December 13, 2019

Bronce Stephenson, MPA
Director of Planning and Community Development
City of Winter Park
401 South Park Avenue
Winter Park, FL 32789

**RE: Orange Avenue Technical Memorandum #3**

Dear Mr. Stephenson:

Kimley-Horn conducted a transportation analysis associated with the proposed Orange Avenue Overlay District, between Orlando Avenue (US 17/92) and Fairbanks Avenue. This memorandum outlines the analysis, assumptions, and findings. Note that the Overlay District does not mandate specific modifications to Orange Avenue.

**Roadway Segment Volumes:**

Roadway segment counts and turning movement volume data were used to determine the existing and future roadway segment volumes. FDOT count station 75-5122, on Orange Avenue, was used to calculate an annual trend growth rate of 4.74%. The trend growth worksheet is attached. The growth rate calculation is based on 5 years of data from the count station and traffic counts that were taken in year 2019 along the corridor. Resulting future volumes in year 2025 are shown in **Table 1**.

**Table 1:** Existing Daily Volumes, Growth, And Future Volumes on Orange Avenue

<table>
<thead>
<tr>
<th>Orange Avenue Segment</th>
<th>2019 Volume</th>
<th>Historic Trend</th>
<th>Growth</th>
<th>2025 AADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
<td>Volume</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US 17/92 (Orlando Ave)</td>
<td>Cypress Ave</td>
<td>18,600</td>
<td>4.74%</td>
<td>5,300</td>
</tr>
<tr>
<td>Cypress Ave</td>
<td>Minnesota / Denning</td>
<td>18,200</td>
<td>4.74%</td>
<td>5,200</td>
</tr>
<tr>
<td>Minnesota / Denning</td>
<td>SR 426 (Fairbanks)</td>
<td>17,800</td>
<td>4.74%</td>
<td>5,100</td>
</tr>
</tbody>
</table>

As shown in Table 1, volumes on Orange Avenue are relatively high given the significant bottleneck intersections at each end of the corridor (US 17/92 in the southwest and Fairbanks Avenue in the northeast). Evaluation of existing conditions at intersections (as described in a previous technical memorandum) concluded that the existing lane configurations and signal timings at the boundary intersections have maximized the available peak-hour capacity. Therefore, the next evolution of improvements to the corridor should focus on safety and mobility options that better connect people with existing and future destinations along the corridor. Since traffic is effectively metered by the operations of the large intersections at both ends of the corridor (Orlando Ave and Fairbanks) it's reasonable to assume that a portion of any additional/future peak-hour traffic demand is likely to be absorbed by alternate travel routes and by travel modes other than single occupant vehicles.
Travel Patterns on Orange Avenue:

As detailed by MetroPlan Orlando, vehicles were measured as they enter/exit the corridor at points just beyond the study area on Orange Avenue southwest of Orlando Avenue, and east of the corridor on Fairbanks Avenue. At least 70% of the vehicles are cut-through trips that do not begin or end within the study area. Only 13% of the measured vehicles that pass control points (just outside of the corridor) begin or end within the study area. The remaining 17% of vehicles enter/exit the corridor at other side streets, and it isn’t known whether they are cutting through or not. The relevant slide provided by MetroPlan is attached. If development patterns remain as they are, this relationship is anticipated to continue, with most vehicles on Orange Avenue making longer trips that do not start or end within the corridor.

When considering that the majority of vehicles on Orange Avenue are cutting through (and therefore have other travel options to choose) and the boundary intersections are already at capacity during the peak-hour, it is clear that significant diversion to more auto oriented routes will occur. Rather than encouraging more peak-hour traffic, the corridor can be enhanced to focus on safety, walkability, and multimodal options. Investment in these options has the added benefit of contributing positively to the creation of a cohesive corridor that integrates the aspirations for place making with a priority given to local (rather than) regional travel.

Potential Trip Generation:

Three key properties have the ability to develop/redevelop, and once developed, they will serve as catalyst sites for the area. These key properties will provide valuable benefits to other surrounding properties by including extra parking, stormwater collection and stormwater treatment.

Representative development programs for these sites have been provided for evaluation and include:

- Site 1 – Southern Portion of the corridor: 200 apartment units, 100 hotel rooms, 25,000 square feet of medical office, and 25,000 square feet of retail.
- Site 2 – Central Portion of the corridor: 120,000 square feet of office and 30,000 square feet of retail
- Site 3 – Northern portion of the corridor: 200 apartments units and 50,000 square feet of retail

Note that these sites currently have existing uses and could be redeveloped within the existing zoning requirements, though not with the mix of uses as considered herein. More importantly, redevelopment under existing zoning requirements would not result in the place making qualities offered by the proposed mixed-use overlay requirements.

Potential trip generation of the key properties is shown in Table 2, and internal capture worksheets are attached. Pass-by reductions were applied to the individual retail uses separately since they are located in different areas. Internal capture reductions were calculated in aggregate since several similar uses are located throughout the mixed-use corridor. This represents a relatively conservative internal capture reduction – it is more likely that the unconstrained internal capture rates for each use will be realized due to the proximity of compatible uses.
Table 2: Trip Generation of Key Properties along Corridor

<table>
<thead>
<tr>
<th>Land Use</th>
<th>LUC</th>
<th>Size</th>
<th>Units</th>
<th>Daily</th>
<th>AM Total</th>
<th>AM In</th>
<th>AM Out</th>
<th>PM Total</th>
<th>PM In</th>
<th>PM Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apartment</td>
<td>221a</td>
<td>400</td>
<td>DU</td>
<td>1,036</td>
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<td>10</td>
<td>70</td>
<td>66</td>
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<tr>
<td>Hotel</td>
<td>310a</td>
<td>100</td>
<td>Rooms</td>
<td>702</td>
<td>39</td>
<td>23</td>
<td>16</td>
<td>39</td>
<td>20</td>
<td>19</td>
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<tr>
<td>Office</td>
<td>710</td>
<td>120</td>
<td>KSF</td>
<td>1,266</td>
<td>108</td>
<td>93</td>
<td>15</td>
<td>108</td>
<td>18</td>
<td>90</td>
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<tr>
<td>Medical Office</td>
<td>720</td>
<td>25</td>
<td>KSF</td>
<td>873</td>
<td>65</td>
<td>51</td>
<td>14</td>
<td>87</td>
<td>24</td>
<td>63</td>
</tr>
<tr>
<td>Retail (Total Trips)</td>
<td>820</td>
<td>105</td>
<td>KSF</td>
<td>3,965</td>
<td>99</td>
<td>61</td>
<td>38</td>
<td>400</td>
<td>193</td>
<td>207</td>
</tr>
</tbody>
</table>

Pass-By Reduction (Retail Only)

- Daily
  - Retail (After Pass-By): 2,617
  - SubTotal: 6,494
  - Internal Capture Reduction: 21.7%

Net External Trips: 5,085

As shown in the table, the trip generation potential (5,085 daily trips) for the major properties in the Overlay District is roughly equal to the anticipated daily volume growth for the corridor (5,200 vehicles per day). More importantly is the peak-hour demand for AM (320) and PM (368) periods. This is the 60 minutes in the morning and afternoon that experience the greatest amount of delay with the remainder of the 22 hours operating well within acceptable parameters.

Given the high percentage of vehicles that are using Orange Avenue as a cut-through corridor, it appears that future operating conditions will be similar, whether the new trips are associated with development along Orange Avenue, or with development in areas outside of the corridor (or outside of the City). However, decisions regarding the type and form of development as well as the types of corridor investments can influence the type of travel that absorbs this remaining travel capacity: local trips or regional trips.

Additional background / cut-through trips will gravitate to Orange Avenue to the extent that capacity is available if the route is more attractive than other vehicular options. Conversely, if the corridor takes on a more walkable design with mixed uses and quality placemaking features, the travel will absorb and prioritize local travel.

Future Traffic Impact Analyses

While this memorandum represents potential development intensities for the three large sites within the corridor, this does not represent a final development program. Additional properties will likely redevelop as opportunities become more feasible. Once the individual sites are ready to develop / redevelop, a Traffic Impact Analysis (TIA) will be required based on the City’s development review requirements, just like TIA’s are required for projects in any other area of the City.

It is recommended that the City’s TIA requirements are reviewed to determine whether modifications are appropriate for developments that are proposed within the overlay district. Example modifications include the provision for increases in mode split assumptions, reduced trip lengths, and internal capture calculations.
Potential Strategies to Reduce Congestion on Orange Avenue

Several strategies could alleviate conditions on Orange Avenue. Potential examples include the following:

- **Roundabouts**
  - Denning Drive / Minnesota Avenue: This signalized intersection currently operates with a PM peak-hour maximum volume to capacity (v/c) ratio of 1.26, with considerable lost time due to the changing of multiple phases for the six approaches. If this intersection is converted to a roundabout, the degree of saturation (similar to a v/c ratio) reduces to 0.99 when analyzed as a 1-lane roundabout, with a lower degree of saturation as a 2-lane roundabout. Signalized analysis and analysis of a 1-lane roundabout are attached.
  - Fairbanks Avenue / Pennsylvania Avenue: This intersection currently operates with a PM peak-hour maximum v/c ratio of 1.26 (coincidentally the same v/c ratio as the Denning / Minnesota intersection), with an average vehicle delay of 65.7 seconds. If converted to a roundabout, the maximum degree of saturation would be 0.745, with an average vehicle delay of 16.9 seconds. Though this would be a significant improvement, there are several geometric challenges that need to be addressed when considering a roundabout. Signalized analysis and analysis of a roundabout are attached.

- **Upgrades to US 17/92:** FDOT will be implementing improvements to US 17/92 that are anticipated to be primarily bike / ped improvements. As bicycle travel on US 17/92 becomes more feasible and attractive, Orange Avenue will benefit as multi-modal mobility increases.

- **Extension of the multi-use path adjacent to the railroad track:** A path along the railroad track through Winter Park currently has a southern terminus at Fairbanks Avenue. If this trail is extended throughout the study area, it will allow longer-range, higher-speed cyclists to travel through the corridor in a protected alignment that does not conflict with slower pedestrians or faster cars along Orange Avenue. This alignment will also serve as a connection to bicycle facilities along Denning Drive.

- **Completion of I-4 Ultimate project –** Once improvements to I-4 are complete, traffic is anticipated to shift back to I-4 from several adjacent north / south roads. This shift will likely improve vehicular conditions on Orange Avenue, reducing the amount of cut-through traffic from longer trips.

- **Turn lane at Fairbanks Avenue and Denning Drive:** Installation of a dedicated westbound left-turn lane at this intersection will alleviate the existing westbound left-turn movement from Fairbanks Avenue to Orange Avenue.

Sincerely,

Mike Woodward, P.E.
Stephen M Stansbery, AICP
Attachments:
Trend Growth Worksheet
Excerpt from Streetlight Data Analysis by MetroPlan
Internal Capture Worksheets
Synchro and Sidra Analysis at Denning / Minnesota
Synchro and Sidra Analysis at Fairbanks / Pennsylvania
## Traffic Trends - V2.0
### ORANGE AVE --

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<thead>
<tr>
<th>PIN#</th>
<th>Location</th>
<th>12345</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Count*</th>
<th>Trend**</th>
</tr>
</thead>
<tbody>
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<td>14300</td>
<td>13800</td>
</tr>
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<td>14900</td>
<td>14800</td>
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<tr>
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<td>18800</td>
<td>17700</td>
</tr>
<tr>
<td>2019</td>
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<td>18700</td>
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<tr>
<td>2020</td>
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<td>19600</td>
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<td>2022</td>
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### Traffic (ADT/AADT)

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<th>Year</th>
<th>Count*</th>
<th>Trend**</th>
</tr>
</thead>
<tbody>
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<td>2014</td>
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<td>13800</td>
</tr>
<tr>
<td>2015</td>
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<td>2022</td>
<td>N/A</td>
<td>21600</td>
</tr>
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</table>

**Annual Trend Increase**: 970

**Trend R-squared**: 75.56%

**Trend Annual Historic Growth Rate**: 7.07%

**Trend Growth Rate (2018 to Design Year)**: 5.51%

**Trend Annual Historic Growth Rate**: 0

**Printed**: 10-Jul-19

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### Straight Line Growth Option

*Axle-Adjusted*
On weekdays, 13 percent of traffic on Orange Avenue (west of Denning Dr) is starting or ending a trip on the study area. That number peaks at 17% during midday hours.

At least 70% of trips using Orange Avenue start and end their trips outside of the study area. In essence, they are cut-through trips from the point of view of the study area.

Weekends are similar.
### Internal Capture Reduction Calculations

Methodology for A.M. Peak Hour and P.M. Peak Hour
Based on the Trip Generation Handbook, 3rd Edition, published by the Institute of Transportation Engineers

Methodology for Daily
Based on the average of the Unconstrained Rates for the A.M. Peak Hour and P.M. Peak Hour

#### SUMMARY

**GROSS TRIP GENERATION**

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<tr>
<th>Land Use</th>
<th>Daily Enter</th>
<th>Exit</th>
<th>A.M. Peak Hour Enter</th>
<th>Exit</th>
<th>P.M. Peak Hour Enter</th>
<th>Exit</th>
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<tbody>
<tr>
<td>Office</td>
<td>633</td>
<td>633</td>
<td>93</td>
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<tr>
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<td>1,309</td>
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<td>100</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cinema/Entertainment</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Residential</td>
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<td>518</td>
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<td>70</td>
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<tr>
<td>Hotel</td>
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<td>351</td>
<td>23</td>
<td>16</td>
<td>20</td>
<td>19</td>
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<tr>
<td><strong>Total</strong></td>
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<td>2,811</td>
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<td>122</td>
<td>170</td>
<td>227</td>
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</table>

**INTERNAL TRIPS**

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<th>Land Use</th>
<th>Daily Enter</th>
<th>Exit</th>
<th>A.M. Peak Hour Enter</th>
<th>Exit</th>
<th>P.M. Peak Hour Enter</th>
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<td>7</td>
<td>4</td>
<td>17</td>
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<td>Restaurant</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>Cinema/Entertainment</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>135</td>
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<td>Hotel</td>
<td>38</td>
<td>48</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>2</td>
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<tr>
<td><strong>Total</strong></td>
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<td>609</td>
<td>15</td>
<td>15</td>
<td>48</td>
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</table>

% Reduction: 21.7% 10.3% 24.2%

**EXTERNAL TRIPS**

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<tr>
<th>Land Use</th>
<th>Daily Enter</th>
<th>Exit</th>
<th>A.M. Peak Hour Enter</th>
<th>Exit</th>
<th>P.M. Peak Hour Enter</th>
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<td>383</td>
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### Lanes, Volumes, Timings

**Existing - PM Peak Hour**

**3: Orange Ave & S Denning Dr & Minnesota Ave**

06/17/2019

### Lane Configurations

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<thead>
<tr>
<th>Lane Group</th>
<th>EBL2</th>
<th>EBL</th>
<th>EBT</th>
<th>EBR</th>
<th>EBR2</th>
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<th>WBR</th>
<th>WBR2</th>
<th>NBL2</th>
<th>NBL</th>
<th>NBT</th>
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</thead>
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<tr>
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<td></td>
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<tr>
<td>Future Volume (vph)</td>
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<tr>
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<tr>
<td>Storage Lanes</td>
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<td></td>
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<td></td>
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<td>Frt</td>
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<td>Flt Protected</td>
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<tr>
<td>Flt Permitted</td>
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<tr>
<td>Satd. Flow (perm)</td>
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<td></td>
</tr>
<tr>
<td>Right Turn on Red</td>
<td>Yes Yes</td>
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### Shared Lane Traffic (%)

| Lane Group Flow (vph) | 0 0 393 0 0 0 265 0 0 0 0 219 |
| Turn Type | Perm Perm NA Perm NA Perm Perm NA |
| Protected Phases | 4 8 |
| Permitted Phases | 4 4 8 10 10 10 |
| Detector Phase | 4 4 4 8 8 10 10 |

### Lead/Lag

| Lead/Lag Optimize? | |
| Vehicle Extension (s) | 3.0 3.0 3.0 |
| Recall Mode | None None None |
| Act Effct Green (s) | 19.1 19.1 14.1 |
| Actuated g/C Ratio | 0.26 0.26 0.19 |
| v/c Ratio | 1.26 0.71 0.68 |
| Control Delay | 167.3 39.3 42.4 |
| Queue Delay | 0.0 0.0 0.0 |
| Total Delay | 167.3 39.3 42.4 |
| LOS | F D D |
| Approach Delay | 167.3 39.3 42.4 |
| Approach LOS | F D D |
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### Lane Group Flow (vph)

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- Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 12.0 | 12.0 | 12.0 | 12.0 |
- Minimum Split (s) | 11.0 | 11.0 | 11.0 | 18.0 | 18.0 | 18.0 | 18.0 |
- Total Split (s) | 20.0 | 20.0 | 20.0 | 60.0 | 60.0 | 60.0 | 60.0 |
- Total Split (%) | 19.0% | 19.0% | 19.0% | 57.1% | 57.1% | 57.1% | 57.1% |
- Maximum Green (s) | 14.0 | 14.0 | 14.0 | 54.0 | 54.0 | 54.0 | 54.0 |
- Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
- All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
- Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
- Total Lost Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
- Lead/Lag | |
- Lead/Lag Optimize? | |
- Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
- Recall Mode | None | None | None | None | None | None | None |
- Act Effct Green (s) | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 |
- Actuated g/C Ratio | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 |
- v/c Ratio | 0.55 | 0.59 | 0.59 | 0.72 | 0.72 | 0.72 | 0.72 |
- Control Delay | 44.0 | 37.2 | 37.2 | 26.8 | 26.8 | 26.8 | 26.8 |
- Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
- Total Delay | 44.0 | 37.2 | 37.2 | 26.8 | 26.8 | 26.8 | 26.8 |
- LOS | D | D | D | C | C | C | C |
- Approach Delay | 39.5 | 39.5 | 39.5 | 26.8 | 26.8 | 26.8 | 26.8 |
- Approach LOS | D | D | D | C | C | C | C |
### Lanes, Volumes, Timings

**Existing - PM Peak Hour**

#### 3: Orange Ave & S Denning Dr & Minnesota Ave

06/17/2019

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## Intersection Summary

- **Area Type:** Other
- **Cycle Length:** 105
- **Actuated Cycle Length:** 74.8
- **Natural Cycle:** 75
- **Control Type:** Actuated-Uncoordinated
- **Maximum v/c Ratio:** 1.26
- **Intersection Signal Delay:** 52.3
- **Intersection LOS:** D
- **Intersection Capacity Utilization:** 114.2%
- **ICU Level of Service:** H
- **Analysis Period (min):** 15

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

## Splits and Phases

<table>
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<tr>
<th>Lane</th>
<th>Split 1</th>
<th>Split 2</th>
<th>Split 3</th>
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<tbody>
<tr>
<td>01</td>
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<td>25 s</td>
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<td>02</td>
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</table>

---

Orange Avenue

EDR

Syncho 10 Report

Page 10
**LANE SUMMARY**

Site: 101 [Orange at Minnesota / Denning]

New Site
Site Category: (None)
Roundabout

<table>
<thead>
<tr>
<th>Lane Use and Performance</th>
<th>Demand Flows</th>
<th>Lane Capacity</th>
<th>Lane Util.</th>
<th>Average Delay</th>
<th>Level of Service</th>
<th>95% Back of Queue</th>
<th>Lane Config</th>
<th>Lane Length</th>
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<th>Prob. Block.</th>
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<td>57.4</td>
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<tr>
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<td>3.0</td>
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<td>LOS C</td>
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<tr>
<td>Lane 1&lt;sup&gt;d&lt;/sup&gt;</td>
<td>272</td>
<td>3.0</td>
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<td>100</td>
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<td><strong>NorthEast: Orange Ave</strong></td>
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</table>

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

<sup>d</sup> Dominant lane on roundabout approach
### Orange Avenue Synchro 10 Report

**Lanes, Volumes, Timings Existing - PM Peak Hour**

**4: Orange Ave & S Pennsylvania Ave & W Fairbanks**

**06/17/2019**

<table>
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<tr>
<th>Lane Group</th>
<th>EBT</th>
<th>EBR</th>
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<th>WBL2</th>
<th>WBL</th>
<th>WBT</th>
<th>WBR</th>
<th>NBL2</th>
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<td>770</td>
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<td>8</td>
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<td>157</td>
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<td><strong>Future Volume (vph)</strong></td>
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<td>8</td>
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</tr>
</tbody>
</table>

#### Switch Phase

| **Minimum Initial (s)** | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 |
| **Minimum Split (s)** | 16.1 | 14.2 | 15.2 | 15.9 | 15.9 | 15.9 | 15.9 | 15.9 |
| **Total Split (s)** | 50.0 | 50.0 | 50.0 | 100.0 | 60.0 | 60.0 | 60.0 | 60.0 |
| **Total Split (%)** | 31.3% | 31.3% | 31.3% | 62.5% | 37.5% | 37.5% | 37.5% | 37.5% |
| **Maximum Green (s)** | 41.9 | 43.8 | 43.8 | 92.8 | 52.1 | 52.1 | 52.1 | 52.1 |
| **Yellow Time (s)** | 3.7 | 4.1 | 4.1 | 3.7 | 3.4 | 3.4 | 3.4 | 3.4 |
| **All-Red Time (s)** | 4.4 | 2.1 | 2.1 | 3.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| **Lost Time Adjust (s)** | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total Lost Time (s)** | 8.1 | 6.2 | 7.2 | 7.9 |

### Lead/Lag

| **Lead/Lag** | Lead | Lag | Lag |
| **Lead-Lag Optimize?** | Yes | Yes | Yes |
| **Vehicle Extension (s)** | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

### Recall Mode

| **Recall Mode** | Max | None | Max | None | Max | None | Max | None |
| **Act Effct Green (s)** | 42.0 | 43.9 | 93.0 | 26.2 |
| **Actuated g/C Ratio** | 0.31 | 0.33 | 0.69 | 0.19 |
| **v/C Ratio** | 0.86 | 1.26 | 0.33 | 0.96 |
| **Control Delay (s)** | 52.5 | 174.7 | 9.2 | 99.8 |
| **Queue Delay (s)** | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total Delay (s)** | 52.5 | 174.7 | 9.2 | 99.8 |
| **LOS** | D | F | A | F |
| **Approach Delay (s)** | 52.5 | 67.6 | 99.8 |
| **Approach LOS** | D | E | F |
### Existing - PM Peak Hour

#### 4: Orange Ave & S Pennsylvania Ave & W Fairbanks

<table>
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<tr>
<th>Lane Group</th>
<th>SBT</th>
<th>SBR</th>
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**Intersection Summary**

- **Area Type:** Other
- **Cycle Length:** 160
- **Actuated Cycle Length:** 134.4
- **Natural Cycle:** 140
- **Control Type:** Actuated-Uncoordinated
- **Maximum v/c Ratio:** 1.26
- **Intersection Signal Delay:** 65.7
- **Intersection LOS:** E
- **Intersection Capacity Utilization:** 83.1%
- **ICU Level of Service:** E

**Analysis Period (min) 15**

* User Entered Value

~ Volume exceeds capacity, queue is theoretically infinite.
  Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.
  Queue shown is maximum after two cycles.

**Splits and Phases:**

- 4: Orange Ave & S Pennsylvania Ave & W Fairbanks
## LANE SUMMARY

**Site: 101 [Orange Ave/S Penn./W Fairbanks]**

Orange Ave/W Fairbanks Ave/S Pennsylvania Ave  
Site Category: (None)  
Roundabout

### Lane Use and Performance

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<th>Deg. Satn v/c</th>
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<th>Level of Service</th>
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Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
Roundabout LOS Method: Same as Sign Control.  
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.  
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).  
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).  
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach