</td>
</tr>
<tr>
<td>5</td>
<td>224647</td>
<td>17%</td>
</tr>
<tr>
<td>6</td>
<td>139437</td>
<td>11%</td>
</tr>
<tr>
<td>7</td>
<td>135169</td>
<td>10%</td>
</tr>
<tr>
<td>8</td>
<td>116599</td>
<td>9%</td>
</tr>
<tr>
<td>9</td>
<td>98047</td>
<td>8%</td>
</tr>
<tr>
<td>10</td>
<td>67292</td>
<td>5%</td>
</tr>
</tbody>
</table>

Table 4.1. Highest to Lowest Trips Attraction and Production

Section 4.2. Home Based Work Trips vs Home Based Other Trips

The following section breaks apart the commuting trips that are made within Davidson County to determine how many of them are home based work trips and how many are home based other trips. A home based work trips is any trips in which one end of the trip is home and the other is work, where a home based other trip is a trip in which one end is a home trips and the other end is any trip besides work. This is important because it will allow for an understanding of whether or not the trips that are being made within Davidson County are for work or for another purpose. Table 4.2 shows the origin and destination matrix for home based work trips, showing that on average about 53% of the trips that are being made within Davidson County are connected to work. Where looking at Table 4.3 the origin and destination matrix for home based other trips, where an average of 47% of the trips connects to another location besides work.
### Table 4.2. Home Based Work Trips for 2040

<table>
<thead>
<tr>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
<th>Zone 7</th>
<th>Zone 8</th>
<th>Zone 9</th>
<th>Zone 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>-</td>
<td>1,768</td>
<td>2,203</td>
<td>15,764</td>
<td>7,901</td>
<td>3,087</td>
<td>1,912</td>
<td>2,002</td>
<td>797</td>
</tr>
<tr>
<td>Zone 2</td>
<td>1,768</td>
<td>-</td>
<td>1,163</td>
<td>22,732</td>
<td>2,109</td>
<td>6,508</td>
<td>1,496</td>
<td>957</td>
<td>207.23</td>
</tr>
<tr>
<td>Zone 3</td>
<td>2,203</td>
<td>1,163</td>
<td>-</td>
<td>14,595</td>
<td>7,603</td>
<td>1,511</td>
<td>748</td>
<td>1,568</td>
<td>1,819</td>
</tr>
<tr>
<td>Zone 4</td>
<td>15,764</td>
<td>22,732</td>
<td>14,595</td>
<td>-</td>
<td>16,868</td>
<td>7,753</td>
<td>4,797</td>
<td>3,003</td>
<td>1,870</td>
</tr>
<tr>
<td>Zone 5</td>
<td>7,901</td>
<td>2,109</td>
<td>7,603</td>
<td>16,868</td>
<td>-</td>
<td>8,129</td>
<td>7,298</td>
<td>10,691</td>
<td>11,297</td>
</tr>
<tr>
<td>Zone 6</td>
<td>3,087</td>
<td>6,508</td>
<td>1,511</td>
<td>18,541</td>
<td>7,753</td>
<td>-</td>
<td>14,449</td>
<td>2,966</td>
<td>448.38</td>
</tr>
<tr>
<td>Zone 7</td>
<td>1,912</td>
<td>1,496</td>
<td>748</td>
<td>7,753</td>
<td>7,298</td>
<td>14,449</td>
<td>-</td>
<td>10,399</td>
<td>855</td>
</tr>
<tr>
<td>Zone 8</td>
<td>2,002</td>
<td>957</td>
<td>1,496</td>
<td>7,753</td>
<td>7,298</td>
<td>14,449</td>
<td>10,399</td>
<td>-</td>
<td>5,645</td>
</tr>
<tr>
<td>Zone 9</td>
<td>797</td>
<td>207.23</td>
<td>1,819</td>
<td>3,003</td>
<td>11,494</td>
<td>448.38</td>
<td>855</td>
<td>5,645</td>
<td>-</td>
</tr>
<tr>
<td>Zone 10</td>
<td>548</td>
<td>147.34</td>
<td>2,299</td>
<td>1,870</td>
<td>4,874</td>
<td>197.69</td>
<td>511.98</td>
<td>1,879</td>
<td>10,372</td>
</tr>
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</table>

### Table 4.3. Home Based Other Trips for 2040

<table>
<thead>
<tr>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
<th>Zone 7</th>
<th>Zone 8</th>
<th>Zone 9</th>
<th>Zone 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>-</td>
<td>1,567</td>
<td>1,954</td>
<td>13,979</td>
<td>7,007</td>
<td>2,738</td>
<td>1,695</td>
<td>1,776</td>
<td>706</td>
</tr>
<tr>
<td>Zone 2</td>
<td>1,567</td>
<td>-</td>
<td>1,031</td>
<td>20,158</td>
<td>1,871</td>
<td>5,772</td>
<td>1,327</td>
<td>849</td>
<td>183.77</td>
</tr>
<tr>
<td>Zone 3</td>
<td>1,954</td>
<td>1,031</td>
<td>-</td>
<td>12,942</td>
<td>6,743</td>
<td>1,340</td>
<td>664</td>
<td>1,390</td>
<td>1,614</td>
</tr>
<tr>
<td>Zone 4</td>
<td>13,979</td>
<td>20,158</td>
<td>12,942</td>
<td>-</td>
<td>14,958</td>
<td>16,442</td>
<td>6,876</td>
<td>4,254</td>
<td>2,663</td>
</tr>
<tr>
<td>Zone 5</td>
<td>7,007</td>
<td>1,871</td>
<td>6,743</td>
<td>14,958</td>
<td>-</td>
<td>7,208</td>
<td>6,471</td>
<td>9,481</td>
<td>10,019</td>
</tr>
<tr>
<td>Zone 6</td>
<td>2,738</td>
<td>5,772</td>
<td>1,340</td>
<td>16,442</td>
<td>7,208</td>
<td>-</td>
<td>12,813</td>
<td>2,631</td>
<td>397.62</td>
</tr>
<tr>
<td>Zone 7</td>
<td>1,695</td>
<td>1,327</td>
<td>664</td>
<td>6,876</td>
<td>6,471</td>
<td>12,813</td>
<td>-</td>
<td>9,221</td>
<td>758</td>
</tr>
<tr>
<td>Zone 8</td>
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<td>849</td>
<td>1,390</td>
<td>4,254</td>
<td>9,481</td>
<td>2,631</td>
<td>9,221</td>
<td>-</td>
<td>5,006</td>
</tr>
<tr>
<td>Zone 9</td>
<td>706</td>
<td>183.77</td>
<td>1,614</td>
<td>2,663</td>
<td>10,193</td>
<td>397.62</td>
<td>758</td>
<td>5,006</td>
<td>-</td>
</tr>
<tr>
<td>Zone 10</td>
<td>486</td>
<td>130.66</td>
<td>2,039</td>
<td>1,659</td>
<td>4,323</td>
<td>175.31</td>
<td>454.02</td>
<td>1,666</td>
<td>9,197</td>
</tr>
</tbody>
</table>

### Section 4.3. Future Traffic Volume

Section 4.3 addresses the traffic volume on the major roads in Davidson County. The reasoning for visualizing the traffic volume is to determine which roads in Davidson County are being utilized the most by auto vehicle traffic. Within this section only certain roads will be used to analyze the traffic volume, these roads are the interstates, the expressways, and the minor and major arterials. **Figure 4.10** shows the roads in Davidson County that will be analyzed for the traffic volume.
Knowing where the major roads are at in Davidson County form *figure 4.10*, the next step is to determine what the travel volume is for auto trips on these roads. The travel volume will be broken up into three different categories, such as: auto travel volume in the morning, auto travel volume in the afternoon, and finally the total auto volume. *Figure 4.11* though *figure 4.13* shows the travel volume for Davidson County’s main roads.
Figure 4.11. Morning Auto Traffic Volume
Figure 4.12. Afternoon Auto Traffic Volume
Evaluating the three different travel volume times, there is a clear common characteristic between the three visuals, and that is that the interstates are the main road that is used for auto travel in Davidson County. The smaller arterial produce little travel volume compared to the rest of Davidson County. This could show that once the vehicles make it to the smaller arterial they are more disperse than they are on the interstates. However, there is a major increase in the auto travel volume in 2040 than there was in 2020.

Section 4.3. Travel Time Analysis

The last section for the future 2040 year is to look at how the travel time has changed for auto since 2020. The analysis done on the travel time will look at two sets of data; the first will be the free-flow running time, which represents the travel time with no traffic. The second will be the average daily congestion time. The reasoning for this is to show the difference in travel time
when there is no traffic at all on the roads and then showing what travel time looks like when there is traffic on the roads. *Figure 4.14* will show the daily free-flow running time and *figure 4.15* will show the average daily congestion for Davidson County.

Figure 4.14. Davidson County Daily Free-Flow Travel Time
Figure 4.15. Davidson County Daily Average Congestion Travel Time
CHAPTER 5. COMMUTING PATTERN RESULTS

The purpose of chapter 5 is to provide the results from the 2020 and 2040 commuting patterns in Davidson County from auto trips. This chapter is broken up into two sections, the first provides the commuting pattern results from 2020, and the second provides the commuting pattern results from 2040. Within each of the section in this chapter there will be a summary of the results from the desire line analysis, with an illustration showing which zones are the main destinations. There will also be a summary of the commuting time and travel volume, which will help to illustrate which segments in Davidson County are the main ones used for auto travel.

Section 5.1. 2020 Commuting Pattern Results

Section 5.1 looks at the 2020 commuting patterns between the 10 zones in Davidson County using arrows to illustrate which zones are the main producers and consumers of traffic flow for the zone that is being looked at.

Sub-Section 5.1.1. Desire Line Analysis

The first set of results will come from the data that was collected in section 3.1, the desire line analysis for the auto trips made in Davidson County between the 10 zones for 2020. In order to provide a simple visual of the major zones that each produce the most auto trips from the other zones, the created of figure 5.0 was done. Figure 5.0 shows an arrow from the origin zone to the destination zones that produces the largest amount of auto trips for 2020.
With the use of figure 5.0, there is a clear indication that zone 3 and zone 4 are the two locations with the highest main destinations between the 10 zones. However, zone 3 and zone 5 are the two zones that produce the highest amount of auto trips for 2020. An explanation for how zone 4 is a main destination between the 10 zones and not one of the top two zones for most trips is because the rest of the contributing zones produce a low amount of auto trips to zone 4. Looking further into the travel patterns in Davidson County for 2020, it would be important to connect the desire line analysis with the InfoGroup data that was done. The InfoGroup data looks at the number of employment firms that are within each of the Tennessee Zones. Figure 5.1 represents the 10 zones in Davidson County based on the number of employment firms.
It was anticipated that there would be more auto trips made to the zones that have a more employment firms, such as zones 1, zone 5, zone, 7, zone 8, zone 9, and zone 10. However, this was not the results that were concluded from the auto trips created in the desire line analysis. 

Table 5.0 summarizes the number of auto trips for 2020, showing that most of the zones with the exception of zone 5 are in the lower area of having the most auto trips attracted in Davidson County in 2020. From the 2020 travel analysis there seems to be very little connection between the number of auto trips being made and the number of employment firms in a given area.
Table 5.0. Trips Attraction and Production

<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Attracted Trips</th>
<th>Percentage of Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75180</td>
<td>6%</td>
</tr>
<tr>
<td>2</td>
<td>72734</td>
<td>5%</td>
</tr>
<tr>
<td>3</td>
<td>273859</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>224863</td>
<td>17%</td>
</tr>
<tr>
<td>5</td>
<td>202231</td>
<td>15%</td>
</tr>
<tr>
<td>6</td>
<td>134721</td>
<td>10%</td>
</tr>
<tr>
<td>7</td>
<td>104257</td>
<td>8%</td>
</tr>
<tr>
<td>8</td>
<td>107250</td>
<td>8%</td>
</tr>
<tr>
<td>9</td>
<td>93913</td>
<td>7%</td>
</tr>
<tr>
<td>10</td>
<td>64655</td>
<td>5%</td>
</tr>
</tbody>
</table>

Sub-Section 5.1.2. Travel Time and Volume

The second result discussion for the 2020 auto analysis for Davidson County is the travel volume on the main road segments and the travel time in Davidson County. In Davidson County for the year 2020, the main route for daily auto trips is on the interstates, referring back to *figure 3.13*, where the interstates are displayed in showing that they have a large auto volume than the rest of the roads. This was anticipated since Nashville being the center of Davidson County is connected with interstate 40, interstate 65, and interstates 24. Breaking the travel volume up into the time of day, the morning traffic for auto on the interstates is relatively equal to the travel volume on the interstates in the afternoon. This was also anticipated as it is capturing both the peak hour morning traffic and the afternoon peak hour traffic. Unlike the traffic pattern based on the employment firms, the road segments were anticipated to have the results that it did. This would be that having heavier traffic on the interstates and lower auto traffic on the smaller streets, as the traffic from the interstates is now being spread out through a larger range of roads.

Section 5.2. 2040 Commuting Pattern Results

Section 5.2 looks at the 2040 commuting patterns between the 10 zones in Davidson County using arrows to illustrate which zones are the main producers and consumers of traffic flow for the zone that is being looked at.
Sub-Section 5.2.1. Desire Line Analysis

The first set of results will come from the data that was collected in section 4.1, the desire line analysis for the auto trips made in Davidson County between the 10 zones for 2040. In order to provide a simple visual of the major zones that each produce the most auto trips from the other zones, the same creation of the major destinations that was created in the previous subsection will be conducted for 2040. Figure 5.2 shows an arrow from the origin zone to the destination zones that produces the largest amount of auto trips for 2040.

![Figure 5.2. Major Destination Zones for Each Davidson County Zone](image)

Using Figure 5.2, there is a clear pattern between the auto trips in 2020 and the auto trips in 2040, meaning that zone 3 and zone 4 are two of the main destination zones for the trips made within Davidson County. However, zone 6 was added in 2040, showing that zone 3, zone 4, and zone 6
were tied with having 3 zones each as their major destination site. Another common feature in 2040 that was the same in 2020, is that the areas in Davidson County that have the largest employment firms are still the locations that are producing the lowest amount of auto trips. This means there is another factor that is drawing the number of auto trips in Davidson County besides the number of employment firms. However, there is also a chance that the InfoGroup Data does not provide all the employment firms in Davidson County and there is actually more employment in the zones that are producing the larger amount of trips than is actually showed. Figure 5.3 shows a comparison of the major destination for auto trips from 2020 to 2040 from each of the 10 zones.

Figure 5.3. Major Zone Destination for Auto Travel. Left Image 2020. Right Image 2040.

**Sub-Section 5.2.2. Travel Time and Volume**

The final results that can be concluded from the travel pattern analysis in Davidson County for 2040, is the change in travel volume from 2020 to 2040. From the 2020 analysis there was an increase in the level of auto trips being made on the interstates and a small amount of trips being made on the arterials in Davidson County. However, moving forward 20 years there is a continuous pattern when it comes to the travel volume for auto trips, and that the interstates are still the heavy traveled areas. There was a shift in the travel volume showing that it is anticipated that there will be an increase in the travel volume in 2040 than there was in 2020. One reasoning behind this could be because there an expected increase in the number of residents who will be living in Davidson County in 2040 than there was in 2020. Figure 5.4 through figure 5.6 shows a side by side comparison of the auto travel volume in Davidson County.
Figure 5.4. Morning Auto Travel Volume. Left Image 2020. Right Image 2040.

Figure 5.5. Afternoon Auto Travel Volume. Left Image 2020. Right Image 2040.
The final analysis for the travel time in Davidson County is to evaluate the change in travel time from the non-peak hours to the peak hours. This analysis will help with determining where the major congestion locations are in Davidson County when it comes to the auto travel. Figure 5.7 shows the 2020 (left) and 2040 (right) change in travel time when it comes to non-peak and peak hours.
Based on the two maps in figure 5.7, there is predicted to be an increase in the amount of congestion in 2040 based on the difference in travel time from non-peak and peak hours. This is most likely driven by an increase in the number of residents that will be moving to the Davidson County area.
Chapter 3, is designed to evaluate the public transportation system in Davidson County, referred to as Nashville Metropolitan Transit Authority (MTA) or recently rebranded to WeGo Transit. During this evaluation there will be a comparison to the number of auto trips that are produced in each zone with the number of bus stops that are located in each of the 10 zones in Davidson County. The reasoning for this is to see if zones with a lower number of transit stops have a high number of auto trips. The WeGo bus system (or MTA) in Davidson County has 55 bus routes that are served by 137 buses, 40 Access Ride, which accommodate approximately 30,000 riders a day. Figure 6.0 shows the bus system in Davidson County, showing that is serves a large majority of the county.

Figure 6.0. Bus System in Davidson County, Tennessee
Without having the bus routes overlaid with the 10 zones in Davidson County, it is easy to see that there is going to be more bus opportunities near the center of Davidson County near Nashville than there is in the periphery of Davidson County. Figure 6.1 shows the overlay of the bus system and the 10 zones in Davidson County.

Figure 6.1. Bus System and Davidson County Zones

Comparing the locations of the public transit routes with the zones that were created in Davidson County, it is clear that zone 1, zone 4, and zone 5 are strongly served by public transportation. Whereas with zone 3, zone 2, and zone 10 are the zones with the least amount of public transportation. Table 6.0 shows how many bus routes are serving each of the zones in Davidson County.
<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Bus Routes</th>
<th>Percentage of Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1</td>
<td>44</td>
<td>92%</td>
</tr>
<tr>
<td>Zone 2</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Zone 3</td>
<td>8</td>
<td>17%</td>
</tr>
<tr>
<td>Zone 4</td>
<td>28</td>
<td>58%</td>
</tr>
<tr>
<td>Zone 5</td>
<td>31</td>
<td>65%</td>
</tr>
<tr>
<td>Zone 6</td>
<td>9</td>
<td>19%</td>
</tr>
<tr>
<td>Zone 7</td>
<td>12</td>
<td>25%</td>
</tr>
<tr>
<td>Zone 8</td>
<td>5</td>
<td>10%</td>
</tr>
<tr>
<td>Zone 9</td>
<td>6</td>
<td>13%</td>
</tr>
<tr>
<td>Zone 10</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Routes in Davidson County</td>
<td>48</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 6.0. Number of Routes in Each Zone

Table 6.0 shows the number of bus routes that are supporting the different zones in Davidson County, however, a more in-depth comparison of the number of auto trips and the number of bus stops is needed to accurately determine if there is an increase in the number of auto trips in the regions that are not supported by public transportation. Figure 6.2 shows a graph showing the number of auto trips from each Davidson County zone with response to the number of bus stops that is present in that zone.

**Figure 6.2. Number of Auto Trips by Zone Compared to the number of Present Bus Routes**
With the anticipation that when there is a higher level of public transportation available to the public that there would be a decrease in the number of auto trips being done, is not completely supported in this situation. In zone 1 there is a high number of bus routes and a low number of auto trips being done. However, this is the only zone where this is present. Referring back to figure 6.2 the number of auto trips being done is followed by the same pattern as the number of bus lanes that is serving that zone.
CHAPTER 7: DAVIDSON COUNTY URBAN REGIONS

From the last chapter, there was an understanding that the public transportation system did not have any impact on the number of auto trips that were being completed. Chapter 4 is designed to look at the urbanized and non-urbanized areas in Davidson County and evaluate which regions produced more auto trips. This analysis will provide an understanding of where the major traffic analysis zones are in Davidson County. *Figure 7.0* represents the urbanized areas and non-urbanized areas in Davidson County.

![Figure 7.0. Urbanized Areas in Davidson County](image)

Looking at *figure 7.0* it is indicated that around 50% of Davidson County is in an urban area, which is located mainly in the center of the county, where the periphery is non-urban/rural. However, one issue with connecting the urbanized layer with the traffic analysis zones in Davidson County is that some of the traffic analysis zones contain both an urban area and a non-
urban area. For determining which traffic analysis zones are going to be urban and non-urban for creating the desire lines, if the traffic analysis zone contains at least 50% of an urban area than it will be classified as an urban area. Figure 7.1 shows the urbanized zones in Davidson County based on the 10 different zones, which will be used to create desire lines for auto traffic flow.

Figure 7.1. Davidson County Urbanized Area Using TAZ and Urban Boundary Buffer

Comparing the two maps in figure 7.0 and figure 7.1, there is a slight difference in the urban areas. This slight variation in the borders for the urban areas should not show a significant change in the results when it comes to the flow of auto traffic. The analysis of the desire lines for the urbanized areas will look at the flow of traffic from the specified zone to the urbanized areas. Creating the new origin and destination matrix with this format will allow a simple subtraction of
the whole zone from the urban zone to get the number of auto trips from each zone to the non-
urbanized areas. Figure 7.2 through figure 7.11 illustrates the desire lines maps for the auto flow
to the urbanized areas in Davidson County

Figure 7.2. Auto Trips Originating in Zone 1
Figure 7.3. Auto Trips Originating in Zone 2
Figure 7.4. Auto Trips Originating in Zone 3
Figure 7.5. Auto Trips Originating in Zone 4
Figure 7.6. Auto Trips Originating in Zone 5
Figure 7.7. Auto Trips Originating in Zone 6
Figure 7.8. Auto Trips Originating in Zone 7
Figure 7.9. Auto Trips Originating in Zone 8
Figure 7.10. Auto Trips Originating in Zone 9
Analyzing the traffic patterns between the whole zone and the urban part of the zone, there is a similar pattern showing that the major destination location when looking at the zone as a whole is still the main destination when looking at just the urban area, there is just a decrease in the number of auto trips that are being made to that zone.
<table>
<thead>
<tr>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
<th>Zone 5</th>
<th>Zone 6</th>
<th>Zone 7</th>
<th>Zone 8</th>
<th>Zone 9</th>
<th>Zone 10</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>900</td>
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<td>28,495</td>
<td>14,403</td>
<td>4,688</td>
<td>2,913</td>
<td>2,837</td>
<td>553</td>
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<td>1,760</td>
<td>38,021</td>
<td>3,844</td>
<td>11,119</td>
<td>2,289</td>
<td>1,389</td>
<td>115</td>
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<tr>
<td>Zone 3</td>
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<td></td>
<td>26,490</td>
<td>13,860</td>
<td>2,477</td>
<td>1,205</td>
<td>2,432</td>
<td>1,542</td>
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<tr>
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<td>21,505</td>
<td>23,547</td>
<td></td>
<td>30,749</td>
<td>29,409</td>
<td>11,298</td>
<td>6,216</td>
<td>1,826</td>
</tr>
<tr>
<td>Zone 5</td>
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<td>1,190</td>
<td>13,860</td>
<td>30,338</td>
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<td>13,512</td>
<td>11,352</td>
<td>16,338</td>
<td>14,564</td>
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<td>13,303</td>
<td>21,719</td>
<td></td>
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<tr>
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<tr>
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<td>20,954</td>
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<td>1,280</td>
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<td>100</td>
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<td>3,379</td>
<td>8,886</td>
<td>324</td>
<td>933</td>
<td>2,618</td>
<td>5,688</td>
</tr>
</tbody>
</table>

Table 7.0. Origin and Destination Matrix for Urban Based Trips
CHAPTER 8. CONCLUSION

In a final conclusion with the auto travel patterns in Davidson County for 2020 and the anticipated 2040 years, there is a clear indication that the population in Davidson County is going to increase in 2040, which will result in an increase in the number of daily auto trips being made within the county. It is difficult to get an exact number of auto trips that will be made in 2040, because of the difficulty with predicting the future of 20 years from now. However, it can be estimated based on the current trends in data, which was done in this report showing that traffic volumes and travel time is going to increase in Davidson County. Especially since there is a negative correlation between the number of auto trips being made and the number of public transportation options being made. The result showed that individuals in Davidson County would rather drive than ride on the bus system, and there is going to need to be a major change in the public transportation network that will persuade people to leave their cars and start using alternative options for transportation. With the future being a difficult concept to predict, the best option for planners is to continue to monitor the travel patterns in Davidson County and the alternative transportation options to see if eventually alternative options become a better mode for commuters.