



December 21, 2023

Steven Gomez
Senior Engineer – Traffic
City of Aurora
15151 E. Alameda Parkway
Aurora, CO 80012

Re: Revolve at Windler Traffic Impact Study Cover Letter
SEC 56th Avenue and Denali Street
Aurora, Colorado

Dear Mr. Gomez:

The purpose of this cover letter is to inform City of Aurora staff that the Revolve at Windler Traffic Impact Study has been updated to be consistent with the with the recent changes to the lane configurations at the 56th Avenue and Denali Street intersection from the Windler Homestead Traffic Impact Study Supplemental Letter dated October 3, 2023. These changes consist of converting the northbound approach of the 56th Avenue and Denali Street intersection from one left turn lane, a shared left/through lane, and a continuous right to lane to dual left turn lanes, one through lane, and a right turn lane.

Thank you for the continued coordination with the Revolve at Windler project. If you have any questions or require anything further, please feel free to call me at (720) 943-9962

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

A handwritten signature in blue ink that reads "Jeffrey R. Planck".

Jeffrey R. Planck, P.E.
Project Traffic Engineer

Traffic Impact Study

Revolve at Windler

Aurora, Colorado

Prepared for:

Sub4 Development Co.

Kimley»Horn

T R A F F I C I M P A C T S T U D Y

Revolve at Windler

Aurora, Colorado

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December 2023

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1.0 EXECUTIVE SUMMARY

This report has been prepared to document the results of a Traffic Impact Study for Revolve at Windler proposed to be located on the southeast corner of the future 56th Avenue and Denali Street intersection in Aurora, Colorado. Revolve at Windler is proposed to include 201 multifamily housing units.

This study includes a 2025 horizon for project buildout as well as full buildout of the overall Windler development area in the 2040 horizon. It is noted that only the Revolve at Windler is being considered for the 2025 horizon in this submittal, however, the full buildout of the overall Windler development area with the addition of this project is included in the 2040 horizon to provide a comprehensive analysis for this area. It is expected that Revolve at Windler will be completed in the next several years with the remaining Windler Development to be completed after Revolve at Windler. Therefore, analysis was conducted for the 2025 Revolve at Windler buildout horizon and the 2040 full area buildout horizon. The Windler Homestead Master Traffic Study completed in May 2023 was used as a basis for the 2040 project horizon.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study based on the City of Aurora requested scope:

- 56th Avenue & Denali Street (#1)
- 56th Avenue & Fultondale Street (#2)
- 56th Avenue & Harvest Street (#3)
- 55th Avenue & Denali Street (#4)
- 55th Avenue & Fultondale Street (#5)
- 55th Avenue & Harvest Road (#6)

In addition, the two proposed full movement accesses along the north side of 55th Avenue (#7 and #8) were evaluated.

Regional access to Revolve at Windler will be provided by E-470, I-70, and Peña Boulevard. Primary access will be provided by 56th Avenue, while direct access into the project site will be

provided by two access intersections along the north side of 55th Avenue approximately 350 feet and 685 feet east of Denali Street for the West Access (#7) and East Access (#8), respectively (measured center to center).

Revolve at Windler is expected to generate approximately 1,356 weekday daily trips, with 80 of these trips occurring during the morning peak hour and 103 of these trips occurring during the afternoon peak hour.

Based on the analysis presented in this report, Kimley-Horn believes Revolve at Windler will be successfully incorporated into the existing and future roadway network. Analysis of the existing and future street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

2025 Recommendations

For purposes of this analysis, it was assumed that the Revolve at Windler development would be the first in place for the overall Windler development area. Therefore, the following roadway configurations are based upon this assumption:

- The intersection of 56th Avenue and Denali Street (#1) is planned to be constructed with development of the project. It is recommended that the eastbound and westbound 56th Avenue approaches consist of one left turn lane, one through lane, and one right turn lane. The northbound and southbound Denali Street approaches should operate with stop control with the installation of R1-1 “STOP” signs and one shared lane for all movements. The eastbound left turn lane, eastbound right turn lane, and westbound right turn lane lengths are recommended based upon CDOT standards as these meet turn lane warrants; it is recommended that these lanes be constructed to a length of 275 feet plus a 160-foot taper. Additionally, the westbound left turn lane, which is not anticipated to meet CDOT turn lane warrants in 2025, is recommended to be designated in the shadow of the eastbound left turn lane to a length of 100 feet.
- The ‘T’-intersection of 56th Avenue and Fultondale Street (#2) is planned to be constructed with development of the project. It is recommended that all three approaches consist of one

shared lane for all movements in this horizon. The northbound Fultondale Street approach should operate well with stop control with the installation of an R1-1 “STOP” sign.

- With completion of the Revolve at Windler project, two accesses (#7 and #8) are proposed along the north side of 55th Avenue on the south side of the development. It is recommended that an R1-1 “STOP” sign be installed on the exiting southbound approaches. Both access intersections should operate well with one shared lane for all movements at each intersection.

2040 Recommendations

- For purposes of this analysis, it was assumed that the overall Windler development area would be completed by 2040. Therefore, the intersection configuration at the intersections included in the Windler Homestead Master Traffic Study are consistent with that study, while the intersection configuration for intersections that were not studied in the master study are based on the operational analysis performed in this study. Additionally, the turn lane lengths at each intersection are generally aligned with the Windler Homestead Master study with a minimum of 100 feet in length.
- It is anticipated that a signal will be warranted at the intersection of 56th Avenue and Denali Street (#1). Therefore, if future volumes are realized, this intersection should be signalized by 2040. Additionally, it is recommended that the eastbound 56th Avenue approach consist of a left turn lane with 100 feet in length, three through lanes, and a right turn lane with 275 feet in length. The 56th Avenue westbound approach is recommended to consist of 200-foot dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane. The northbound Denali Street approach is recommended to consist of dual left turn lanes, one through lane, and a right turn lane. It is recommended that the inside northbound left turn lane be 225 feet of length, the outside left turn lane be a continuous lane, and the northbound right turn lane provide a length of 175 feet. The Denali Street southbound approach is recommended to consist of one 100-foot left turn lane, one through lane, and a 100-foot right turn lane.
- It is recommended that the eastbound approach at the intersection of 56th Avenue and Fultondale Street (#2) consist of three through lanes with the outside lane being a shared through/right turn lane. The 56th Avenue westbound approach is recommended to consist of

a 100-foot left turn lane and three through lanes. The northbound Fultondale Street approach is recommended to be designated with one left turn lane and one 100-foot right turn lane. This configuration aligns with the Windler Homestead Master study.

- The intersection of 56th Avenue and Harvest Road (#3) is planned to be constructed with completion of the overall Windler development. By 2040, it is anticipated that a signal will be warranted at this intersection. Therefore, this intersection should be signalized if future volumes are realized. It is recommended the eastbound 56th Avenue approach consist of 350-foot dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane. The 56th Avenue westbound approach should consist of one 350-foot left turn lane and three through lanes with the outside lane being a shared through/right turn lane. The northbound Harvest Road approach should consist of one 275-foot left turn lane, two through lanes, and a 100-foot right turn lane. The southbound Harvest Road approach is recommended to consist of one 300-foot left turn lane, two through lanes, and a 550-foot right turn lane.
- With full buildout of the Windler Development, it is anticipated that 55th Avenue will be extended to the west and Denali Street will be extended to the south, creating the four-leg intersection of 55th Avenue and Denali Street (#4). It is recommended that the eastbound and westbound 55th Avenue approaches operate with stop control with the installation of R1-1 “STOP” signs and consist of one shared lane for all movements. The northbound and southbound Denali Street approaches are recommended to consist of one 100-foot left turn lane and two through lanes with the outside lane being a shared through/right turn lane.
- With full buildout of the Windler Development, it is anticipated that 55th Avenue will be extended to the east and Fultondale Street will be extended to the south, creating the four-leg intersection of 55th Avenue and Fultondale Street (#5). It is recommended that the eastbound and westbound 55th Avenue approaches operate with stop-control with the installation of R1-1 “STOP” signs. All four approaches are recommended to consist of one shared lane for all movements.
- The intersection of 55th Avenue and Harvest Road (#6) is planned to be constructed with completion of the overall Windler development. It is recommended the eastbound and

westbound approaches consist of a shared left turn/through lane and one 100-foot right turn lane. The northbound and southbound approaches should consist of one 100-foot left turn lane, two through lanes, and one 100-foot right turn lane.

- With full construction of the Windler development, a south leg is anticipated to be constructed at the 55th Avenue West Access (#7). It is recommended that this south leg operate with stop control with installation of a R1-1 “STOP” sign.

General Recommendations

- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Aurora and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this report to document the results of a Traffic Impact Study for Revolve at Windler proposed to be located on the southeast corner of the future 56th Avenue and Denali Street intersection in Aurora, Colorado. A vicinity map illustrating the Revolve at Windler development location is shown in **Figure 1**. Revolve at Windler is proposed to include 201 multifamily housing units. A conceptual site plan is attached in **Appendix G**.

This study includes a 2025 horizon for project buildout as well as full buildout of the overall Windler development area in the 2040 horizon. It is noted that only the Revolve at Windler is being considered for the 2025 horizon in this submittal, however, the full buildout of the overall Windler development area with the addition of this project is included in the 2040 horizon to provide a comprehensive analysis for this area. It is expected that Revolve at Windler will be completed in the next several years with the remaining Windler Development to be completed after Revolve at Windler. Therefore, analysis was conducted for the 2025 Revolve at Windler buildout horizon and the 2040 full area buildout horizon. The Windler Homestead Master Traffic Study completed in May 2023 was used as a basis for the 2040 project horizon.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following intersections were incorporated into this traffic study based on the City of Aurora requested scope:

- 56th Avenue & Denali Street (#1)
- 56th Avenue & Fultondale Street (#2)
- 56th Avenue & Harvest Street (#3)
- 55th Avenue & Denali Street (#4)
- 55th Avenue & Fultondale Street (#5)
- 55th Avenue & Harvest Road (#6)

In addition, the two proposed full movement accesses along the north side of 55th Avenue (#7 and #8) were evaluated.

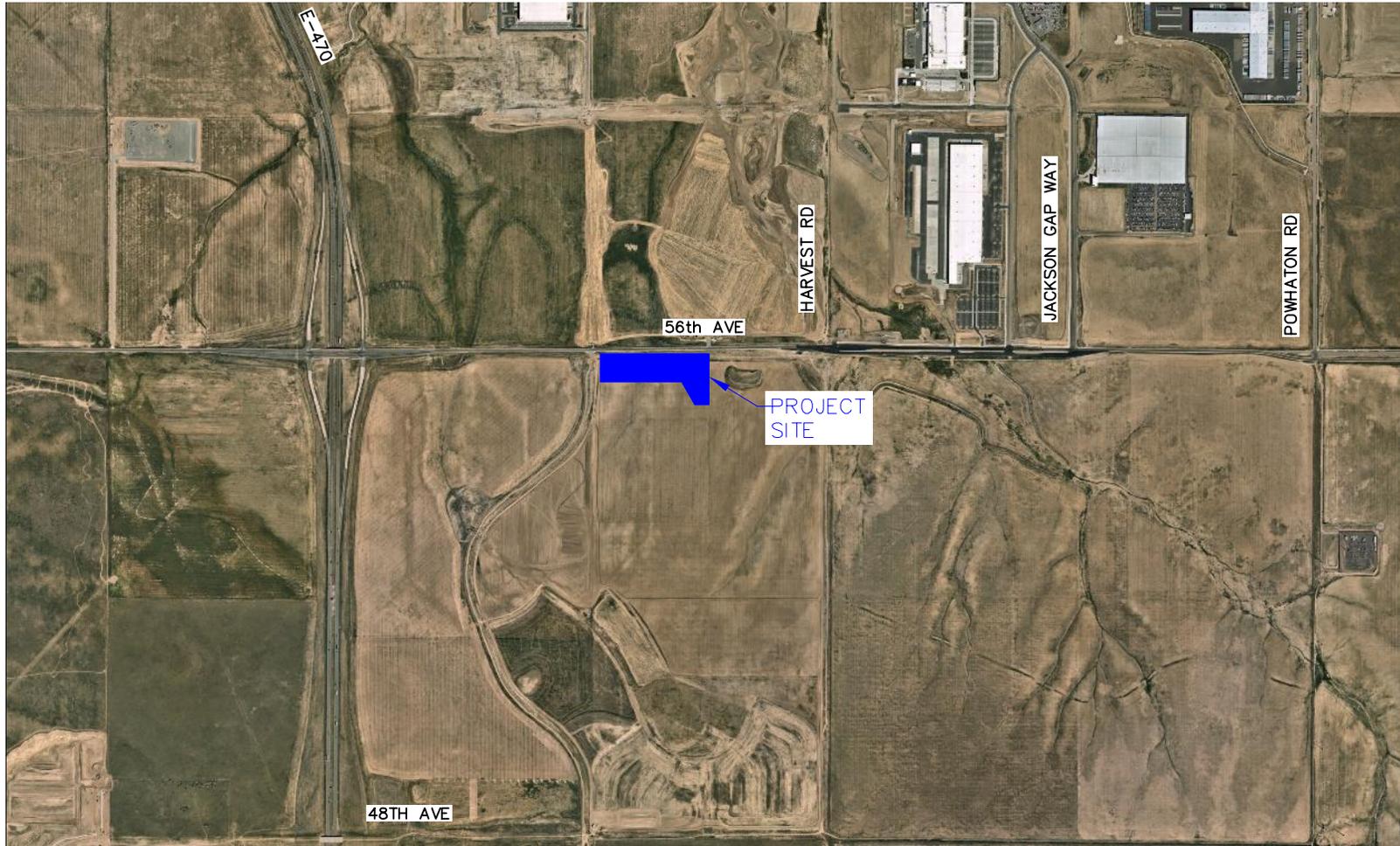


FIGURE 1
REVOLVE AT WINDLER
AURORA, CO
VICINITY MAP

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area and Future Access

The existing site and surrounding vicinity are comprised of vacant land, with most of the nearest existing development located to the west, which are mainly single-family homes to the west of Picadilly Road. There is additional development currently occurring in the vicinity, with some industrial uses and Denver International Airport (DEN) related uses to the northeast of the project site.

Regional access to Revolve at Windler will be provided by E-470, I-70, and Peña Boulevard. Primary access will be provided by 56th Avenue, while direct access into the project site will be provided by two access intersections along the north side of 55th Avenue approximately 350 feet and 685 feet east of Denali Street for the West Access (#7) and East Access (#8), respectively (measured center to center).

3.2 Existing and Future Roadway Network

As most of the area is currently undeveloped in this area, the street network surrounding the project site is not yet constructed. With development continuing to occur in the study area, several new roadways and intersections will be created in the next several years.

56th Avenue

56th Avenue provides one lane of travel in each direction eastbound and westbound with a posted speed limit of 45 miles per hour. Based on the Northeast Aurora Transportation Study (NEATS) 2030 proposed roadway network, 56th Avenue is anticipated to provide two through lanes in each direction to the west of Jackson Gap Street and one through lane to the east of Jackson Gap Street. According to NEATS and the Windler Homestead Master Traffic Study, 56th Avenue will provide three through lanes in each direction eastbound and westbound by the 2040 horizon within the study area.

55th Avenue

55th Avenue is proposed to include one through lane in each direction eastbound and westbound. With construction of the Revolve at Windler development 55th Avenue is proposed to extend along the project frontage between Denali Street and Fultondale Street. By 2040 and according to the

Windler Homestead Master Traffic Study, 55th Avenue will be extended from the west of Denali Street through Harvest Street to the east.

Denali Street

With project construction, Denali Street is proposed to include one through lane in each direction northbound and southbound. With construction of the Revolve at Windler development, Denali Street is proposed to extend along the project frontage from 56th Avenue to the north and to 55th Avenue on the south. According to NEATS and the Windler Homestead Master Traffic Study, by 2040 Denali Street is planned to be extended south beyond 48th Avenue and is anticipated to provide two through lanes in each direction northbound and southbound.

Fultondale Street

Fultondale Street is proposed to include one through lane in each direction northbound and southbound. With construction of the Revolve at Windler development, Fultondale Street is proposed to extend along the project frontage between 55th Avenue and 56th Avenue. By 2040 and according to the Windler Homestead Master Traffic Study, Fultondale Street will be extended south beyond 48th Avenue and continue to provide one through lane in each direction northbound and southbound.

Harvest Road

Harvest Road within the study area is not anticipated to be constructed by 2025. However, according to the Windler Homestead Master Traffic Study, Harvest Road will be extended south to 48th Avenue and north beyond 56th Avenue and provide two through lanes in each direction northbound and southbound.

3.3 Existing Traffic Volumes

Existing turning movement counts were conducted at the intersection of 56th Avenue and E-470 Northbound Ramps on Tuesday, January 10, 2023, during the weekday morning and afternoon peak hours to provide a basis of existing eastbound and westbound through traffic along 56th Avenue adjacent to the project site. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on this count date. Count sheets are provided in **Appendix A**.

3.4 Unspecified Development Traffic Growth

None of the study area key intersections analyzed in this study are constructed today. However, it is believed that the Revolve at Windler development will be the first development constructed as part of the overall Windler Homestead development. Therefore, traffic traveling along the proposed roadways of Denali Street, Fultondale Street, and 55th Avenue in the study area will only be project-generated trips during the 2025 short-term horizon. To conform to City of Aurora Traffic Impact Study Guidelines, a two (2) percent annual growth rate was used to estimate future traffic volume along 56th Avenue for the 2025 horizon. In addition, the Harvest Mile – Fulenwider development traffic volumes were directly added to the 2025 traffic volumes to provide a conservative analysis.

Traffic volumes from the Windler Homestead Master Traffic Study were used to derive 2040 traffic volumes at the key intersections. Traffic volumes from the PA-5 development were subtracted from the 2040 total traffic volumes as the Revolve at Windler development will be constructed in this area. Background traffic volumes at the intersections of 55th Avenue/Fultondale Street (#5) and the 55th Avenue project accesses (#7 and #8) were based on the traffic volumes at adjacent intersections from the Windler Homestead Master Traffic Study, as these intersections were not studied in the master study. Applicable documents from the Windler Homestead Master Traffic Study are attached in **Appendix B**.

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*¹ published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn used the ITE Trip Generation Report average rate equations that apply to Multifamily Low-Rise Housing (ITE Land Use Code 220) for traffic associated with the development.

Revolve at Windler is expected to generate approximately 1,356 weekday daily trips, with 80 of these trips occurring during the morning peak hour and 103 of these trips occurring during the afternoon peak hour. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 11th Edition – Volume 1: User's Guide and Handbook, 2021*.

The Windler Homestead Master Traffic Study identified this same development area (PA-5) to include 228 multifamily low-rise housing units. This development area was expected to generate approximately 1,537 weekday daily trips, with 94 of these trips occurring during the morning peak hour and 119 of these trips occurring during the afternoon peak hour. Calculations in the original master study were based on the procedure and information provided in the ITE *Trip Generation Manual, 11th Edition*. The following **Table 1** compares the trip generation of the applicable area from the original traffic study to the current proposal. The trip generation worksheets are included in **Appendix C** for the Revolve at Windler development and **Appendix B** for the Windler Homestead Master Traffic Study.

¹ Institute of Transportation Engineers, *Trip Generation Manual*, Eleventh Edition, Washington DC, 2021.

Table 1 – Trip Generation Comparison

| Land Use and Size | Weekday Vehicle Trips | | | | | | |
|---|-----------------------|--------------|------------|------------|--------------|-----------|------------|
| | Daily | AM Peak Hour | | | PM Peak Hour | | |
| | | In | Out | Total | In | Out | Total |
| Original Traffic Study (Applicable Area, PA-5 - ITE 10th Edition) | | | | | | | |
| Multifamily Low-Rise Housing (ITE 220) – 228 Dwelling Units | 1,537 | 23 | 71 | 94 | 75 | 44 | 119 |
| Proposed Development (ITE 11th Edition) | | | | | | | |
| Multifamily Low-Rise Housing (ITE 220) – 201 Dwelling Units | 1,356 | 19 | 61 | 80 | 65 | 38 | 103 |
| Trip Difference | -181 | -4 | -10 | -14 | -10 | -6 | -16 |

As summarized in the trip generation table, the proposed Revolve at Windler development generates 181 fewer daily trips, 14 fewer trips during the morning peak hour, and 16 fewer trips during the afternoon peak hour compared to the previously studied development area.

4.2 Trip Distribution

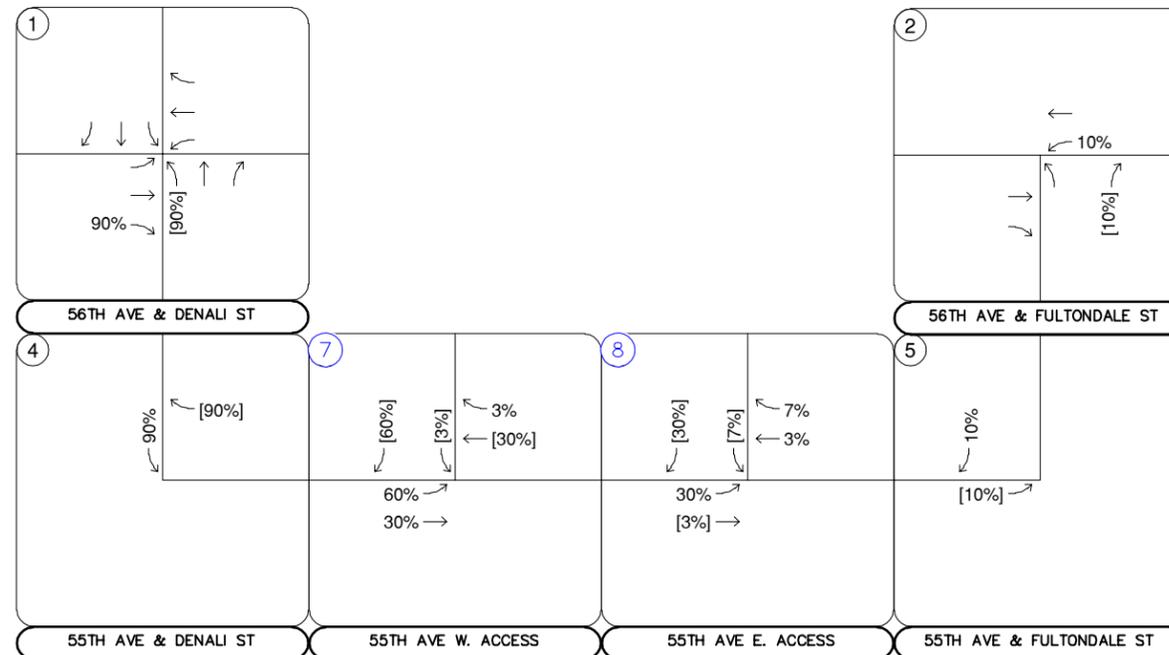
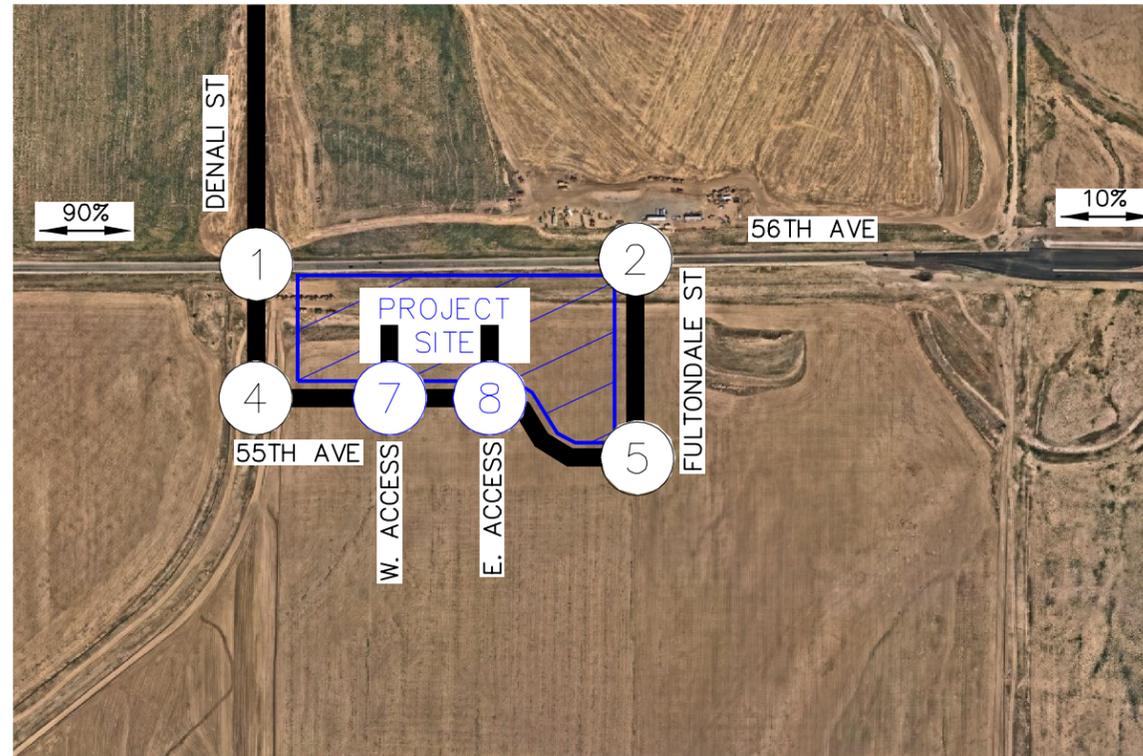
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding employment, school, and attraction information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution for the proposed development is illustrated in **Figure 2** for the 2025 horizon and **Figure 3** for the 2040 horizon.

4.3 Traffic Assignment

Revolve at Windler traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment is shown in **Figure 4** for the 2025 horizon and in **Figure 5** for the 2040 horizon.

4.4 Total (Background Plus Project) Traffic

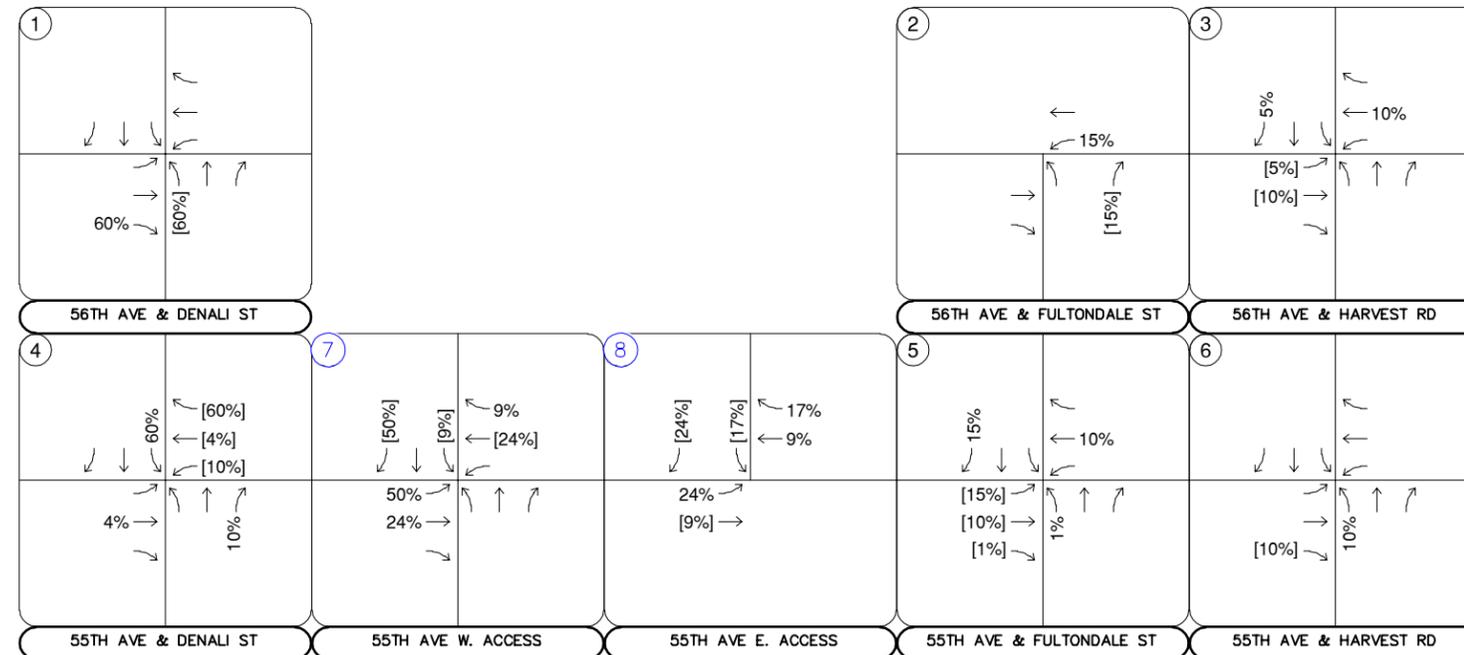
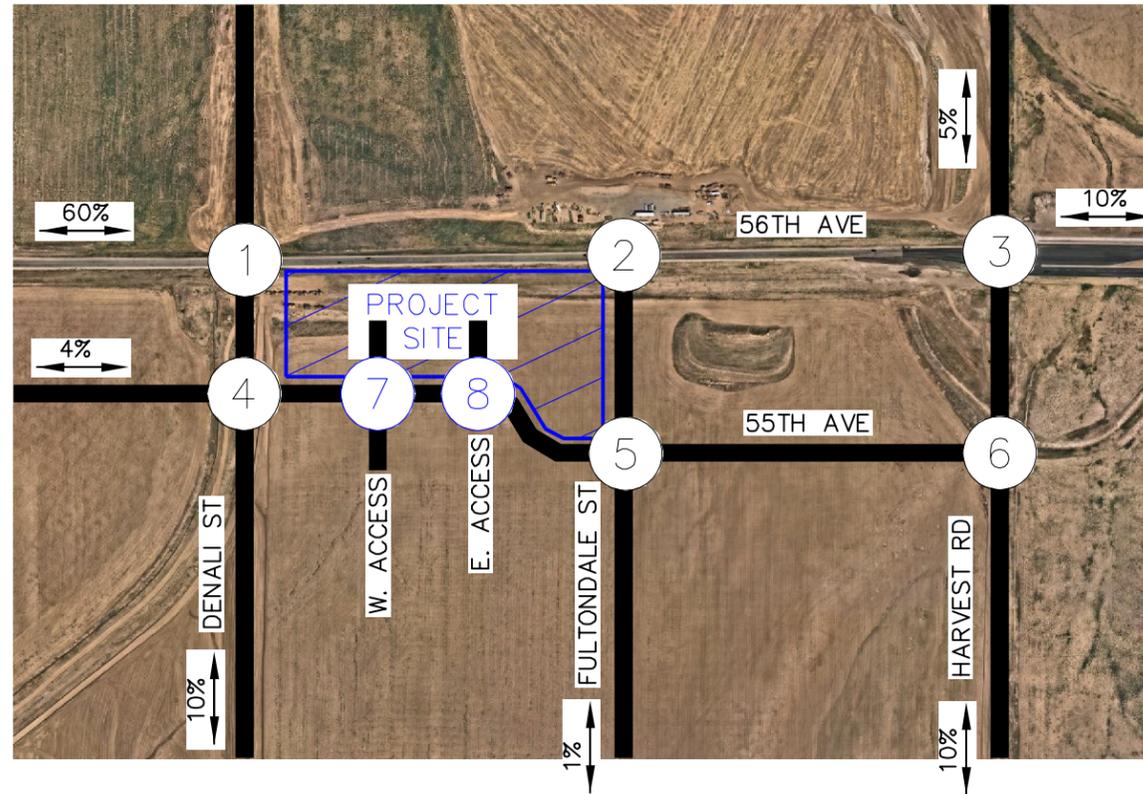
Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2025 horizon and long-term 2040 twenty-year planning horizon. These total traffic volumes for the study area are illustrated for the 2025 horizon and 2040 horizon years in **Figures 6** and **7**, respectively.



LEGEND

- Study Area Key Intersection
- Project Access Intersection
- External Trip Distribution Percentage
- Entering[Exiting] Trip Distribution Percentage

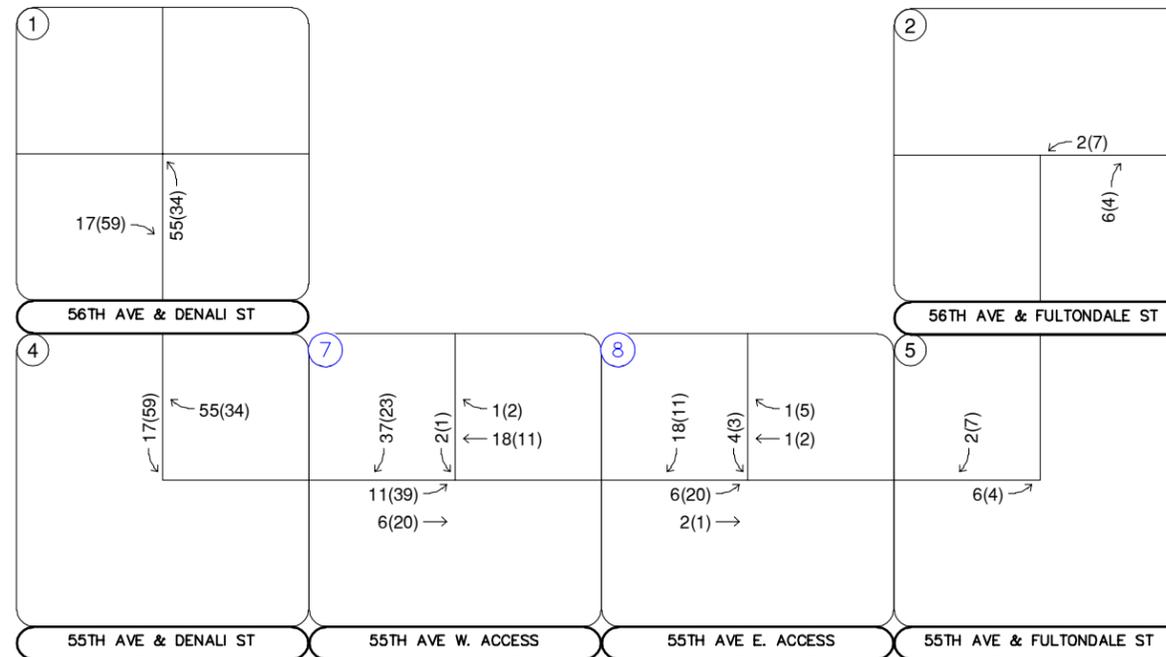
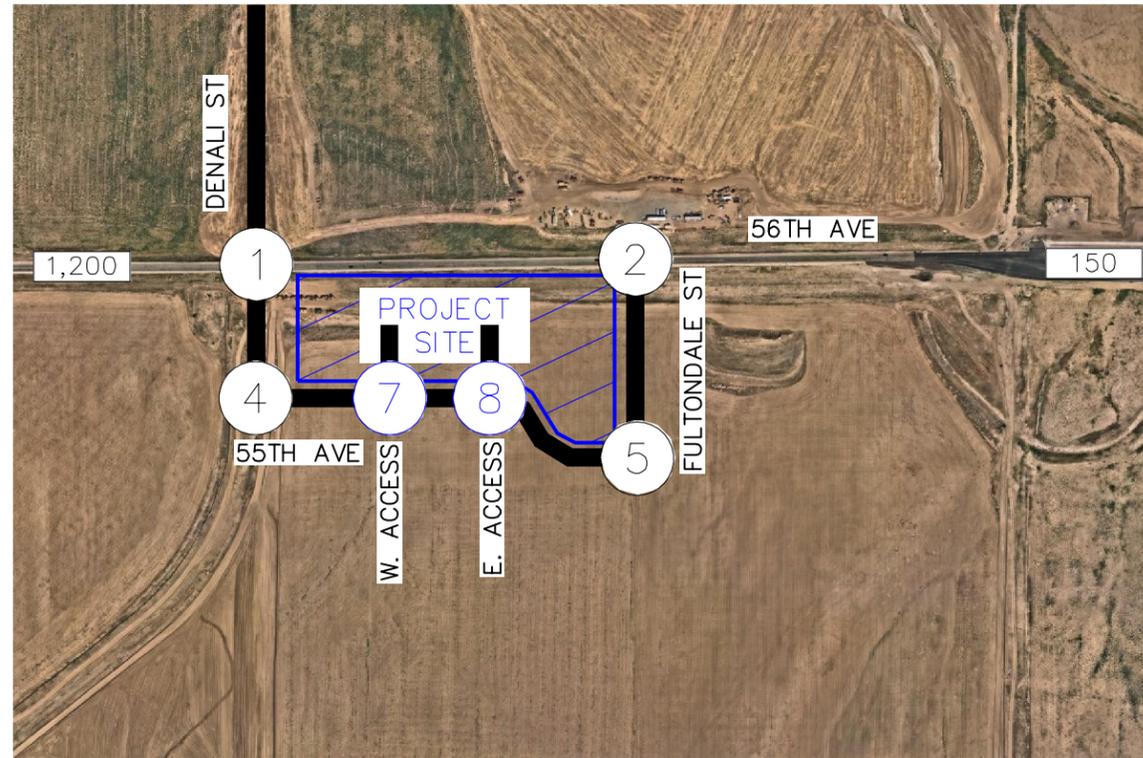
FIGURE 2
REVOLVE AT WINDLER
AURORA, COLORADO
2025 PROJECT TRIP DISTRIBUTION



LEGEND

- Study Area Key Intersection
- Project Access Intersection
- External Trip Distribution Percentage
- Entering[Exiting] Trip Distribution Percentage

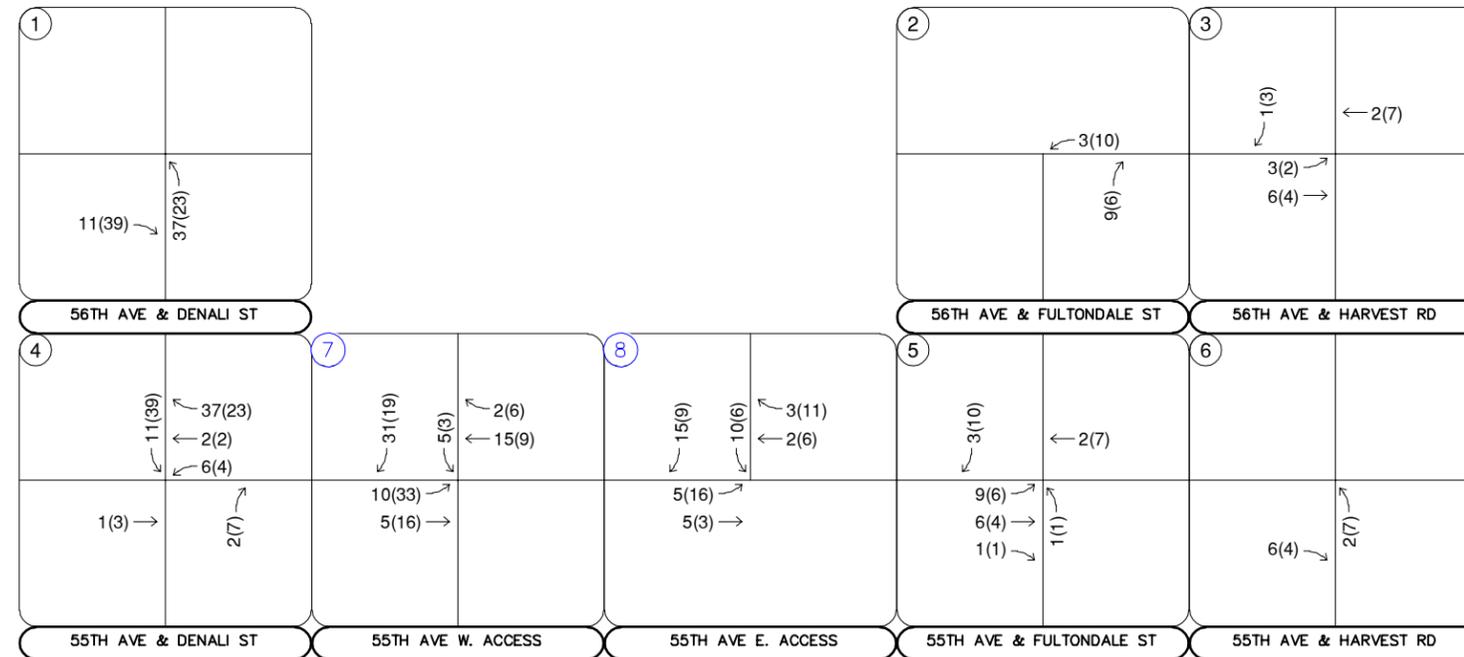
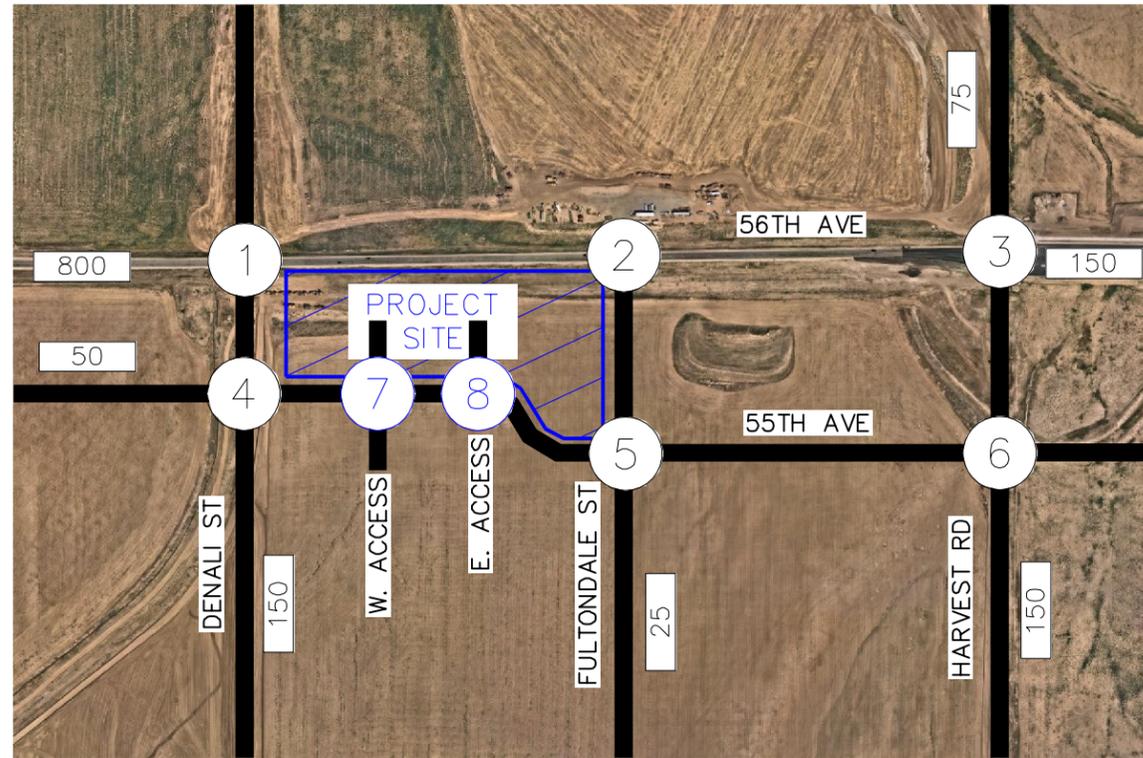
FIGURE 3
REVOLVE AT WINDLER
AURORA, COLORADO
2040 PROJECT TRIP DISTRIBUTION



LEGEND

- ⊗ Study Area Key Intersection
- ⊗ Project Access Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

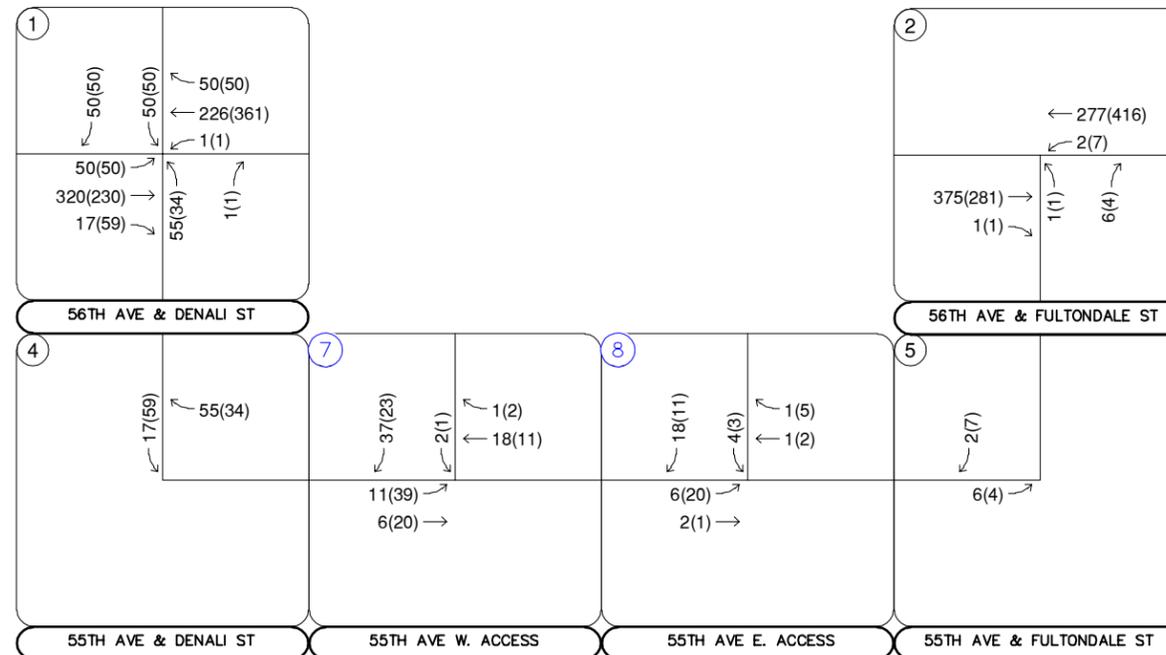
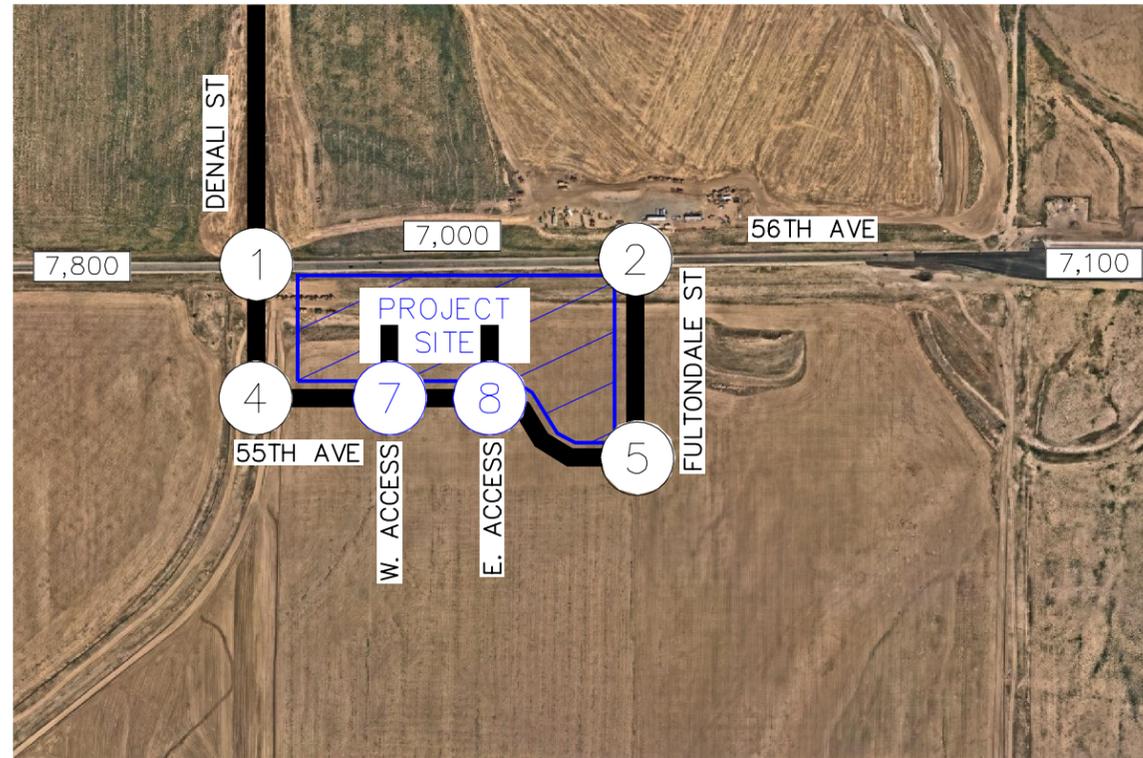
FIGURE 4
REVOLVE AT WINDLER
AURORA, COLORADO
2025 PROJECT TRAFFIC ASSIGNMENT



LEGEND

- ⊗ Study Area Key Intersection
- ⊗ Project Access Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

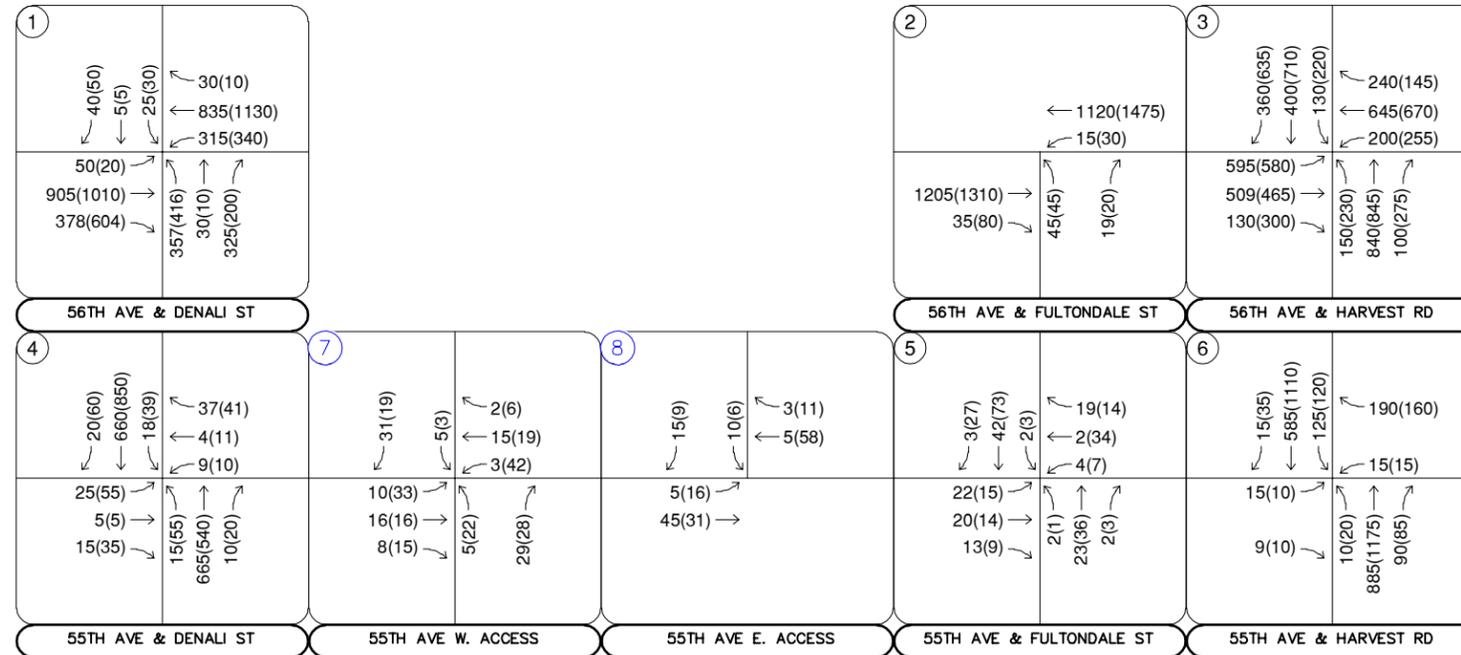
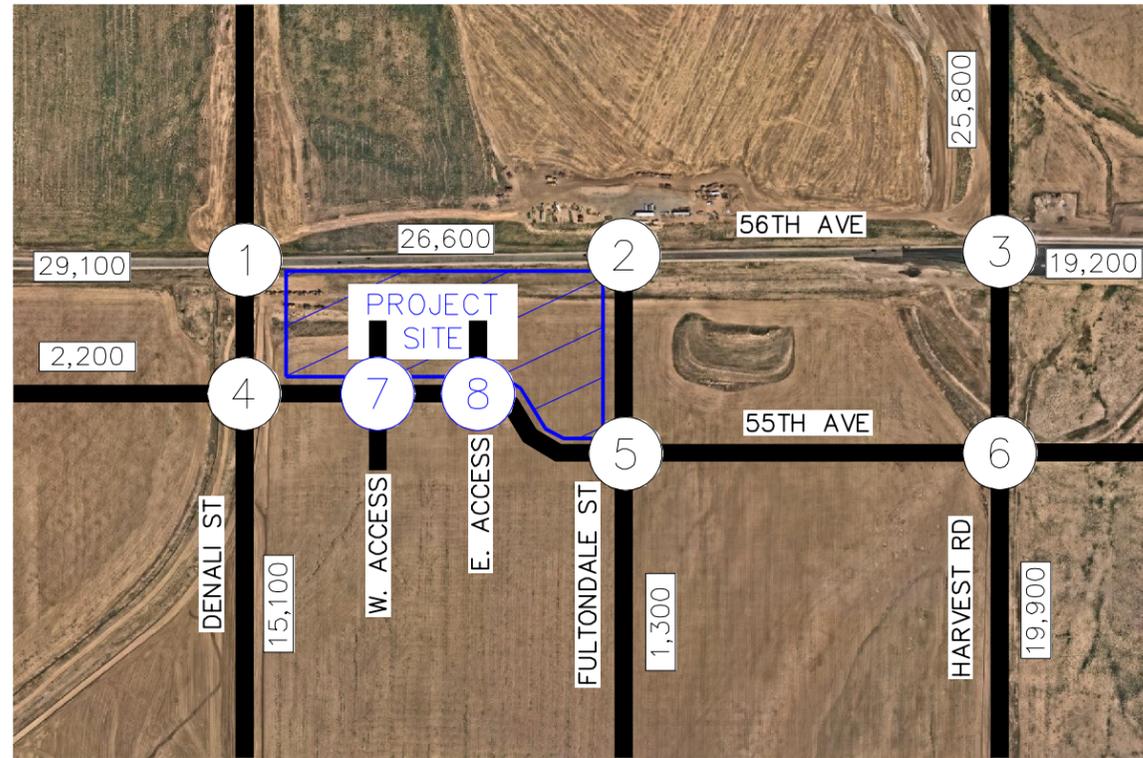
FIGURE 5
REVOLVE AT WINDLER
AURORA, COLORADO
2040 PROJECT TRAFFIC ASSIGNMENT



LEGEND

- X Study Area Key Intersection
- X Project Access Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

FIGURE 6
REVOLVE AT WINDLER
AURORA, COLORADO
2025 TOTAL TRAFFIC VOLUMES



LEGEND

- (X) Study Area Key Intersection
- (X) Project Access Intersection
- XXX(XXX) Weekday AM(PM)
Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

FIGURE 7
 REVOLVE AT WINDLER
 AURORA, COLORADO
 2040 TOTAL TRAFFIC VOLUMES

5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2025 and 2040 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the *Highway Capacity Manual (HCM)*².

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). According to City of Aurora guidelines for signalized intersections, individual movements may be allowed to fall to LOS E, but in most cases the overall intersection must operate (or be projected to operate) at a LOS D or better during AM and PM peak periods. If the existing LOS for an intersection is worse than LOS D, potential alternatives to improve the intersection to achieve LOS D should be provided or maintain the existing critical lane volume with the addition of site generated traffic. Minor movements at unsignalized intersections, such as left turns onto a major arterial from a side street, may be allowed to fall below LOS D pending the specific conditions. Movements which have a light traffic demand, and a viable travel alternative may be allowed to fall below LOS D. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

| Level of Service | Signalized Intersection Average Total Delay (sec/veh) | Unsignalized Intersection Average Total Delay (sec/veh) |
|------------------|---|---|
| A | ≤ 10 | ≤ 10 |
| B | > 10 and ≤ 20 | > 10 and ≤ 15 |
| C | > 20 and ≤ 35 | > 15 and ≤ 25 |
| D | > 35 and ≤ 55 | > 25 and ≤ 35 |
| E | > 55 and ≤ 80 | > 35 and ≤ 50 |
| F | > 80 | > 50 |

Definitions provided from the Highway Capacity Manual, Sixth Edition, Transportation Research Board, 2016.

² Transportation Research Board, *Highway Capacity Manual*, Sixth Edition, Washington DC, 2016.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled intersection is not defined for the intersection as a whole. LOS for signalized, roundabout, and all-way stop controlled intersections are defined for each approach and for the overall intersection.

5.2 Key Intersection Operational Analysis

Calculations for the operational level of service at the key intersections for the study area are provided in **Appendix D**. The HCM urban standard of 0.92 was used for the 2025 and 2040 horizon analysis years. The signalized intersection analysis generally assumes a 120-second cycle length with optimized phasing and timing at each signalized intersection. Synchro traffic analysis software was used to analyze the signalized and unsignalized key intersections for HCM level of service.

56th Avenue and Denali Street (#1)

The intersection of 56th Avenue and Denali Street (#1) is planned to be constructed with development of the project. It is conservatively assumed that the north leg of this intersection will be constructed in association with the Harvest Mile – Fulenwider project by the 2025 horizon. In the 2025 horizon, it is recommended that the eastbound and westbound 56th Avenue approaches consist of one left turn lane, one through lane, and one right turn lane. The northbound and southbound Denali Street approaches should operate well with one shared lane for all movements at each approach to the intersection in this horizon with stop control through the installation of R1-1 “STOP” signs. With this configuration, the movements at this intersection are anticipated to operate acceptably during the 2025 horizon with the addition of project traffic.

By 2040, it is anticipated that a signal will be warranted at this intersection. Therefore, if future volumes are realized, this intersection should be signalized by 2040. Signal warrant analysis worksheets are included in **Appendix E**. By 2040, and consistent with the recent 56th Street & Denali Boulevard Laneage Memo (supplement to Windler Homestead Master Traffic Impact Study) completed in October 2023, it is recommended that the eastbound 56th Avenue approach consist of one left turn lane, three through lanes, and one right turn lane while the 56th Avenue westbound approach is recommended to consist of dual left turn lanes and three through lanes

with the outside lane being a shared through/right turn lane. The northbound Denali Street approach is recommended to be designated with dual left turn lanes, one through lane, and a right turn lane while the Denali Street southbound approach is recommended to consist of one left turn lane, one through lane, and a right turn lane. With this recommended geometry and control, this intersection is anticipated to operate acceptably with LOS C during both peak hours in 2040. Roundabout analysis was not conducted at this intersection as three through lanes are not conducive to roundabout operations. **Table 3** provides the results of the LOS analysis conducted at this intersection.

Table 3 – 56th Avenue & Denali Street (#1) LOS Results

| Scenario | AM Peak Hour | | PM Peak Hour | |
|-------------------------|-----------------|----------|-----------------|----------|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| 2025 Total # | | | | |
| Northbound Approach | 19.9 | C | 20.7 | C |
| Eastbound Left | 8.0 | A | 8.4 | A |
| Westbound Left | 8.0 | A | 7.9 | A |
| Southbound Approach | 15.0 | C | 17.1 | C |
| 2040 Total ## | 23.3 | C | 26.4 | C |
| Eastbound Approach | 19.5 | B | 30.8 | C |
| Eastbound Left | 15.6 | B | 22.4 | C |
| Eastbound Through | 21.8 | C | 31.4 | C |
| Eastbound Right | 14.5 | B | 30.0 | C |
| Westbound Approach | 13.5 | B | 14.7 | B |
| Westbound Left | 49.1 | D | 53.7 | D |
| Westbound Through/Right | 0.5 | A | 2.7 | A |
| Northbound Approach | 43.5 | D | 40.1 | D |
| Northbound Left | 56.4 | E | 52.7 | D |
| Northbound Through | 40.4 | D | 31.8 | C |
| Northbound Right | 29.6 | C | 14.3 | B |
| Southbound Approach | 55.0 | E | 46.8 | D |
| Southbound Left | 58.3 | E | 52.8 | D |
| Southbound Through | 50.8 | D | 43.8 | D |
| Southbound Right | 53.4 | D | 43.3 | D |

= Eastbound and westbound approaches: one left turn lane, one through lane, and one right turn lane; northbound and southbound approaches: stop-controlled with one shared lane for all movements
 ## = Signalized; eastbound approach: one left turn lane, three through lanes, and one right turn lane; westbound approach: dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane; northbound approach: dual left turn lanes, one through lane, and one right turn lane; southbound approach: one left turn lane, one through lane, and one right turn lane

56th Avenue and Fultondale Street (#2)

The 'T'-intersection of 56th Avenue and Fultondale Street (#2) is planned to be constructed with development of the project. In the 2025 short-term horizon, it is recommended that all three approaches consist of one shared lane for all movements. In this horizon, the northbound Fultondale Street approach should operate with stop control with the installation of an R1-1 "STOP" sign. With this configuration, the movements at this intersection are anticipated to operate acceptably during the 2025 horizon with project traffic.

By 2040, it is recommended that the eastbound 56th Avenue approach consist of three through lanes with the outside lane being a shared through/right turn lane. The 56th Avenue westbound approach is recommended to consist of one left turn lane and three through lanes. The northbound Fultondale Street approach is recommended to be designated with one left turn lane and one right turn lane. Of note, this lane configuration and control is consistent with the Windler Homestead Master Traffic Study. With the recommended geometry and control, the movements at this intersection are anticipated to operate acceptably with LOS C or better during both peak hours through the 2040 horizon. **Table 4** provides the results of the LOS analysis conducted at this intersection.

Table 4 – 56th Avenue & Fultondale Street (#2) LOS Results

| Scenario | AM Peak Hour | | PM Peak Hour | |
|----------------------|-----------------|-----|-----------------|-----|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| 2025 Total # | | | | |
| Northbound Approach | 12.4 | B | 11.0 | B |
| Westbound Left | 8.1 | A | 7.9 | A |
| 2040 Total ## | | | | |
| Northbound Left | 13.2 | B | 15.4 | C |
| Northbound Right | 10.8 | B | 11.2 | B |
| Westbound Left | 9.6 | A | 10.0 | A |

= One shared lane for all movements on all three approaches with a stop-controlled northbound approach

= Eastbound approach: three through lanes with the outside lane being a shared through/right turn lane; westbound approach: one left turn lane and three through lanes; northbound approach: stop-controlled with one left turn lane and one right turn lane

56th Avenue and Harvest Road (#3)

The intersection of 56th Avenue and Harvest Road (#3) is not anticipated to be constructed by the 2025 horizon but is planned to be constructed with completion of the overall Windler development area. Therefore, this intersection was analyzed for the 2040 horizon only. By 2040, it is anticipated that a signal will be warranted at this intersection. Therefore, this intersection should be signalized if future volumes are realized. Signal warrant analysis worksheets are included in **Appendix E**. It is recommended the eastbound 56th Avenue approach consist of dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane. The 56th Avenue westbound approach should consist of one left turn lane and three through lanes with the outside lane being a shared through/right turn lane. The northbound Harvest Road approach should consist of one left turn lane, two through lanes, and a right turn lane. The southbound Harvest Road approach is recommended to consist of one left turn lane, two through lanes, and a right turn lane. Of note, this lane configuration and control is consistent with the Windler Homestead Master Traffic Study. With the recommended geometry and control, this intersection is anticipated to operate with LOS D during both peak hours in 2040. Roundabout analysis was not conducted at this intersection as three through lanes are not conducive to roundabout operations. **Table 5** provides the results of the LOS analysis conducted at this intersection.

Table 5 – 56th Avenue & Harvest Road (#3) LOS Results

| Scenario | AM Peak Hour | | PM Peak Hour | |
|-------------------------|-----------------|----------|-----------------|----------|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| 2040 Total # | 50.7 | D | 54.7 | D |
| Eastbound Approach | 59.1 | E | 64.5 | E |
| Eastbound Left | 62.0 | E | 69.9 | E |
| Eastbound Through/Right | 57.2 | E | 63.0 | E |
| Westbound Approach | 60.0 | E | 59.4 | E |
| Westbound Left | 37.5 | D | 42.4 | D |
| Westbound Through/Right | 73.7 | E | 72.2 | E |
| Northbound Approach | 40.2 | D | 44.0 | D |
| Northbound Left | 40.9 | D | 50.9 | D |
| Northbound Through | 41.8 | D | 54.0 | D |
| Northbound Right | 4.2 | A | 7.7 | A |
| Southbound Approach | 40.1 | D | 53.2 | D |
| Southbound Left | 44.8 | D | 53.9 | D |
| Southbound Through | 37.8 | D | 48.9 | D |
| Southbound Right | 41.8 | D | 61.9 | E |

= Signalized; eastbound approach: dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane; westbound approach: one left turn lane and three through lanes with the outside lane being a shared through/right turn lane; northbound approach: one left turn lane, two through lanes, and a right turn lane; southbound approach: one left turn lane, two through lanes, and one right turn lane

55th Avenue and Denali Street (#4)

The intersection of 55th Avenue and Denali Street (#4) is planned to be constructed with development of the project. In 2025, this intersection will consist of a north and east leg as only the roadways that border the project are anticipated to be constructed. Therefore, there will be no conflicting movements at this intersection with project construction which results in no delays at this intersection in this horizon.

With full buildout of the Windler Development, it is anticipated that 55th Avenue will be extended to the west and Denali Street will be extended to the south creating a four-leg intersection. By 2040, it is recommended that the eastbound and westbound 55th Avenue approaches operate with stop control with the installation of R1-1 “STOP” signs and consist of one shared lane for all movements. The northbound and southbound Denali Street approaches are recommended to consist of one left turn lane and two through lanes with a shared through/right turn lane. Of note, this lane configuration and control is consistent with the Windler Homestead Master Traffic Study. With the recommended geometry and control, the movements at this intersection are anticipated to operate acceptably with LOS C or better during both peak hours in 2040. **Table 6** provides the results of the LOS analysis conducted at this intersection.

Table 6 – 56th Avenue & Denali Street (#4) LOS Results

| Scenario | AM Peak Hour | | PM Peak Hour | |
|---------------------|-----------------|-----|-----------------|-----|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| 2040 Total # | | | | |
| Northbound Left | 8.0 | A | 8.6 | A |
| Eastbound Approach | 13.8 | B | 17.8 | C |
| Westbound Approach | 13.1 | B | 14.3 | B |
| Southbound Left | 9.2 | A | 8.9 | A |

= Eastbound and westbound approaches: stop-controlled, one shared lane for all movements; northbound and southbound approaches: one left turn lane and two through lanes with the outside lane being a shared through/right turn lane

55th Avenue and Fultondale Street (#5)

The intersection of 55th Avenue and Fultondale Street (#5) is planned to be constructed with development of the project. In 2025, this intersection will consist of a north and west leg as only the roadways that front the project are anticipated to be constructed. Therefore, there will be no conflicting movements at this intersection with project construction which results in no delays at this intersection in this horizon.

With full buildout of the Windler Development, it is anticipated that 55th Avenue will be extended to the east and Fultondale Street will be extended to the south creating a four-leg intersection. By 2040, it is recommended that the eastbound and westbound 55th Avenue approaches operate with stop-control with the installation of R1-1 “STOP” signs. All four approaches are recommended to consist of one shared lane for all movements. With the recommended geometry and control, the movements at this intersection are anticipated to operate acceptably with LOS A during both peak hours in 2040. **Table 7** provides the results of the LOS analysis conducted at this intersection.

Table 7 – 55th Avenue & Fultondale Street (#5) LOS Results

| Scenario | AM Peak Hour | | PM Peak Hour | |
|---------------------|-----------------|-----|-----------------|-----|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| 2040 Total # | | | | |
| Northbound Left | 7.3 | A | 7.4 | A |
| Eastbound Approach | 9.4 | A | 9.8 | A |
| Westbound Approach | 8.7 | A | 9.9 | A |
| Southbound Left | 7.3 | A | 7.3 | A |

= Stop-controlled eastbound and westbound approaches and one shared lane for all movements on all approaches

55th Avenue and Harvest Road (#6)

The intersection of 55th Avenue and Harvest Road (#6) is planned to be constructed with completion of the overall Windler development area. Therefore, this intersection was analyzed for the 2040 horizon only. It is recommended the eastbound and westbound approaches consist of a shared left turn/through lane and a right turn lane. The northbound and southbound approaches should consist of one left turn lane, two through lanes, and a right turn lane. Of note, this lane configuration and control is consistent with the Windler Homestead Master Traffic Study. With the recommended geometry and control, the movements at this intersection are anticipated to operate acceptably with LOS E or better during both peak hours in 2040 when the minor approaches are designed to allow two-stage left turn movements. **Table 8** provides the results of the LOS analysis conducted at this intersection.

Table 8 – 55th Avenue & Harvest Road (#6) LOS Results

| Scenario | AM Peak Hour | | PM Peak Hour | |
|------------------------|-----------------|-----|-----------------|----------|
| | Delay (sec/veh) | LOS | Delay (sec/veh) | LOS |
| 2040 Total # | | | | |
| Northbound Left | 7.9 | A | 9.1 | A |
| Eastbound Left/Through | 29.0 | D | 48.8 | E |
| Eastbound Right | 9.3 | A | 11.0 | B |
| Westbound Left/Through | 21.2 | C | 33.4 | D |
| Westbound Right | 16.0 | C | 19.6 | C |
| Southbound Left | 12.0 | B | 14.8 | B |

= Eastbound and westbound approaches: shared left turn/through lane and one right turn lane; northbound and southbound approaches: one left turn lane, two through lanes, and a right turn lane

Project Accesses

With completion of the Revolve at Windler project, two accesses (#7 and #8) are proposed along the north side of 55th Avenue on the south side of the development. It is recommended that an R1-1 “STOP” sign be installed on the exiting southbound approaches. Both accesses should operate with one shared lane for all movements. With full construction of the Windler development, it is anticipated that a south leg will be constructed that will align with the West Access (#7). It is recommended that this south leg operate with stop control with installation of an R1-1 “STOP” sign. **Table 9** provides the results of the level of service for these accesses. As shown in the table, the project street access intersections along 55th Avenue are anticipated to have all movements operating with acceptable LOS A during the peak hours in both the 2025 and the 2040 horizons.

Table 9 – Project Accesses Level of Service Results

| Intersection | 2025 Total | | | | 2040 Total | | | |
|---|-----------------|-----|-----------------|-----|-----------------|-----|-----------------|-----|
| | AM Peak Hour | | PM Peak Hour | | AM Peak Hour | | PM Peak Hour | |
| | Delay (sec/veh) | LOS |
| 55th Ave West Access (#7) | | | | | | | | |
| Eastbound Left | 7.3 | A | 7.3 | A | - | - | - | - |
| Southbound Approach | 8.6 | A | 8.5 | A | - | - | - | - |
| 55th Ave West Access (#7) # | | | | | | | | |
| Northbound Approach | - | - | - | - | 8.7 | A | 9.5 | A |
| Eastbound Left | - | - | - | - | 7.3 | A | 7.3 | A |
| Westbound Left | - | - | - | - | 7.3 | A | 7.3 | A |
| Southbound Approach | - | - | - | - | 8.6 | A | 8.8 | A |
| 55th Ave East Access (#8) | | | | | | | | |
| Eastbound Left | 7.2 | A | 7.3 | A | 7.2 | A | 7.4 | A |
| Southbound Approach | 8.5 | A | 8.5 | A | 8.6 | A | 8.9 | A |

= South leg constructed to align with the West Access (#7)

5.3 Turn Bay Length Analysis

The City of Aurora defaults to the Colorado Department of Transportation (CDOT) State Highway Access Code (SHAC) guidelines to determine if turn lanes are warranted at key intersections and accesses. CDOT classifies their state highways based on roadway types. The Non-Rural Arterial Category NR-B (moderate travel speed and moderate traffic volumes) was assigned to 56th Avenue based on matching the characteristics of the CDOT roadways. The speed limit along 56th Avenue is currently 45 miles per hour.

According to the State Highway Access Code for category NR-B roadways, the following thresholds apply for an auxiliary lane:

- A left turn lane with storage length plus taper is required for any access with a projected peak hour left ingress turning volume greater than 25 vph. If the posted speed is greater than 40 mph, a deceleration lane and taper is required for any access with a projected peak hour left ingress turning volume greater than 10 vph. The taper length will be included within the deceleration length.
- A right turn lane with storage length plus taper is required for any access with a projected peak hour right ingress turning volume greater than 50 vph. If the posted speed is greater than 40 mph, a right turn deceleration lane and taper is required for any access with a projected peak hour right ingress turning volume greater than 25 vph. The taper length will be included within the deceleration length.

Table 10 provides a summary of whether auxiliary turn lane warrants are met based on 2025 total traffic volumes. If warranted, the required turn lane lengths are provided based on CDOT State Highway Access Code guidelines:

Table 10 – Turn Lane Warrant and Length Summary

| Intersection | 2025 Total Traffic | | |
|---|--------------------|------|------------------|
| | Volume | Met? | Turn Lane Length |
| 56th Ave & Denali St (#1) | | | |
| Eastbound Left | 50 | Y | 275'+160'T |
| Eastbound Right | 59 | Y | 275'+160'T |
| Westbound Left | 5 | N | - |
| Westbound Right | 50 | Y | 275'+160'T |

As shown in the table above an eastbound left turn lane, eastbound right turn lane, and westbound right turn lane are warranted at the intersection of 56th Avenue and Denali Street (#1) by 2025 with project traffic. It is recommended that these turn lanes be designated to a length of 275 feet plus a 160-foot taper. It should be noted that project traffic only contributes to the eastbound right turn movements.

5.4 Vehicle Queueing Analysis

A vehicle queueing analysis was conducted for the study area intersections. The queueing analysis was performed using Synchro presenting the results of the 95th percentile queue lengths. Results are shown in the following **Table 11** with calculations provided within the level of service operational sheets of **Appendix D** for unsignalized intersections and **Appendix F** for signalized intersections. The recommended turn lane lengths shown in the 2025 horizon are based on the queues seen at the study area intersections while also meeting the CDOT State Highway Access Code (SHAC) guidelines for each turn lane where applicable, as was shown in **Table 10**.

Table 11 – Turn Lane Queuing Analysis Results

| Intersection Turn Lane | 2025 Calculated Queue (feet) | 2025 Recommended Length (feet) | 2040 Calculated Queue (feet) | 2040 Recommended Length (feet) |
|---|------------------------------|--------------------------------|------------------------------|--------------------------------|
| 56th Ave & Denali St (#1) | | | | |
| Eastbound Left | 25' | 275'+160'T | 34' | 100' |
| Eastbound Right | 25' | 275'+160'T | 268' | 275' |
| Westbound Left | 25' | 100' | 116' | 200' DL |
| Westbound Right | 25' | 275'+160'T | - | - |
| Northbound Left | DNE | DNE | 211' DL | 225' DL |
| Northbound Right | DNE | DNE | 178' | 175' |
| Southbound Left | DNE | DNE | 65' | 100' |
| Southbound Right | DNE | DNE | 25' | 100' |
| 56th Ave & Fultondale St (#2) | | | | |
| Westbound Left | DNE | DNE | 25' | 100' |
| Northbound Right | DNE | DNE | 25' | 100' |
| 56th Ave & Harvest Rd (#3) | | | | |
| Eastbound Left | DNE | DNE | 350' | 350' DL |
| Westbound Left | DNE | DNE | 268' | 350' |
| Northbound Left | DNE | DNE | 269' | 275' |
| Northbound Right | DNE | DNE | 85' | 100' |
| Southbound Left | DNE | DNE | 253' | 300' |
| Southbound Right | DNE | DNE | 480' | 550' |
| 55th Ave & Denali St (#4) | | | | |
| Northbound Left | DNE | DNE | 25' | 100' |
| Southbound Left | DNE | DNE | 25' | 100' |
| 55th Ave & Harvest Road (#6) | | | | |
| Eastbound Right | DNE | DNE | 25' | 100' |
| Westbound Right | DNE | DNE | 50' | 100' |
| Northbound Left | DNE | DNE | 25' | 100' |
| Northbound Right | DNE | DNE | 25' | 100' |
| Southbound Left | DNE | DNE | 25' | 100' |
| Southbound Right | DNE | DNE | 25' | 100' |

T = Taper Length (Feet); DL = Dual Left Turn Lanes; DNE = Does Not Exist; C = Continuous Turn Lane; **Blue** Text = Recommendation; **Red** Text = Recommendation from Windler Homestead Master Traffic Study

As shown in **Table 11**, the vehicle queues are all anticipated to remain within the recommended turn lane lengths through the 2040 full project buildout horizon. For purposes of this analysis, the recommended turn lane lengths provided in this study are generally based on meeting CDOT State Highway Access Code where applicable for the 2025 horizon, whereas the original Windler Homestead Master Traffic study recommended turn lane lengths were recommended for the 2040 horizon with a minimum turn lane length of 100 feet. The recommended turn lane lengths are provided in **Table 11**.

In 2025, at the intersection of 56th Avenue and Denali Street (#1) the eastbound left, eastbound right, and westbound right turn lanes are recommended to be installed to a length of 275 feet with a 160-foot taper to meet CDOT State Highway Access Code standards, while the westbound left turn lane, which is not warranted per CDOT standards, should be constructed in the shadow of the eastbound left turn lane with a minimum standard length of 100 feet. By 2040, the eastbound left turn lane is recommended to be 100 feet. Additionally, in 2040 northbound dual left turn lanes are recommended with 225 feet of length and the northbound right turn lane is recommended with 175 feet of length at 56th Avenue and Denali Street intersection. The southbound left and right turn lanes are recommended to be 100 feet. The eastbound right turn lane, westbound dual left turn lanes, and northbound right turn lane lengths each align with the Windler Homestead Master study with 125 feet, 200 feet, and continuous in length, respectively.

The 56th Avenue and Fultondale Street (#2) intersection is not anticipated to provide turn lanes in 2025, but by 2040 it is recommended the westbound left turn lane and northbound right turn lane be constructed to 100 feet in length.

At the intersection of 56th Avenue and Harvest Road (#3), the dual eastbound left turn lanes are recommended to provide 350 feet in length. The westbound direction should provide a 350-foot left turn lane. The northbound direction should provide a 275-foot left turn lane and a 100-foot right turn lane. The southbound direction should also provide a 300-foot left turn lane and a 550-foot right turn lane.

With construction of the 55th Avenue and Denali Street (#4) intersection, it is recommended that the northbound and southbound left turn lanes be designated to a length of 100 feet.

With construction of the 55th Avenue and Harvest Road (#6) intersection, it is recommended that the eastbound right, westbound right, northbound left, northbound right, southbound left, and southbound right turn lanes be designated to a length of 100 feet.

5.5 Bicycle, Pedestrian, Transit Access, and Traffic Calming Evaluation

Since the roadways included in this study do not currently exist, with the exception of 56th Avenue, there is no bicycle, pedestrian, or transit infrastructure established within the study area. As such, these multimodal evaluations will be conducted based on the planned future bicycle, pedestrian,

and transit infrastructure proposed in the City of Aurora NEATS report and the transit network that is proposed in the Windler Homestead Master study with applicable documents attached in **Appendix B**. These proposed bicycle, pedestrian, and transit routes are subject to change based on traffic and design analysis over the next several years.

According to the City of Aurora NEATS report and the Windler Homestead Master study, the envisioned service plan for transit routes in the area would include 1- to 2-mile route spacing along major arterials, all routes connecting to a park-n-ride, FasTracks, and/or mobility hub, most routes meeting RTD's "Suburban Local" classification with at least 20 riders boarding on average per hour, all routes having 15-minute peak hour services and at least 60-minute off-peak service, and ridership for each route ranging from 170 to 2,400 rides per day based on comparable existing service ridership. Nearby and within the study area, future high frequency transit routes identified in NEATS would be located along 56th Avenue, 48th Avenue to the south of the site, E-470, Picadilly Road to the west of the site, and Harvest Road to the southeast of the site. A Type 1 mobility hub is planned at 48th Avenue/Harvest Road and 56th Avenue/Picadilly Road which would include enhanced bus stops with real-time information, designated bus lanes and priority signals, secure bike parking, car sharing, off-street bike paths, and a transit/community information kiosk.

56th Avenue is anticipated to be a primary bike route, which could include separated bike lanes and trails; with Denali Street as a secondary bike route, which could include buffered or separated bike lanes; and there is also a proposed High Plains Trail to travel along the western perimeter of E-470 to the west of the project site. It would be anticipated that there could be grade-separated or enhanced at-grade crossings for pedestrian and bicycle routes within the area. It is also anticipated that sidewalks will be provided along each side of 56th Avenue, Denali Street, and other applicable roadways with crosswalks as appropriate at intersections within the study area to provide sufficient multimodal access to all developments as this area continues to grow. To identify possible traffic calming measures that could be employed in the area, speed cushions, chicanes, lane narrowing, and other traffic calming measures could be employed, however, these measures are not expected to be needed within or surrounding the project site. As mentioned, these recommendations may change over the next several years as needed based on the additional development occurring in the area.

5.6 Improvement Summary

Based on the results of the intersection operational and vehicle queueing analysis, the key intersection recommended improvements and control are shown in **Figure 8** for the 2025 horizon and **Figure 9** for the 2040 horizon.

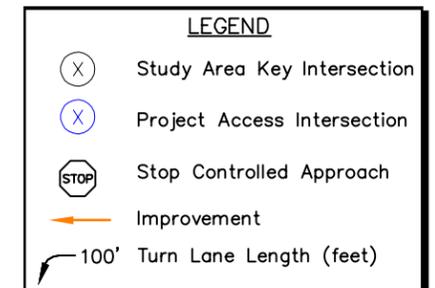
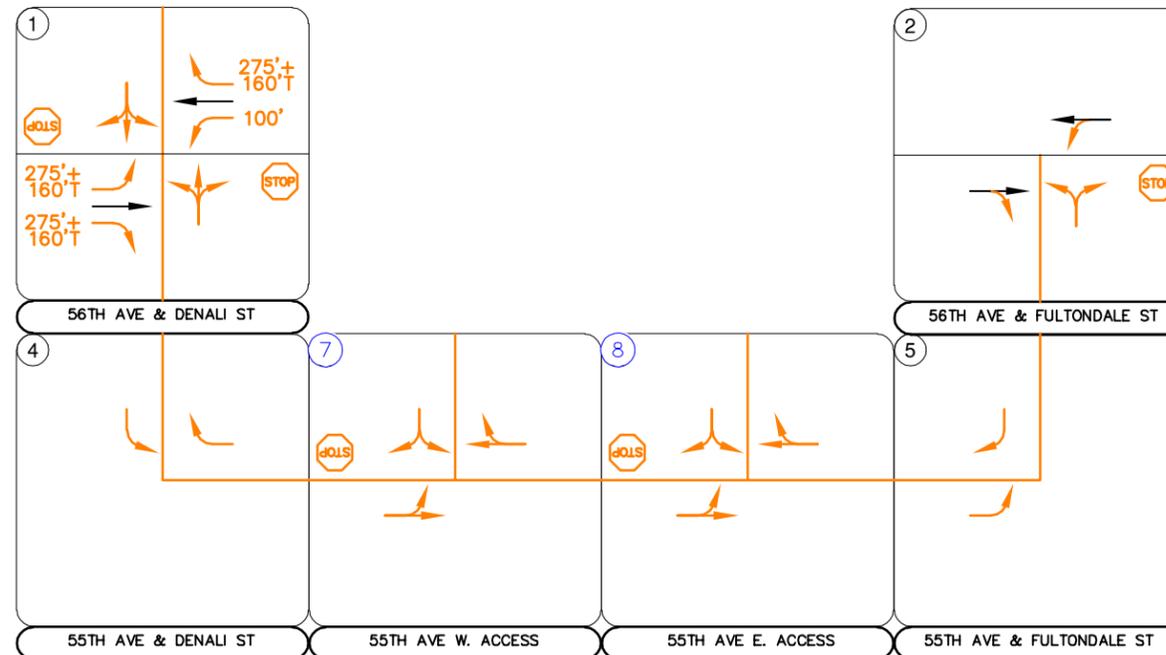
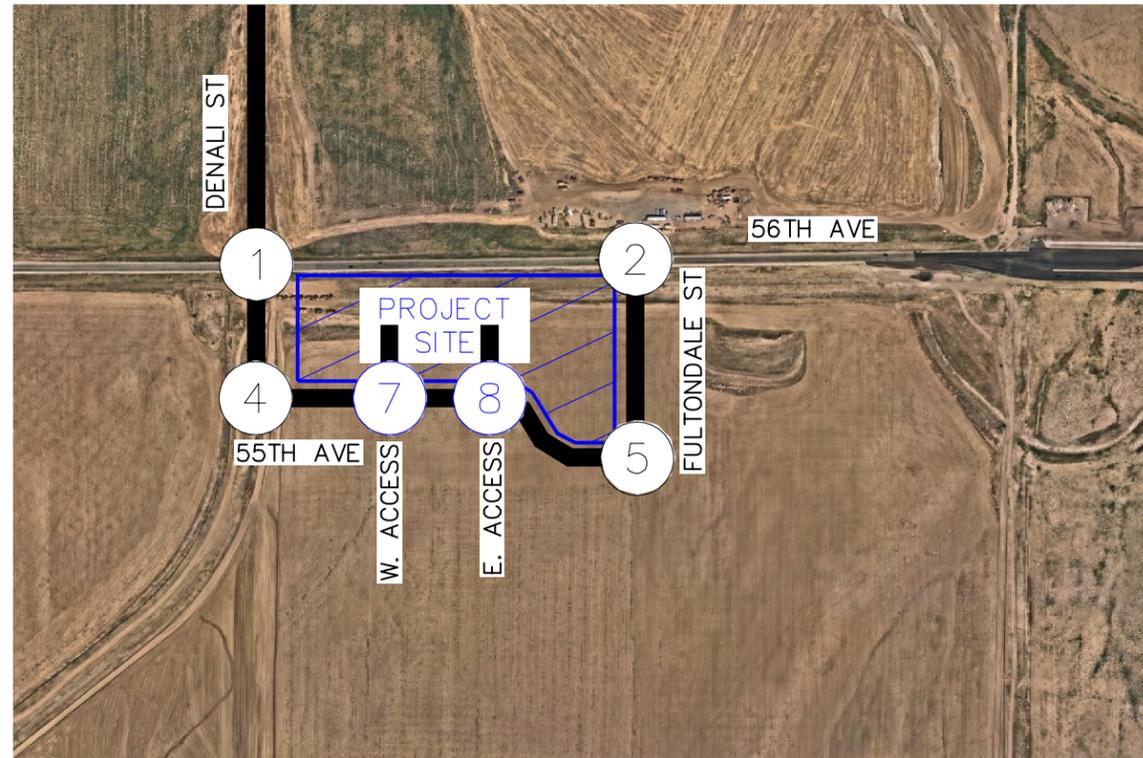


FIGURE 8
REVOLVE AT WINDLER
AURORA, COLORADO
2025 RECOMMENDED GEOMETRY AND CONTROL

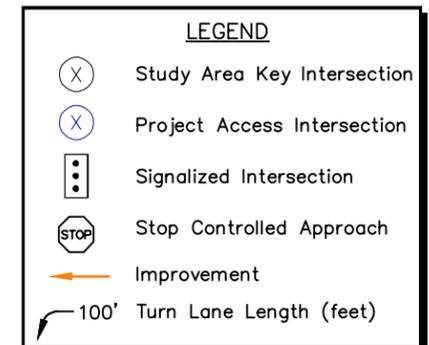
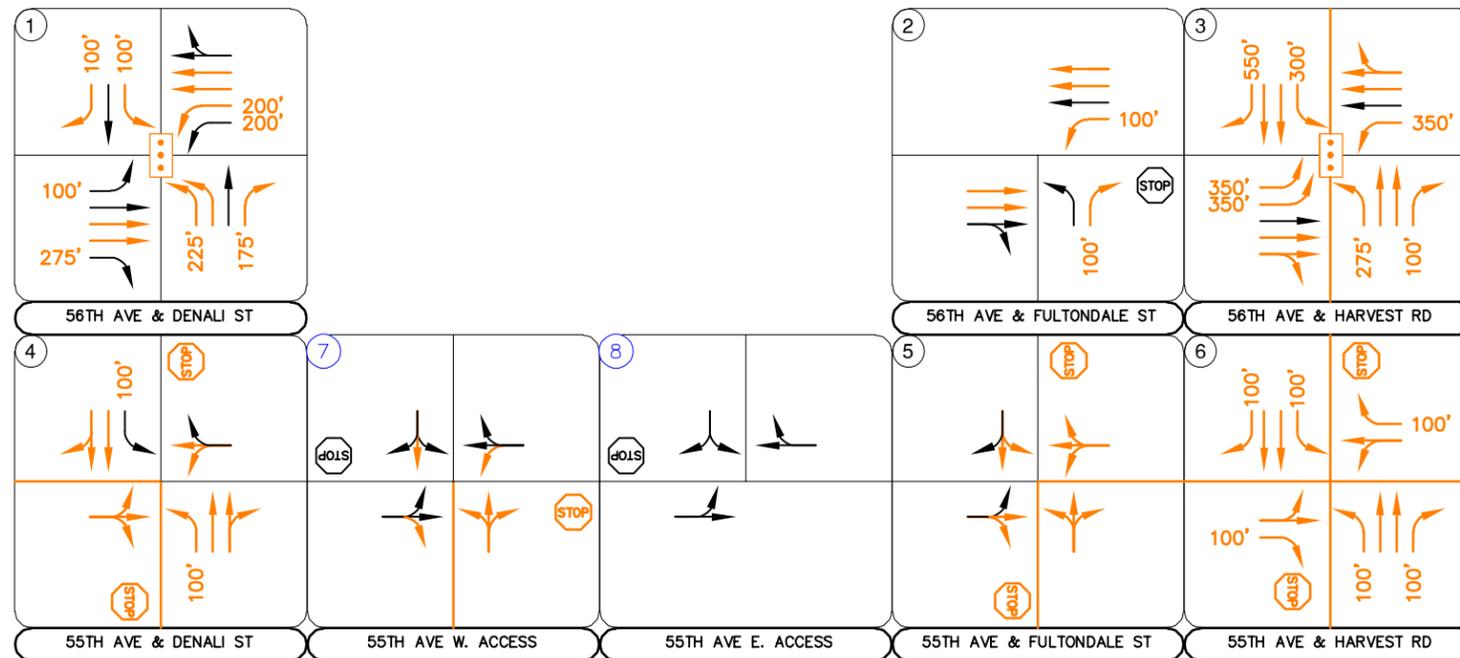
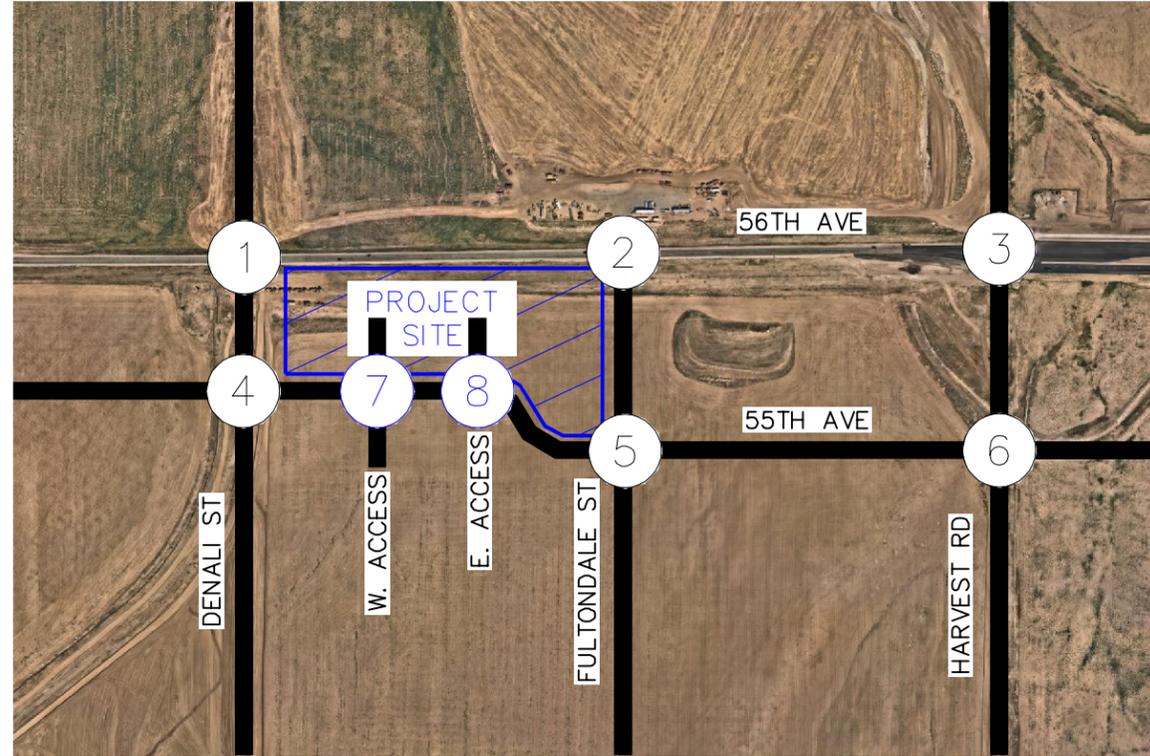


FIGURE 9
 REVOLVE AT WINDLER
 AURORA, COLORADO
 2040 RECOMMENDED GEOMETRY AND CONTROL

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes Revolve at Windler will be successfully incorporated into the existing and future roadway network. Analysis of the existing and future street network, the proposed project development, and expected traffic volumes resulted in the following conclusions and recommendations:

2025 Recommendations

For purposes of this analysis, it was assumed that the Revolve at Windler development would be the first in place for the overall Windler development area. Therefore, the following roadway configurations are based upon this assumption:

- The intersection of 56th Avenue and Denali Street (#1) is planned to be constructed with development of the project. It is recommended that the eastbound and westbound 56th Avenue approaches consist of one left turn lane, one through lane, and one right turn lane. The northbound and southbound Denali Street approaches should operate with stop control with the installation of R1-1 “STOP” signs and one shared lane for all movements. The eastbound left turn lane, eastbound right turn lane, and westbound right turn lane lengths are recommended based upon CDOT standards as these meet turn lane warrants; it is recommended that these lanes be constructed to a length of 275 feet plus a 160-foot taper. Additionally, the westbound left turn lane, which is not anticipated to meet CDOT turn lane warrants in 2025, is recommended to be designated in the shadow of the eastbound left turn lane to a length of 100 feet.
- The ‘T’-intersection of 56th Avenue and Fultondale Street (#2) is planned to be constructed with development of the project. It is recommended that all three approaches consist of one shared lane for all movements in this horizon. The northbound Fultondale Street approach should operate well with stop control with the installation of an R1-1 “STOP” sign.
- With completion of the Revolve at Windler project, two accesses (#7 and #8) are proposed along the north side of 55th Avenue on the south side of the development. It is recommended that an R1-1 “STOP” sign be installed on the exiting southbound approaches. Both access intersections should operate well with one shared lane for all movements at each intersection.

2040 Recommendations

- For purposes of this analysis, it was assumed that the overall Windler development area would be completed by 2040. Therefore, the intersection configuration at the intersections included in the Windler Homestead Master Traffic Study are consistent with that study, while the intersection configuration for intersections that were not studied in the master study are based on the operational analysis performed in this study. Additionally, the turn lane lengths at each intersection are generally aligned with the Windler Homestead Master study with a minimum of 100 feet in length.
- It is anticipated that a signal will be warranted at the intersection of 56th Avenue and Denali Street (#1). Therefore, if future volumes are realized, this intersection should be signalized by 2040. Additionally, it is recommended that the eastbound 56th Avenue approach consist of a left turn lane with 100 feet in length, three through lanes, and a right turn lane with 275 feet in length. The 56th Avenue westbound approach is recommended to consist of 200-foot dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane. The northbound Denali Street approach is recommended to consist of dual left turn lanes, one through lane, and a right turn lane. It is recommended that the inside northbound left turn lane be 225 feet of length, the outside left turn lane be a continuous lane, and the northbound right turn lane provide a length of 175 feet. The Denali Street southbound approach is recommended to consist of one 100-foot left turn lane, one through lane, and a 100-foot right turn lane.
- It is recommended that the eastbound approach at the intersection of 56th Avenue and Fultondale Street (#2) consist of three through lanes with the outside lane being a shared through/right turn lane. The 56th Avenue westbound approach is recommended to consist of a 100-foot left turn lane and three through lanes. The northbound Fultondale Street approach is recommended to be designated with one left turn lane and one 100-foot right turn lane. This configuration aligns with the Windler Homestead Master study.
- The intersection of 56th Avenue and Harvest Road (#3) is planned to be constructed with completion of the overall Windler development. By 2040, it is anticipated that a signal will be warranted at this intersection. Therefore, this intersection should be signalized if future volumes are realized. It is recommended the eastbound 56th Avenue approach consist of

350-foot dual left turn lanes and three through lanes with the outside lane being a shared through/right turn lane. The 56th Avenue westbound approach should consist of one 350-foot left turn lane and three through lanes with the outside lane being a shared through/right turn lane. The northbound Harvest Road approach should consist of one 275-foot left turn lane, two through lanes, and a 100-foot right turn lane. The southbound Harvest Road approach is recommended to consist of one 300-foot left turn lane, two through lanes, and a 550-foot right turn lane.

- With full buildout of the Windler Development, it is anticipated that 55th Avenue will be extended to the west and Denali Street will be extended to the south, creating the four-leg intersection of 55th Avenue and Denali Street (#4). It is recommended that the eastbound and westbound 55th Avenue approaches operate with stop control with the installation of R1-1 “STOP” signs and consist of one shared lane for all movements. The northbound and southbound Denali Street approaches are recommended to consist of one 100-foot left turn lane and two through lanes with the outside lane being a shared through/right turn lane.
- With full buildout of the Windler Development, it is anticipated that 55th Avenue will be extended to the east and Fultondale Street will be extended to the south, creating the four-leg intersection of 55th Avenue and Fultondale Street (#5). It is recommended that the eastbound and westbound 55th Avenue approaches operate with stop-control with the installation of R1-1 “STOP” signs. All four approaches are recommended to consist of one shared lane for all movements.
- The intersection of 55th Avenue and Harvest Road (#6) is planned to be constructed with completion of the overall Windler development. It is recommended the eastbound and westbound approaches consist of a shared left turn/through lane and one 100-foot right turn lane. The northbound and southbound approaches should consist of one 100-foot left turn lane, two through lanes, and one 100-foot right turn lane.
- With full construction of the Windler development, a south leg is anticipated to be constructed at the 55th Avenue West Access (#7). It is recommended that this south leg operate with stop control with installation of a R1-1 “STOP” sign.

General Recommendations

- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Aurora and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

APPENDICES

APPENDIX A

Intersection Count Sheets

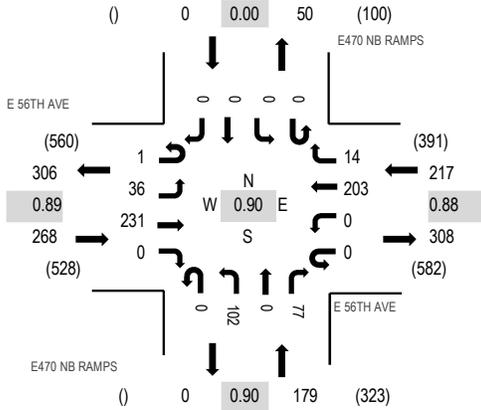
Location: 1 E470 NB RAMPS & E 56TH AVE AM

Date: Tuesday, January 10, 2023

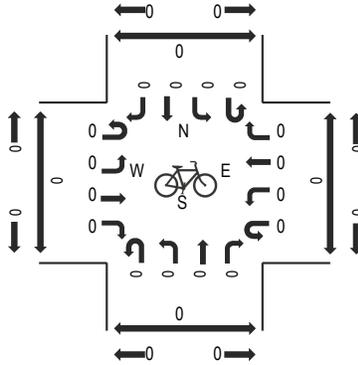
Peak Hour: 07:45 AM - 08:45 AM

Peak 15-Minutes: 08:00 AM - 08:15 AM

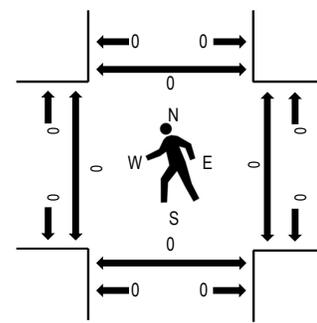
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

| Interval Start Time | E 56TH AVE Eastbound | | | | E 56TH AVE Westbound | | | | E470 NB RAMPS Northbound | | | | E470 NB RAMPS Southbound | | | | Total | Rolling Hour | Pedestrian Crossings | | | |
|------------------------|-------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------------|------|------|-------|-----------------------------|------|------|-------|-------|-----------------|----------------------|------|-------|-------|
| | U-Turn | Left | Thru | Right | U-Turn | Left | Thru | Right | U-Turn | Left | Thru | Right | U-Turn | Left | Thru | Right | | | West | East | South | North |
| 7:00 AM | 0 | 13 | 58 | 0 | 0 | 0 | 33 | 4 | 0 | 16 | 0 | 14 | 0 | 0 | 0 | 0 | 138 | 591 | 0 | 0 | 0 | 0 |
| 7:15 AM | 0 | 12 | 67 | 0 | 0 | 0 | 34 | 2 | 0 | 20 | 0 | 11 | 0 | 0 | 0 | 0 | 146 | 638 | 0 | 0 | 0 | 0 |
| 7:30 AM | 0 | 9 | 49 | 0 | 0 | 0 | 42 | 3 | 0 | 24 | 0 | 20 | 0 | 0 | 0 | 0 | 147 | 650 | 0 | 0 | 0 | 0 |
| 7:45 AM | 0 | 5 | 63 | 0 | 0 | 0 | 43 | 7 | 0 | 19 | 0 | 23 | 0 | 0 | 0 | 0 | 160 | 664 | 0 | 0 | 0 | 0 |
| 8:00 AM | 0 | 8 | 68 | 0 | 0 | 0 | 57 | 6 | 0 | 27 | 0 | 19 | 0 | 0 | 0 | 0 | 185 | 651 | 0 | 0 | 0 | 0 |
| 8:15 AM | 0 | 15 | 42 | 0 | 0 | 0 | 49 | 1 | 0 | 34 | 0 | 17 | 0 | 0 | 0 | 0 | 158 | | 0 | 0 | 0 | 0 |
| 8:30 AM | 1 | 8 | 58 | 0 | 0 | 0 | 54 | 0 | 0 | 22 | 0 | 18 | 0 | 0 | 0 | 0 | 161 | | 0 | 0 | 0 | 0 |
| 8:45 AM | 0 | 5 | 47 | 0 | 0 | 0 | 54 | 2 | 0 | 31 | 0 | 8 | 0 | 0 | 0 | 0 | 147 | | 0 | 0 | 0 | 0 |
| Count Total | 1 | 75 | 452 | 0 | 0 | 0 | 366 | 25 | 0 | 193 | 0 | 130 | 0 | 0 | 0 | 0 | 1,242 | | 0 | 0 | 0 | 0 |
| Peak Hour | 1 | 36 | 231 | 0 | 0 | 0 | 203 | 14 | 0 | 102 | 0 | 77 | 0 | 0 | 0 | 0 | 664 | | 0 | 0 | 0 | 0 |

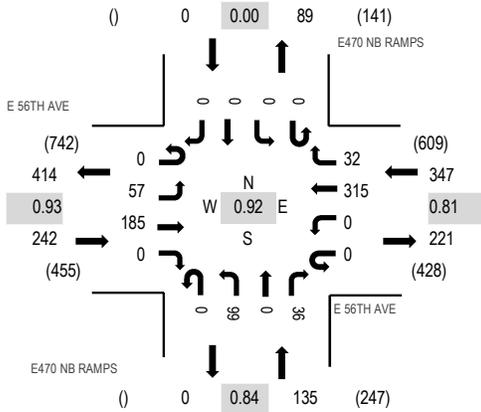
Location: 1 E470 NB RAMPS & E 56TH AVE PM

Date: Tuesday, January 10, 2023

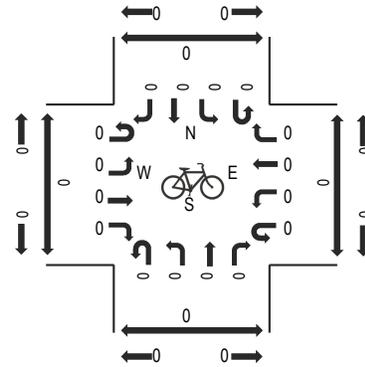
Peak Hour: 04:30 PM - 05:30 PM

Peak 15-Minutes: 05:00 PM - 05:15 PM

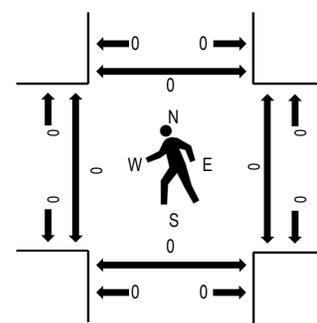
Peak Hour - Motorized Vehicles



Peak Hour - Bicycles



Peak Hour - Pedestrians



Note: Total study counts contained in parentheses.

Traffic Counts - Motorized Vehicles

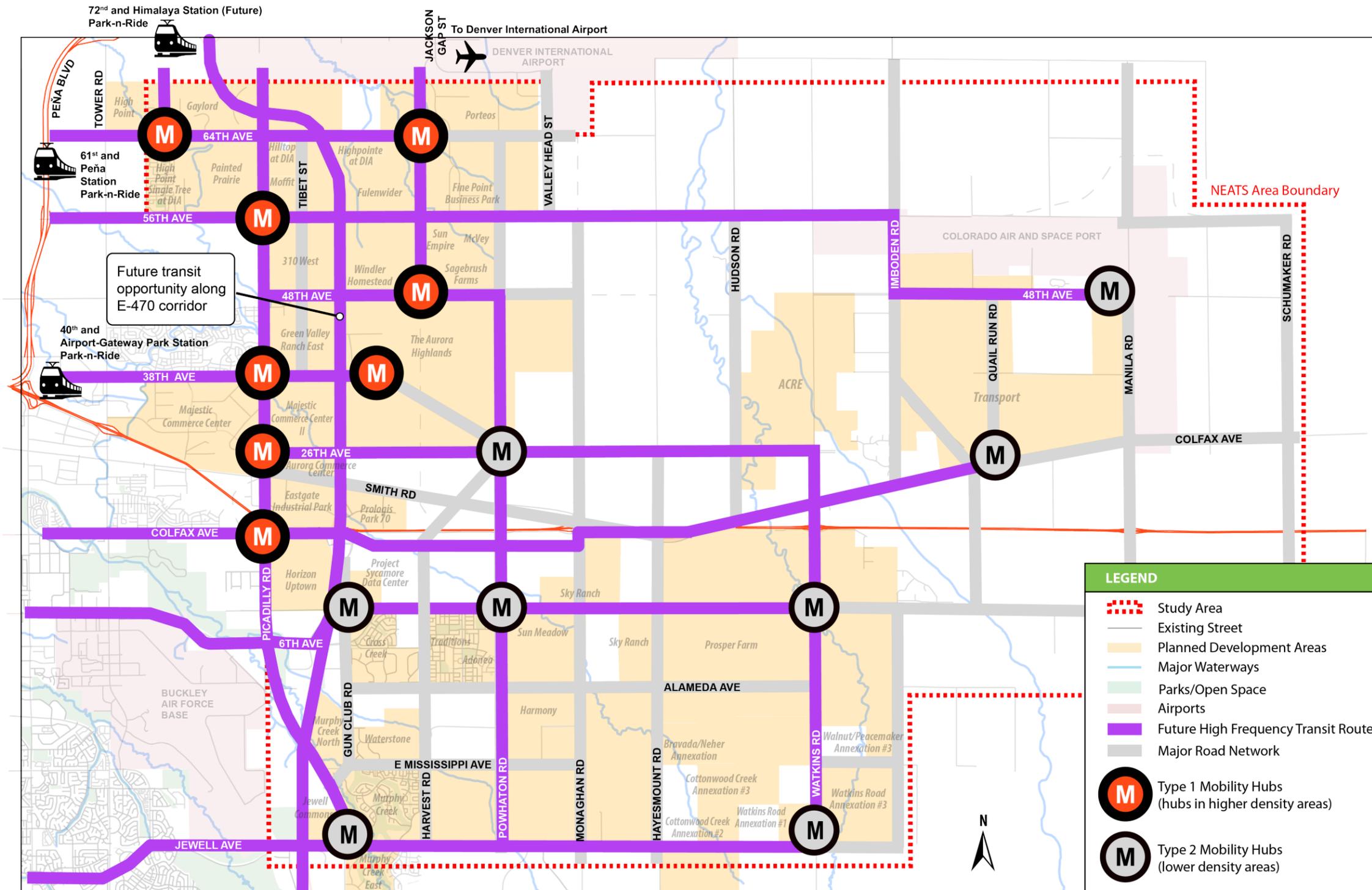
| Interval Start Time | E 56TH AVE Eastbound | | | | E 56TH AVE Westbound | | | | E470 NB RAMPS Northbound | | | | E470 NB RAMPS Southbound | | | | Total | Rolling Hour | Pedestrian Crossings | | | |
|------------------------|-------------------------|------|------|-------|-------------------------|------|------|-------|-----------------------------|------|------|-------|-----------------------------|------|------|-------|-------|-----------------|----------------------|------|-------|-------|
| | U-Turn | Left | Thru | Right | U-Turn | Left | Thru | Right | U-Turn | Left | Thru | Right | U-Turn | Left | Thru | Right | | | West | East | South | North |
| 4:00 PM | 0 | 7 | 31 | 0 | 0 | 0 | 83 | 4 | 0 | 16 | 0 | 10 | 0 | 0 | 0 | 0 | 151 | 639 | 0 | 0 | 0 | 0 |
| 4:15 PM | 0 | 17 | 28 | 0 | 0 | 0 | 64 | 5 | 0 | 24 | 0 | 5 | 0 | 0 | 0 | 0 | 143 | 684 | 0 | 0 | 0 | 0 |
| 4:30 PM | 0 | 17 | 38 | 0 | 0 | 0 | 77 | 6 | 0 | 21 | 0 | 12 | 0 | 0 | 0 | 0 | 171 | 724 | 0 | 0 | 0 | 0 |
| 4:45 PM | 0 | 12 | 49 | 0 | 0 | 0 | 72 | 11 | 0 | 24 | 0 | 6 | 0 | 0 | 0 | 0 | 174 | 711 | 0 | 0 | 0 | 0 |
| 5:00 PM | 0 | 15 | 42 | 0 | 0 | 0 | 102 | 5 | 0 | 23 | 0 | 9 | 0 | 0 | 0 | 0 | 196 | 672 | 0 | 0 | 0 | 0 |
| 5:15 PM | 0 | 13 | 56 | 0 | 0 | 0 | 64 | 10 | 0 | 31 | 0 | 9 | 0 | 0 | 0 | 0 | 183 | | 0 | 0 | 0 | 0 |
| 5:30 PM | 0 | 6 | 59 | 0 | 0 | 0 | 66 | 4 | 0 | 17 | 1 | 5 | 0 | 0 | 0 | 0 | 158 | | 0 | 0 | 0 | 0 |
| 5:45 PM | 0 | 7 | 58 | 0 | 0 | 0 | 35 | 1 | 0 | 23 | 0 | 11 | 0 | 0 | 0 | 0 | 135 | | 0 | 0 | 0 | 0 |
| Count Total | 0 | 94 | 361 | 0 | 0 | 0 | 563 | 46 | 0 | 179 | 1 | 67 | 0 | 0 | 0 | 0 | 1,311 | | 0 | 0 | 0 | 0 |
| Peak Hour | 0 | 57 | 185 | 0 | 0 | 0 | 315 | 32 | 0 | 99 | 0 | 36 | 0 | 0 | 0 | 0 | 724 | | 0 | 0 | 0 | 0 |

APPENDIX B

NEATS Data & Master Traffic Study



Figure ES-4.
Future Transit Routes

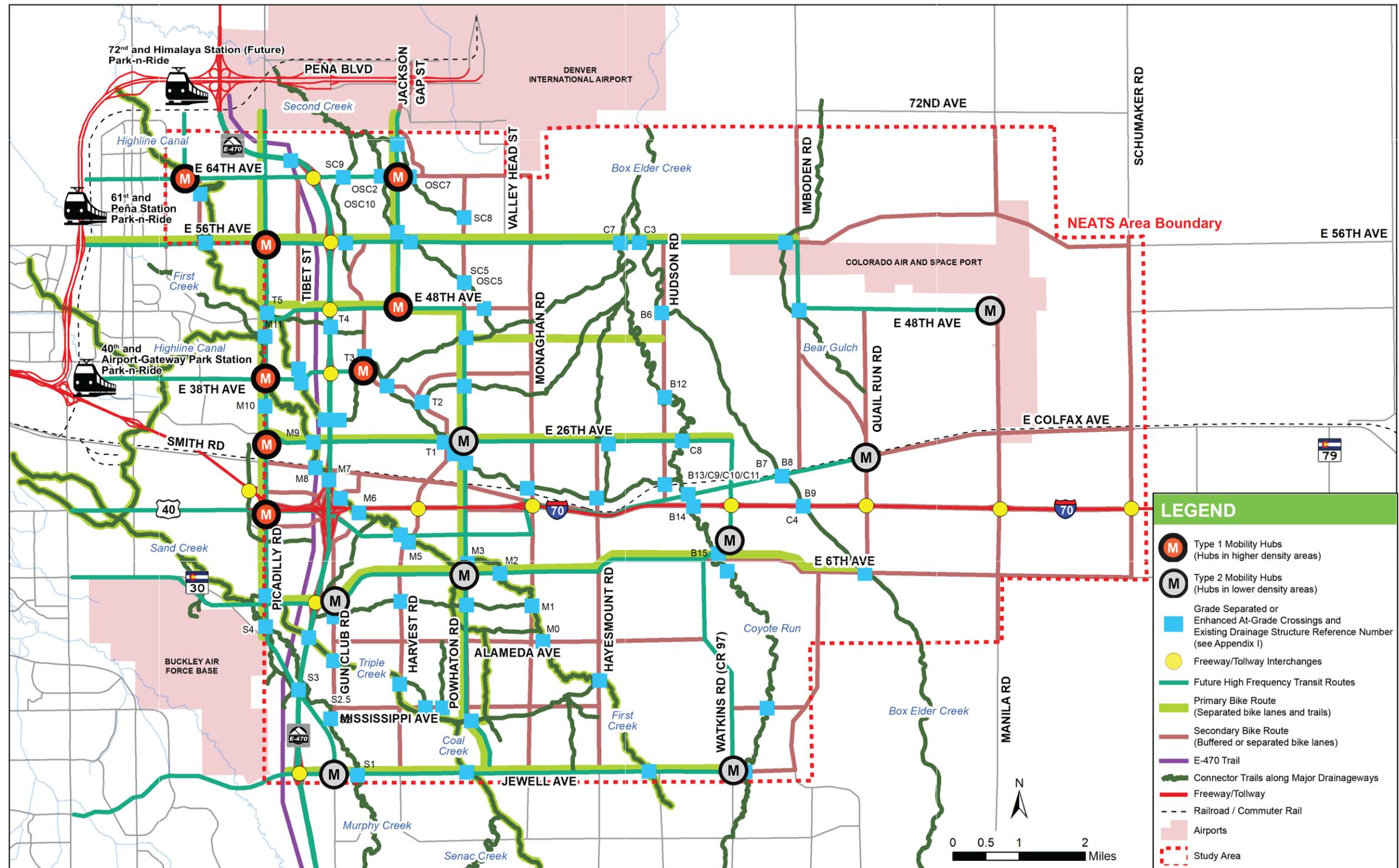


LEGEND

- Study Area
- Existing Street
- Planned Development Areas
- Major Waterways
- Parks/Open Space
- Airports
- Future High Frequency Transit Routes
- Major Road Network
- Type 1 Mobility Hubs (hubs in higher density areas)
- Type 2 Mobility Hubs (lower density areas)



Figure ES-5. Pedestrian/Bicycle Network and Transit Hub Interface



Note

Pedestrian/bicycle facilities are subject to change based on traffic and design analysis for development construction. Trail alignments shown are conceptual: specific alignments will be determined with detailed site plans.

WINDLER HOMESTEAD

TRAFFIC IMPACT STUDY

Prepared for:

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FHU Reference No. 123657-01

May 2023

III. PROPOSED CONDITIONS

III.A. Trip Generation

The *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition, 2021* was used to estimate trip generation. The development would consist of 3,310 units of single-family housing, 2,185 multifamily units, 648,900 square feet of retail space, 290,000 square feet of office space, 2.2 million square feet of industrial/warehousing space, and a 300-student elementary school. This analysis used a mix of regression equations and average rates for the corresponding ITE code based on the methodology outlined in *ITE Trip Generation Handbook, 3rd Edition, 2017* for selecting the proper rates. **Table I** shows the trip generation rates and equations for each land use code.

Table I. ITE Trip Generation Rates and Equations

| Land Use | ITE Code | Unit | Daily | Peak | Equations & Rates | Distributions | |
|--|----------|----------|-----------------------|------|-----------------------|---------------|-----|
| | | | | | | In | Out |
| General Light Industrial | 110 | KSF | T=3.76*X+50.47 | AM | T=0.68*X+3.81 | 88% | 12% |
| | | | | PM | Ln(T)=0.72*Ln(X)+0.38 | 14% | 86% |
| High-Cube Transload & Short-Term Storage Warehouse | 154 | KSF | T=6.41*X+75.31 | AM | T=0.31*X+22.85 | 24% | 76% |
| | | | | PM | T=0.43*X+20.55 | 63% | 37% |
| Single-family Detached | 210 | DU | Ln(T)=0.92*Ln(X)+2.68 | AM | Ln(T)=0.91*Ln(T)+0.12 | 26% | 74% |
| | | | | PM | Ln(T)=0.94*Ln(X)+0.27 | 63% | 37% |
| Multifamily (Low-Rise) | 220 | DU | T=6.41*X+75.31 | AM | T=0.31*X+22.85 | 24% | 76% |
| | | | | PM | T=0.43*X+20.55 | 63% | 37% |
| Elementary School | 520 | Students | T=2.27*X | AM | T=0.74*X | 54% | 46% |
| | | | | PM | T=0.16*X | 46% | 54% |
| General Office | 710 | KSF | T=10.84*X | AM | T=1.52*X | 88% | 12% |
| | | | | PM | T=1.44*X | 17% | 83% |
| Shopping Center (>150 KSF) | 820 | KSF | T=10.84*X | AM | T=1.52*X | 88% | 12% |
| | | | | PM | T=1.44*X | 17% | 83% |
| Shopping Plaza (40-150 KSF) | 821 | KSF | T=67.52*X | AM | T=1.73*X | 62% | 38% |
| | | | | PM | T=5.19*X | 49% | 51% |
| Strip Retail Plaza (<40KSF) | 822 | KSF | T=42.2*X+229.68 | AM | T=2.36*X | 60% | 40% |
| | | | | PM | T=6.59*X | 50% | 50% |

DU = Dwelling Units KSF = 1,000 SF

Table 2 outlines the estimated vehicle-trip generation for the proposed development. The Windler development is anticipated to generate a total of 88,699 vehicle trips per day and approximately 5,454 and 8,226 trips during the AM and PM peak hours, respectively.

Internal trip capture was determined using the National Cooperative Highway Research Program (NCHRP) 684 spreadsheet. Given the NCHRP 684 internal capture calculation methods, approximately 11 percent of the total generated trips were found to be internal, and 16 percent of the PM trips were determined to be internal. This equates to an estimated internal trip capture of 614 vehicle-trips during the AM peak hour and 1,232 vehicle-trips during the PM peak hour.

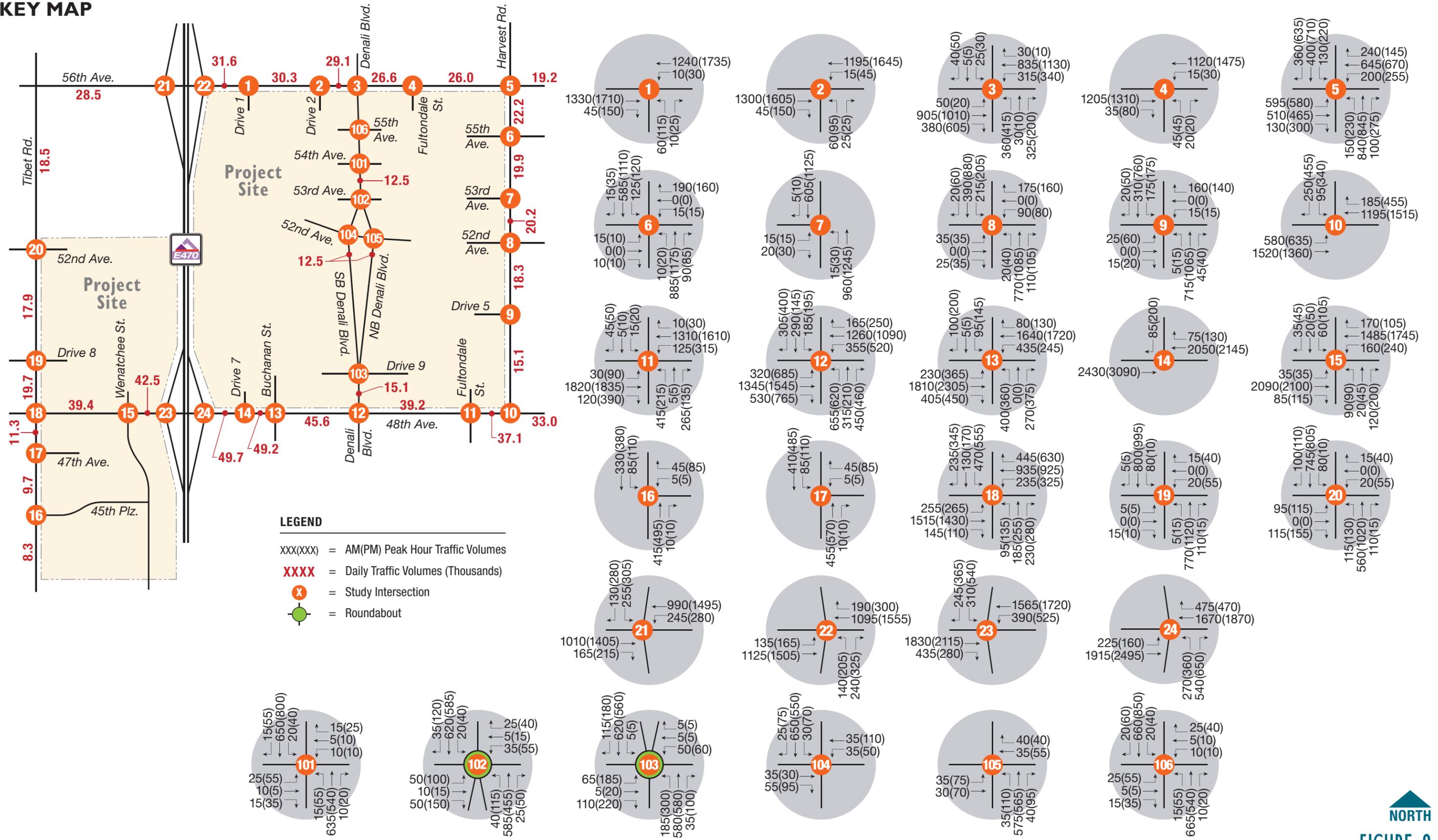
Additionally, A pass-by trip deduction was applied to traffic on the adjacent roadway. Pass-by trips consist of existing trips on the adjacent roadway that choose to make an interim stop on the way to their destination. Pass-by trip percentages from the *ITE Trip Generation Handbook* were used for the appropriate uses. **Appendix C** shows the NCHRP 684 internal capture summary sheets.

Table 2. Site Trip Generation

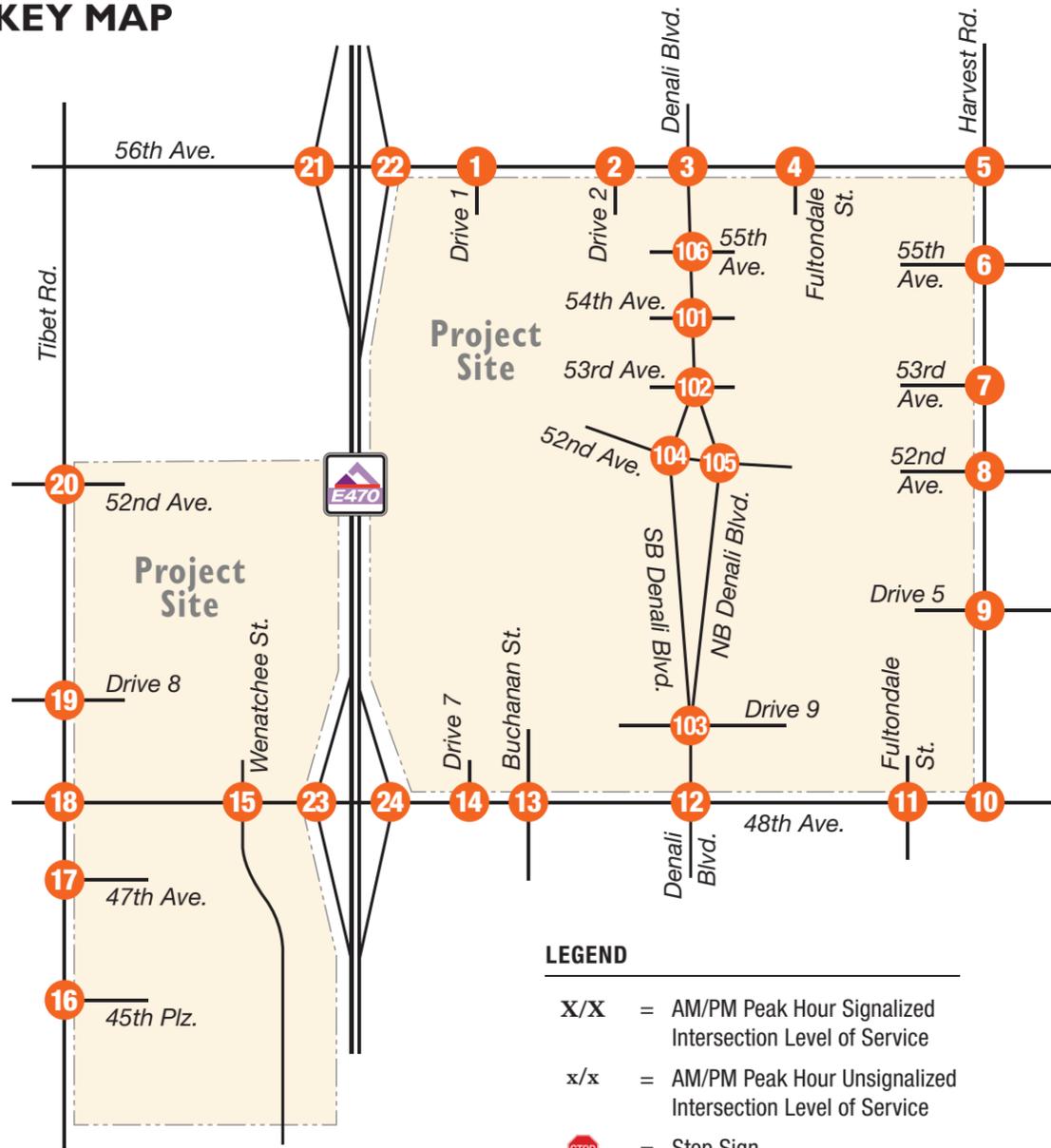
| Map Code | ITE Code | Land Use Description | Size | Unit | Daily Total | AM Peak Hour Total Trip Generation | | | AM Peak Hour Internal Capture Trips | | | AM Peak Hour External Trips | | | PM Peak Hour Total Trip Generation | | | PM Peak Hour Internal Capture Trips | | | PM Peak Hour External Trips | | | PM Pass-By % | PM Pass-By Trips | | | | |
|-----------------------|----------|--|-------|----------|---------------|------------------------------------|--------------|--------------|-------------------------------------|-------|------------|-----------------------------|------------|--------------|------------------------------------|--------------|--------------|-------------------------------------|--------------|------|-----------------------------|------------|------------|--------------|------------------|--------------|--------------|-----|------------|
| | | | | | | In | Out | Total | In % | Out % | In | Out | Total | In | Out | Total | In | Out | Total | In % | Out % | In | Out | | | Total | In | Out | Total |
| PA-1 | 820 | Shopping Center | 338.0 | KSF | 14,689 | 206 | 127 | 333 | 29% | 25% | 61 | 31 | 92 | 145 | 96 | 241 | 651 | 705 | 1,356 | 16% | 20% | 104 | 141 | 245 | 547 | 564 | 1,111 | 34% | 186 |
| PA-2 | 220 | Multifamily Housing (Low-Rise) | 711 | DU | 4,633 | 58 | 185 | 243 | 3% | 6% | 2 | 11 | 13 | 56 | 174 | 230 | 205 | 121 | 326 | 11% | 16% | 23 | 20 | 43 | 182 | 101 | 283 | - | - |
| PA-3.1 | 210 | Single Family Detached Housing | 76 | DU | 784 | 15 | 43 | 58 | 3% | 6% | 1 | 3 | 4 | 14 | 40 | 54 | 49 | 28 | 77 | 11% | 16% | 5 | 5 | 10 | 44 | 23 | 67 | - | - |
| PA-3.2 | 822 | Strip Retail Plaza | 10.0 | KSF | 652 | 14 | 10 | 24 | 29% | 25% | 4 | 3 | 7 | 10 | 7 | 17 | 39 | 39 | 78 | 16% | 20% | 6 | 8 | 14 | 33 | 31 | 64 | 34% | 11 |
| PA-4 | 210 | Single Family Detached Housing | 316 | DU | 2,908 | 53 | 159 | 212 | 3% | 6% | 2 | 9 | 11 | 51 | 150 | 201 | 185 | 108 | 293 | 11% | 16% | 20 | 18 | 38 | 165 | 90 | 255 | - | - |
| PA-5 | 220 | Multifamily Housing (Low-Rise) | 228 | DU | 1,537 | 23 | 71 | 94 | 3% | 6% | 1 | 4 | 5 | 22 | 67 | 89 | 75 | 44 | 119 | 11% | 16% | 8 | 7 | 15 | 67 | 37 | 104 | - | - |
| PA-6 | 220 | Multifamily Housing (Low-Rise) | 322 | DU | 2,139 | 30 | 93 | 123 | 3% | 6% | 1 | 6 | 7 | 29 | 87 | 116 | 100 | 59 | 159 | 11% | 16% | 11 | 10 | 21 | 89 | 49 | 138 | - | - |
| PA-7.1 | 210 | Single Family Detached Housing | 269 | DU | 2,508 | 46 | 137 | 183 | 3% | 6% | 2 | 8 | 10 | 44 | 129 | 173 | 159 | 93 | 252 | 11% | 16% | 18 | 15 | 33 | 141 | 78 | 219 | - | - |
| PA-7.2 | 822 | Strip Retail Plaza | 5.0 | KSF | 441 | 7 | 5 | 12 | 29% | 25% | 2 | 1 | 3 | 5 | 4 | 9 | 24 | 24 | 48 | 16% | 20% | 4 | 5 | 9 | 20 | 19 | 39 | 34% | 7 |
| PA-8 | 210 | Single Family Detached Housing | 160 | DU | 1,555 | 29 | 43 | 114 | 3% | 6% | 1 | 3 | 4 | 28 | 40 | 110 | 98 | 57 | 155 | 11% | 16% | 11 | 9 | 20 | 87 | 48 | 135 | - | - |
| PA-9 | 520 | Elementary School | 300 | Students | 681 | 120 | 102 | 222 | 33% | 42% | 40 | 42 | 82 | 80 | 60 | 140 | 22 | 26 | 48 | 68% | 62% | 15 | 16 | 31 | 7 | 10 | 17 | - | - |
| PA-10 | 210 | Single Family Detached Housing | 185 | DU | 1,777 | 33 | 98 | 130 | 3% | 6% | 1 | 6 | 7 | 32 | 92 | 123 | 112 | 65 | 177 | 11% | 16% | 12 | 10 | 22 | 100 | 55 | 155 | - | - |
| PA-11 | 210 | Single Family Detached Housing | 206 | DU | 1,962 | 36 | 108 | 144 | 3% | 6% | 1 | 7 | 8 | 35 | 101 | 136 | 123 | 73 | 196 | 11% | 16% | 14 | 12 | 26 | 109 | 61 | 170 | - | - |
| PA-12 | 210 | Single Family Detached Housing | 205 | DU | 1,953 | 36 | 107 | 143 | 3% | 6% | 1 | 6 | 7 | 35 | 101 | 136 | 123 | 72 | 195 | 11% | 16% | 14 | 12 | 26 | 109 | 60 | 169 | - | - |
| PA-13.1 | 210 | Single Family Detached Housing | 160 | DU | 1,555 | 29 | 86 | 114 | 3% | 6% | 1 | 5 | 6 | 28 | 81 | 108 | 98 | 57 | 155 | 11% | 16% | 11 | 9 | 20 | 87 | 48 | 135 | - | - |
| PA-13.2 | 220 | Multifamily Housing (Low-Rise) | 338 | DU | 2,242 | 31 | 97 | 128 | 3% | 6% | 1 | 6 | 7 | 30 | 91 | 121 | 105 | 61 | 166 | 11% | 16% | 12 | 10 | 22 | 93 | 51 | 144 | - | - |
| PA-14.1 | 210 | Single Family Detached Housing | 195 | DU | 1,865 | 34 | 103 | 137 | 3% | 6% | 1 | 6 | 7 | 33 | 97 | 130 | 117 | 69 | 186 | 11% | 16% | 13 | 11 | 24 | 104 | 58 | 162 | - | - |
| PA-14.2 | 220 | Multifamily Housing (Low-Rise) | 320 | DU | 2,127 | 29 | 93 | 122 | 3% | 6% | 1 | 5 | 6 | 28 | 88 | 116 | 100 | 58 | 158 | 11% | 16% | 11 | 9 | 20 | 89 | 49 | 138 | - | - |
| PA-14.3 | 710 | General Office Building | 130 | KSF | 1,458 | 185 | 25 | 210 | 21% | 91% | 40 | 23 | 63 | 145 | 2 | 147 | 35 | 171 | 206 | 88% | 6% | 31 | 11 | 42 | 4 | 160 | 164 | - | - |
| PA-15 | 210 | Single Family Detached Housing | 313 | DU | 2,883 | 53 | 158 | 210 | 3% | 6% | 2 | 9 | 11 | 51 | 149 | 199 | 183 | 107 | 290 | 11% | 16% | 20 | 17 | 37 | 163 | 90 | 253 | - | - |
| PA-16 | 210 | Single Family Detached Housing | 59 | DU | 621 | 12 | 35 | 46 | 3% | 6% | 1 | 2 | 3 | 11 | 33 | 43 | 38 | 23 | 61 | 11% | 16% | 4 | 4 | 8 | 34 | 19 | 53 | - | - |
| PA-17.1 | 210 | Single Family Detached Housing | 152 | DU | 1,483 | 27 | 82 | 109 | 3% | 6% | 1 | 5 | 6 | 26 | 77 | 103 | 93 | 54 | 147 | 11% | 16% | 10 | 9 | 19 | 83 | 45 | 128 | - | - |
| PA-17.2 | 822 | Strip Retail Plaza | 10.9 | KSF | 690 | 15 | 11 | 26 | 29% | 25% | 5 | 3 | 8 | 10 | 8 | 18 | 41 | 42 | 83 | 16% | 20% | 7 | 9 | 16 | 34 | 33 | 67 | 34% | 12 |
| PA-18 | 210 | Single Family Detached Housing | 142 | DU | 1,393 | 26 | 77 | 102 | 3% | 6% | 1 | 4 | 5 | 25 | 73 | 97 | 87 | 51 | 138 | 11% | 16% | 10 | 8 | 18 | 77 | 43 | 120 | - | - |
| PA-19 | 210 | Single Family Detached Housing | 161 | DU | 1,564 | 29 | 86 | 115 | 3% | 6% | 1 | 5 | 6 | 28 | 81 | 109 | 98 | 57 | 155 | 11% | 16% | 11 | 10 | 21 | 87 | 47 | 134 | - | - |
| PA-20 | 710 | General Office Building | 160 | KSF | 1,747 | 221 | 30 | 251 | 21% | 91% | 47 | 27 | 74 | 174 | 3 | 177 | 42 | 203 | 245 | 88% | 6% | 37 | 13 | 50 | 5 | 190 | 195 | - | - |
| PA-21.1 | 220 | Multifamily Housing (Low-Rise) | 320 | DU | 2,127 | 29 | 93 | 122 | 3% | 6% | 1 | 6 | 7 | 28 | 87 | 115 | 100 | 58 | 158 | 11% | 16% | 11 | 10 | 21 | 89 | 48 | 137 | - | - |
| PA-21.2 | 821 | Shopping Plaza | 45 | KSF | 4,252 | 98 | 61 | 159 | 29% | 25% | 29 | 15 | 44 | 69 | 46 | 115 | 223 | 241 | 464 | 16% | 20% | 36 | 49 | 85 | 187 | 192 | 379 | 34% | 64 |
| PA-22.1 | 820 | Shopping Center | 240.0 | KSF | 12,130 | 171 | 105 | 275 | 29% | 25% | 50 | 26 | 76 | 121 | 79 | 199 | 509 | 551 | 1,060 | 16% | 20% | 82 | 110 | 192 | 427 | 441 | 868 | 34% | 145 |
| PA-22.2 | 220 | Multifamily Housing (Low-Rise) | 103 | DU | 736 | 13 | 42 | 55 | 3% | 6% | 1 | 2 | 3 | 12 | 40 | 52 | 41 | 24 | 65 | 11% | 16% | 5 | 4 | 9 | 36 | 20 | 56 | - | - |
| PA-23 | 210 | Single Family Detached Housing | 209 | DU | 1,988 | 37 | 110 | 146 | 3% | 6% | 1 | 6 | 7 | 36 | 104 | 139 | 125 | 74 | 199 | 11% | 16% | 14 | 12 | 26 | 111 | 62 | 173 | - | - |
| PA-24 | 210 | Single Family Detached Housing | 118 | DU | 1,175 | 22 | 65 | 87 | 3% | 6% | 1 | 4 | 5 | 21 | 61 | 82 | 73 | 43 | 116 | 11% | 16% | 8 | 7 | 15 | 65 | 36 | 101 | - | - |
| PA-25 | 210 | Single Family Detached Housing | 276 | DU | 2,568 | 47 | 141 | 188 | 3% | 6% | 2 | 8 | 10 | 45 | 133 | 178 | 163 | 95 | 258 | 11% | 16% | 18 | 16 | 34 | 145 | 79 | 224 | - | - |
| PA-26.1 | 154 | High-Cube Transload and Short-Term Storage Warehouse | 250 | KSF | 350 | 15 | 5 | 20 | 0% | 0% | 0 | 0 | 0 | 15 | 5 | 20 | 7 | 18 | 25 | 0% | 0% | 0 | 0 | 0 | 7 | 18 | 25 | - | - |
| PA-26.2 | 110 | General Light Industrial | 250 | KSF | 990 | 153 | 21 | 174 | 0% | 0% | 0 | 0 | 0 | 153 | 21 | 174 | 11 | 67 | 78 | 0% | 0% | 0 | 0 | 0 | 11 | 67 | 78 | - | - |
| PA-27.1 | 154 | High-Cube Transload and Short-Term Storage Warehouse | 100 | KSF | 140 | 6 | 2 | 8 | 0% | 0% | 0 | 0 | 0 | 6 | 2 | 8 | 3 | 7 | 10 | 0% | 0% | 0 | 0 | 0 | 3 | 7 | 10 | - | - |
| PA-21.2 | 110 | General Light Industrial | 100 | KSF | 426 | 63 | 9 | 72 | 0% | 0% | 0 | 0 | 0 | 63 | 9 | 72 | 6 | 34 | 40 | 0% | 0% | 0 | 0 | 0 | 6 | 34 | 40 | - | - |
| PA-28.1 | 154 | High-Cube Transload and Short-Term Storage Warehouse | 375 | KSF | 525 | 23 | 7 | 30 | 0% | 0% | 0 | 0 | 0 | 23 | 7 | 30 | 11 | 27 | 38 | 0% | 0% | 0 | 0 | 0 | 11 | 27 | 38 | - | - |
| PA-28.2 | 110 | General Light Industrial | 375 | KSF | 1,460 | 228 | 31 | 259 | 0% | 0% | 0 | 0 | 0 | 228 | 31 | 259 | 15 | 89 | 104 | 0% | 0% | 0 | 0 | 0 | 15 | 89 | 104 | - | - |
| PA-29.1 | 154 | High-Cube Transload and Short-Term Storage Warehouse | 375 | KSF | 525 | 23 | 7 | 30 | 0% | 0% | 0 | 0 | 0 | 23 | 7 | 30 | 11 | 27 | 38 | 0% | 0% | 0 | 0 | 0 | 11 | 27 | 38 | - | - |
| PA-29.2 | 110 | General Light Industrial | 375 | KSF | 1,460 | 228 | 31 | 259 | 0% | 0% | 0 | 0 | 0 | 228 | 31 | 259 | 15 | 89 | 104 | 0% | 0% | 0 | 0 | 0 | 15 | 89 | 104 | - | - |
| Total Vehicles | | | | | 88,699 | 2,553 | 2,901 | 5,454 | - | - | 307 | 307 | 614 | 2,246 | 2,594 | 4,840 | 4,315 | 3,911 | 8,226 | - | - | 616 | 616 | 1,232 | 3,699 | 3,295 | 6,994 | - | 425 |

DU = Dwelling Units KSF = 1,000 SF

KEY MAP

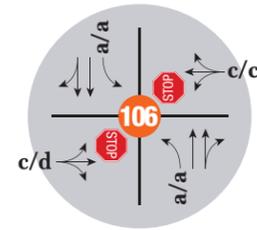
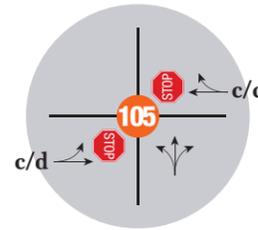
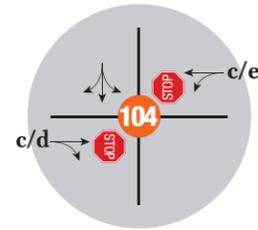
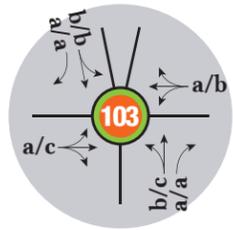
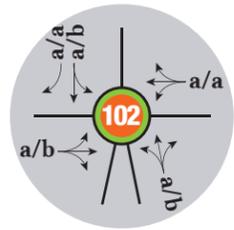
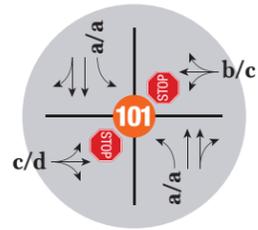
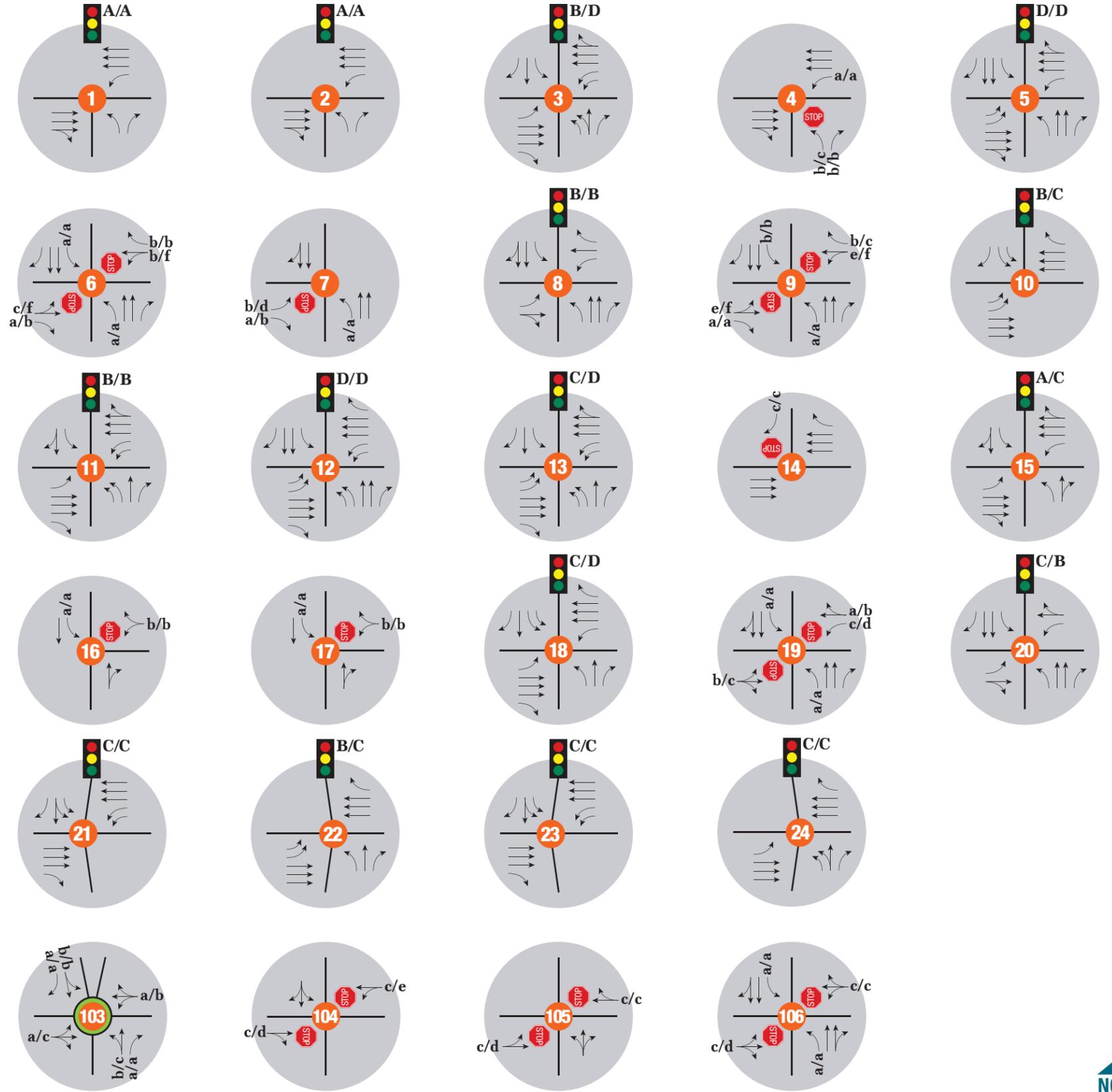


KEY MAP



LEGEND

- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- STOP = Stop Sign
- Traffic Signal
- X = Study Intersection
- Roundabout



V.D. Queuing and Auxiliary Lane Requirements

Recommendations for vehicle storage lengths at each of the external study area intersections are included in **Table 3** for use in identifying construction needs for the Windler site. These dimensions represent the storage space necessary to meet the 95th percentile maximum queue during either the AM or PM peak hour.

Output from the traffic analysis effort was used to recommend these storage lengths, using the following methodology:

- **Left turn lane storage lengths.** At signalized intersections, the greater of the HCM 6th Edition or Synchro methodology queue calculations were reported. For unsignalized intersections, the HCM 6th Edition calculation was reported.
- **Through movements.** For signalized intersections, Synchro calculation results were reported. No through movement queues are reported for unsignalized intersections as the through movements are free.
- **Right turn movements.** The Synchro queue length was used. HCM 6th Edition information was not used because HCM's signalized intersection methodology does not account for right turns on red.

Deceleration lane and taper lengths should be added to these dimensions per the City of Aurora standards to identify the total length of each auxiliary lane. Upon the development of site plans, more detailed traffic impact studies should be prepared to confirm/refine the above queue lengths as well as all the study area intersection operations.

Table 3A. Turn Lane Storage & 95th Percentile Queue Lengths

| Location | Movement | 95% Queue Length (ft) | Recommended Storage Length (ft) | SHAC Recommendation (ft) |
|---|-------------------------|-------------------------------------|---------------------------------|--------------------------|
| | | 2040 Future Total (AM Peak/PM Peak) | | |
| Drive 1 & 56 th Avenue | NB Left-turn | 93 / 151 | 175 | 150 |
| | NB Right-turn | 18 / 27 | Continuous | Continuous |
| | EB Through ⁺ | 48 / 166 | Continuous | Continuous |
| | WB Through | 125 / 141 | Continuous | Continuous |
| | WB Left-turn | 6 / 46 | 50 | 50 |
| Drive 2 & 56 th Avenue | NB Left-turn | 93 / 131 | Continuous | Continuous |
| | NB Right-turn | 29 / 28 | 50 | 125 |
| | EB Through ⁺ | 117 / 83 | Continuous | Continuous |
| | WB Left-turn | m3 / m51 | 75 | 75 |
| | WB Through | 39 / 222 | Continuous | Continuous |
| Denali Boulevard & 56 th Avenue | NB Left-turn | 192 / 205 | 225 | 550 |
| | NB Through ⁺ | 193 / 206 | Continuous | Continuous |
| | NB Right-turn | 140 / 76 | Continuous | Continuous |
| | EB Left-turn | 52 / m19 | 75 | 75 |
| | EB Through | 204 / 281 | Continuous | Continuous |
| | EB Right-turn | 89 / 125 | 125 | 875 |
| | SB Left-turn | 34 / 38 | 50 | 50 |
| | SB Through | 16 / 17 | Continuous | Continuous |
| | SB Right-turn | 0 / 0 | 50 | 75 |
| WB Left-turn** | m176 / m161 | 200 | 550 | |
| WB Through ⁺ | 126 / 212 | Continuous | Continuous | |
| Fultondale Street & 56 th Avenue | NB Left-turn | 8 / 13 | Continuous | Continuous |
| | NB Right-turn | 3 / 3 | 25 | 50 |
| | WB Left-turn | 3 / 3 | 25 | 50 |

Table 3B. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

| Location | Movement | 95% Queue Length (ft) | Recommended Storage Length (ft) | SHAC Recommendation (ft) |
|--|---------------------------|-------------------------------------|---------------------------------|--------------------------|
| | | 2040 Future Total (AM Peak/PM Peak) | | |
| Harvest Road & 56 th Avenue | NB Left-turn | 147 / #270 | 275 | 300 |
| | NB Through | 453 / #466 | Continuous | Continuous |
| | NB Right-turn | 25 / 65 | 100 | 375 |
| | EB Left-turn** | #273 / #333 | 350 | 775 |
| | EB Through ⁺ | 168 / 162 | Continuous | Continuous |
| | SB Left-turn | #144 / #276 | 300 | 300 |
| | SB Through | 190 / 369 | Continuous | Continuous |
| | SB Right-turn | 183 / 549 | 550 | 850 |
| | WB Left-turn | 143 / #325 | 350 | 350 |
| | WB Through ⁺ | 293 / 278 | Continuous | Continuous |
| Harvest Road & 55 th Avenue | NB Left-turn | 0 / 3 | 25 | 50 |
| | EB Left-turn ⁺ | 5 / 25 | Continuous | Continuous |
| | EB Right-turn | 0 / 3 | 25 | 25 |
| | SB Left-turn | 13 / 13 | 25 | 175 |
| | WB Left-turn ⁺ | 3 / 18 | Continuous | Continuous |
| | WB Right-turn | 30 / 33 | 50 | 250 |
| Harvest Road & 53 rd Avenue | NB Left-turn | 0 / 3 | 25 | 50 |
| | EB Left-turn | 3 / 8 | Continuous | Continuous |
| | EB Right-turn | 3 / 3 | 25 | 50 |
| Harvest Road & 52 nd Avenue | NB Left-turn | m9 / m16 | 25 | 75 |
| | NB Through | 110 / 178 | Continuous | Continuous |
| | NB Right-turn | m0 / m7 | 25 | 150 |
| | EB Left-turn | 64 / 64 | 75 | 50 |
| | EB Through ⁺ | 0 / 0 | Continuous | Continuous |
| | SB Left-turn | 35 / m66 | 100 | 300 |
| | SB Through ⁺ | 30 / 112 | Continuous | Continuous |
| | WB Left-turn | 115 / 106 | 125 | 125 |
| | WB Through | 0 / 0 | Continuous | Continuous |
| WB Right-turn | 117 / 123 | 125 | 250 | |
| Harvest Road & Drive 5 | NB Left-turn | 0 / 0 | 25 | 25 |
| | EB Left-turn ⁺ | 20 / 170 | Continuous | Continuous |
| | EB Right-turn | 25 / 3 | 25 | 50 |
| | SB Left-turn | 23 / 35 | 50 | 250 |
| | WB Left-turn ⁺ | 13 / 38 | Continuous | Continuous |
| | WB Right-turn | 30 / 35 | 50 | 225 |
| Harvest Road & 48 th Avenue | EB Left-turn** | m319 / 351 | 375 | 825 |
| | EB Through | 434 / 20 | Continuous | Continuous |
| | SB Left-turn** | 63 / 177 | 200 | 450 |
| | SB Right-turn | 91 / 247 | Continuous | Continuous |
| | WB Through | 307 / 468 | Continuous | Continuous |
| | WB Right-turn | 41 / 65 | 75 | 600 |

Table 3C. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

| Location | Movement | 95% Queue Length (ft) | Recommended Storage Length (ft) | SHAC Recommendation (ft) |
|---|---------------------------|-------------------------------------|---------------------------------|--------------------------|
| | | 2040 Future Total (AM Peak/PM Peak) | | |
| Fultondale Street & 48 th Avenue | NB Left-turn** | #248 / 127 | 250 | 550 |
| | NB Through | 13 / 15 | Continuous | Continuous |
| | NB Right-turn | 160 / 84 | 175 | 350 |
| | EB Left-turn | m8 / m25 | 50 | 125 |
| | EB Through | 608 / m183 | Continuous | Continuous |
| | EB Right-turn | m1 / m0 | 25 | 525 |
| | SB Left-turn | 24 / 45 | 50 | 25 |
| | SB Through ⁺ | 41 / 53 | Continuous | Continuous |
| | WB Left-turn** | 74 / #202 | 225 | 425 |
| WB Through ⁺ | 269 / 81 | Continuous | Continuous | |
| Denali Boulevard & 48 th Avenue | NB Left-turn** | #385 / #394 | 400 | 825 |
| | NB Through | 162 / 128 | Continuous | Continuous |
| | NB Right-turn | 373 / #383 | 400 | 600 |
| | EB Left-turn** | m139 / m#377 | 400 | 775 |
| | EB Through | m453 / m#482 | Continuous | Continuous |
| | EB Right-turn | m29 / m95 | 675 | 1000 |
| | SB Left-turn | 158 / 231 | 250 | 375 |
| | SB Through | 171 / 92 | Continuous | Continuous |
| | SB Right-turn | 124 / 177 | 200 | 600 |
| | WB Left-turn** | m#217 / #341 | 350 | 700 |
| | WB Through | 362 / 328 | Continuous | Continuous |
| WB Right-turn | m12 / 17 | 50 | 400 | |
| Buchanan Street & 48 th Avenue | NB Left-turn** | #270 / #253 | 275 | 525 |
| | NB Through | 14 / 17 | Continuous | Continuous |
| | NB Right-turn | 146 / #520 | Continuous | Continuous |
| | EB Left-turn** | m125 / m162 | 175 | 475 |
| | EB Through | m#523 / m150 | Continuous | Continuous |
| | EB Right-turn | m42 / m0 | 50 | 600 |
| | SB Left-turn | 101 / 172 | 200 | 200 |
| | SB Through | 16 / 17 | Continuous | Continuous |
| | SB Right-turn | 27 / 151 | Continuous | Continuous |
| | WB Left-turn** | m#267 / m#148 | 275 | 575 |
| WB Through ⁺ | 426 / m398 | Continuous | Continuous | |
| Drive 7 & 48 th Avenue | SB Right-turn | 20 / 68 | Continuous | Continuous |
| Wenatchee Street & 48 th Avenue | NB Left-turn | 127 / 109 | 150 | 125 |
| | NB Through ⁺ | 77 / 177 | Continuous | Continuous |
| | EB Left-turn | m4 / m6 | 25 | 50 |
| | EB Through ⁺ | 125 / #269 | Continuous | Continuous |
| | SB Left-turn | 95 / #131 | 150 | 150 |
| | SB Through ⁺ | 55 / 104 | Continuous | Continuous |
| | WB Left-turn | m124 / m#271 | 275 | 325 |
| WB Through ⁺ | 398 / m497 | Continuous | Continuous | |
| Tibet Road & 45 th Plaza | SB Left-turn | 8 / 10 | 25 | 150 |
| | WB Left-turn ⁺ | 8 / 18 | Continuous | Continuous |
| Tibet Road & 47 th Avenue | SB Left-turn | 8 / 10 | 25 | 150 |
| | WB Left-turn ⁺ | 8 / 20 | Continuous | Continuous |

Table 3D. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

| Location | Movement | 95% Queue Length (ft) | Recommended Storage Length (ft) | SHAC Recommendation (ft) |
|--------------------------------------|---------------------------|-------------------------------------|---------------------------------|--------------------------|
| | | 2040 Future Total (AM Peak/PM Peak) | | |
| Tibet Road & 48 th Avenue | NB Left-turn | 94 / 125 | 125 | 200 |
| | NB Through | #251 / #380 | Continuous | Continuous |
| | NB Right-turn | 136 / 176 | 200 | 375 |
| | EB Left-turn | 253 / 264 | 275 | 350 |
| | EB Through | 497 / #501 | Continuous | Continuous |
| | EB Right-turn | 35 / 29 | 50 | 200 |
| | SB Left-turn** | #280 / #352 | 375 | 725 |
| | SB Through | 84 / 135 | Continuous | Continuous |
| | SB Right-turn | 24 / 99 | 100 | 450 |
| | WB Left-turn | #299 / #430 | 450 | 425 |
| | WB Through | 270 / 212 | Continuous | Continuous |
| | WB Right-turn | 158 / 533 | 550 | 825 |
| Tibet Road & Drive 8 | NB Left-turn | 0 / 3 | 25 | 25 |
| | EB Left-turn ⁺ | 3 / 3 | Continuous | Continuous |
| | SB Left-turn | 8 / 0 | 25 | 125 |
| | WB Left-turn ⁺ | 5 / 30 | Continuous | Continuous |
| | WB Right-turn | 3 / 5 | Continuous | Continuous |
| Tibet Road & 52 nd Avenue | NB Left-turn | m42 / m59 | 75 | 175 |
| | NB Through | 104 / m303 | Continuous | Continuous |
| | NB Right-turn | m13 / m0 | 25 | 150 |
| | EB Left-turn | 119 / 120 | 125 | 150 |
| | EB Through ⁺ | 0 / 0 | Continuous | Continuous |
| | SB Left-turn | 64 / 17 | 75 | 125 |
| | SB Through | 228 / 315 | Continuous | Continuous |
| | SB Right-turn | 9 / 24 | 25 | 150 |
| | WB Left-turn | 43 / 85 | 100 | 75 |
| WB Through ⁺ | 0 / 0 | Continuous | Continuous | |
| SB E-470 & 56 th Avenue | EB Through | 235 / 396 | Continuous | Continuous |
| | EB Right-turn | 37 / 46 | 50 | 300 |
| | SB Left-turn | 177 / 150 | 200 | 400 |
| | SB Through ⁺ | 178 / 150 | Continuous | Continuous |
| | SB Right-turn | 70 / 238 | 250 | 375 |
| | WB Left-turn** | 118 / 168 | 175 | 375 |
| | WB Through | 38 / 31 | Continuous | Continuous |
| NB E-470 & 56 th Avenue | NB Left-turn ⁺ | 50 / 226 | Continuous | Continuous |
| | NB Through ⁺ | 50 / 226 | Continuous | Continuous |
| | NB Right-turn | 34 / 310 | 325 | 425 |
| | EB Left-turn** | 90 / 111 | 125 | 225 |
| | EB Through | 116 / 103 | Continuous | Continuous |
| | WB Through | 191 / 175 | Continuous | Continuous |
| | WB Right-turn | 0 / 7 | 25 | 400 |
| SB E-470 & 48 th Avenue | EB Through | 226 / #448 | Continuous | Continuous |
| | EB Right-turn | 22 / m0 | 25 | 575 |
| | SB Left-turn | m161 / m310 | 325 | 725 |
| | SB Through ⁺ | m161 / m310 | Continuous | Continuous |
| | SB Right-turn | m210 / m#451 | 475 | 475 |
| | WB Left-turn** | m151 / m#224 | 250 | 700 |
| | WB Through | 122 / m100 | Continuous | Continuous |

Table 3E. Turn Lane Storage & 95th Percentile Queue Lengths (Continued)

| Location | Movement | 95% Queue Length (ft) | Recommended Storage Length (ft) | SHAC Recommendation (ft) |
|---|----------------------------|-------------------------------------|---------------------------------|--------------------------|
| | | 2040 Future Total (AM Peak/PM Peak) | | |
| NB E-470 & 48 th Avenue | NB Left-turn | m134 / m167 | 175 | 475 |
| | NB Through ⁺ | m135 / m168 | Continuous | Continuous |
| | NB Right-turn | #643 / m#748 | 750 | 850 |
| | EB Left-turn | m#257 / m#107 | 275 | 300 |
| | EB Through | 98 / m#878 | Continuous | Continuous |
| | WB Through | m407 / m#652 | Continuous | Continuous |
| | WB Right-turn | m41 / m127 | 150 | 625 |
| Denali Boulevard & 54 th Avenue | NB Left-turn | 0 / 5 | 50 | 50 |
| | EB Left-turn ⁺ | 15 / 50 | Continuous | Continuous |
| | SB Left-turn | 3 / 3 | 50 | 45 |
| | WB Left-turn ⁺ | 10 / 23 | Continuous | Continuous |
| Denali Boulevard & 53 rd Avenue | NB Through ⁺ | 121 / 118 | Continuous | Continuous |
| | EB Through ⁺ | 19 / 67 | Continuous | Continuous |
| | SB Through ⁺ | 101 / 106 | Continuous | Continuous |
| | SB Right-turn ⁺ | 3 / 12 | Continuous | Continuous |
| | WB Through ⁺ | 11 / 19 | Continuous | Continuous |
| Denali Boulevard & Drive 9 | NB Through ⁺ | 148 / 686 | Continuous | Continuous |
| | NB Right-turn ⁺ | 3 / 10 | Continuous | Continuous |
| | EB Through ⁺ | 34 / 166 | Continuous | Continuous |
| | SB Through ⁺ | 172 / 227 | Continuous | Continuous |
| | WB Through ⁺ | 12 / 9 | Continuous | Continuous |
| SB Denali Boulevard & 52 nd Avenue | EB Through ⁺ | 25 / 35 | Continuous | Continuous |
| | WB Left-turn ⁺ | 30 / 108 | Continuous | Continuous |
| NB Denali Boulevard & 52 nd Avenue | EB Left-turn ⁺ | 23 / 58 | Continuous | Continuous |
| | WB Through ⁺ | 18 / 30 | Continuous | Continuous |
| Denali Boulevard & 55 th Avenue | NB Left-turn | 0 / 5 | 50 | 50 |
| | EB Left-turn ⁺ | 13 / 55 | Continuous | Continuous |
| | SB Left-turn | 3 / 3 | 50 | 45 |
| | WB Left-turn ⁺ | 10 / 18 | Continuous | Continuous |

*shared lane **dual turn lane SHAC values based on a HV% of ten percent.
 # - 95th percentile volume exceeds capacity; queues may be longer
 m - volume for 95th percentile queue is metered by upstream signal

V.E. Transit Network

NEATS states that a well-developed transit system, properly related to the development patterns and land uses within the NEATS study area, will provide travelers with an effective alternative to single-occupancy vehicles. The reduction in single-occupancy vehicle use will help reduce congestion and improve air quality within the surrounding region.

NEATS identifies a proposed transit network, including a series of mobility hubs that will anchor transit routes that serve major employment and population areas. The network is designed to allow a systematic transition from traditional fixed route bus services and park-n-rides to a comprehensive transit system, including high frequency fixed transit routes and on-demand transit services linked with mobility hubs.

As identified in NEATS, while RTD is operating traditional fixed route bus service, the envisioned service plan for the transit routes is outlined below:

- 1 to 2-mile route spacing along major arterials.
- All routes connect to a park-n-ride, FasTracks station and/or mobility hub.
- Most routes would meet RTD's "Suburban Local" classification with at least 20 riders boarding on average per hour.
- All routes would have 15-minute peak hour services and at least 60-minute off peak service.
- The possible ridership for each route would range from 170 to 2,400 rides per day based on comparable existing service ridership.

NEATS has identified the following high frequency transit routes surrounding the Windler site:

- Along 56th Avenue from the western NEATS boundary at Tower Road extending east to Imboden Road.
- Along 48th Avenue from Picadilly Road extending east to Powhaton Road.
- Along Harvest Road from 48th Avenue extending north to the northern NEATS boundary at 72nd Avenue.

Additionally, NEATS identifies a Type I Mobility Hub planned for the southeast corner of Windler at the intersection of 48th Avenue and Harvest Road. Features of a Type I Mobility Hubs at intersections include but are not limited to:

- Enhanced bus stops with real time information
- Designated bus lanes and priority signals
- Secure bike parking
- Car sharing
- Off-street bike paths
- Public art
- A transit/community information kiosk

V.F. Bicycle and Pedestrian Network

NEATS states that a safe and connected walking and biking network is the cornerstone of the mobility system. The proposed network of trails along drainageways, bike lanes, and sidewalks will allow people of all ages and abilities to safely travel to and from their destinations. The network includes on and off-street travel ways that people can use for commuting, recreation, exercise, and short personal trips.

The network of bicycle and pedestrian facilities is designed for people who are traveling by foot or using a variety of e-motorized and non-motorized vehicles. This network includes facilities along roadway corridors and along drainageways. The range of facilities includes the following: sidewalks, shared-use paths, off-street trails, on-street bike lanes and buffered bike lanes, and protected or separated bike lanes. This network will provide the flexibility to serve pedestrians, bicycles, small e-vehicles, skateboarders, and other non-motorized vehicles that will emerge in the future. This walk and wheel accessible network will work in conjunction with the roadway and transit networks to provide safe access within neighborhoods and around the study area. In this context, the recommended bicycle and pedestrian network from the NEATS Refresh study creates a “complete street” system of multimodal facilities along the arterial and collector roadway grid in the study area.

Pedestrian and bicycle facilities identified in the NEATS Refresh study surrounding the Windler site include:

Primary Bike Routes (Separated bike lanes and Trials):

- Along 56th Avenue from the western NEATS boundary at Tower Road extending east to Imboden Road
- Along 48th Avenue from Picadilly Road extending east to Powhatan Road
- Along Harvest Road from 48th Avenue extending north to the northern NEATS boundary at 72nd Avenue

Secondary Bike Routes (Buffered or Separated bike lanes):

- Along Denali Boulevard from 38th Avenue extending north to 56th Avenue
- Along Tibet Street from 38th Avenue extending north to 64th Avenue

Trails

- The E-470 along the westside of E470 along the east side of E-470 through the entire NEATS study area from Jewell Avenue extending north to 72nd Avenue.
- A Connector Trail branching off of the secondary bike route along Denali Boulevard within the Windler site extending north to the Second Creek drainage near the northern NEATS boundary at 72nd Avenue, including an Enhanced At-Grade Crossing at 56th Avenue.



October 3, 2023

MEMORANDUM

TO: Mr. Carl Harline, PE
Principal Engineer – Traffic
City of Aurora

FROM: Philip Dunham, PE, PTOE
Kornel Gwiazdowski, EI
Felsburg Holt & Ullevig

SUBJECT: 56th Street & Denali Boulevard Laneage Updated Memo
FHU Reference No. 123657-01

Felsburg Holt & Ullevig (FHU) has completed an analysis of the proposed changes to the intersection of 56th Street with Denali Boulevard as part of the Windler Homestead development located in Aurora, CO.

As part of the *Windler Homestead Traffic Impact Study (TIS), July 2023*, by FHU, the recommended lane assignment for the northbound approach was a dedicated left-turn lane, a shared through/left-turn lane, and a dedicated right-turn lane at the intersection of 56th Street with Denali Boulevard. This laneage was proposed to reduce creating significant offset of the northbound through movement with the southbound left-turn movement, which is proposed to be a single-lane. The proposed change would provide exclusive dual left-turns lanes, a through lane, and right-turn lane on the northbound approach. This memo summarizes anticipated traffic operations with the proposed change in lane geometry on the northbound approach and resulting adjustment to signal phasing.

Proposed Changes & Analysis

The design team at Westwood has proposed shifting the left-turn lane into the proposed median in order to provide exclusive dual left-turns lanes, a through lane, and right-turn lane based upon a comment received from City of Aurora staff on a recent ISP submittal. With the proposed lane configuration, operational benefits are expected, due to the north-south movements not requiring the traffic signal to run split phasing as required with the previous lane assignment.

The proposed lane geometry and change in signal phasing was analyzed using Synchro traffic analysis software. Under Future Total (2040) traffic conditions with proposed lane geometry and phasing changes, the intersection of 56th Street with Denali Boulevard is anticipated to operate at LOS C during the AM and LOS D during the PM peak periods. With the proposed changes, the intersection LOS would be unchanged to the previous lane geometry and phasing. However, the anticipated delay and LOS is expected to improve for several of the intersection movements. **Table 1** provides a summary and comparison of the anticipated delay and LOS for each movement between the previous lane geometry and the recommended lane geometry under Future (2040) traffic conditions.

The 95th percentile queue lengths were also reviewed at the intersection for the proposed lane geometry and compared with the previous recommendation for Future Total (2040) traffic conditions. **Table 2** summarizes the findings propose lane changes. These dimensions represent the storage space necessary to meet the 95th percentile maximum queue during either the AM or PM peak hour. Methodologies noted in the *Windler Homestead TIS* for storage length recommendations were used for this analysis.

Table 1. Delay & LOS Movement Summary and Comparison

| Location | Critical Movements | Previous Lane Geometry | | Recommended Lane Geometry | |
|---|-------------------------|------------------------|----------------------------|---------------------------|----------------------------|
| | | Delay (sec) (AM / PM) | Level of Service (AM / PM) | Delay (sec) (AM / PM) | Level of Service (AM / PM) |
| 56 th Street & Denali Boulevard (#3) | NB Left-turn | 51.1 / 53.3 | D / D | 49.8 / 50.8 | D / D |
| | NB Through | 50.4 / 53.4 | D / D | 35.3 / 45.5 | D / D |
| | NB Right-turn | 3.5 / 3.6 | A / A | 3.2 / 4.9 | A / A |
| | EB Left-turn | 28.7 / 24.5 | C / C | 25.1 / 18.8 | C / B |
| | EB Through | 28.5 / 25.8 | C / C | 25.7 / 19.9 | C / B |
| | EB Right-turn | 1.3 / 2.7 | A / A | 1.3 / 2.6 | A / A |
| | WB Left-turn | 42.6 / 51.6 | D / D | 42.6 / 51.6 | D / D |
| | WB Through ⁺ | 16.1 / 15.8 | B / B | 14.5 / 11.3 | B / B |
| | SB Left-turn | 58.7 / 59.3 | E / E | 32.3 / 38.1 | C / D |
| | SB Through | 52.6 / 52.0 | D / D | 55.2 / 55.2 | E / E |
| SB Right-turn | 1.1 / 3.2 | A / A | 1.6 / 2.2 | A / A | |
| Total | | 28.0 / 37.5 | C / D | 26.3 / 35.8 | C / D |

Table 2. Turn Lane Storage & 95th Percentile Queue Lengths

| Location | Critical Movements | 95% Queue Length (ft) (AM/PM Peak) | | Recommended Storage Length | SHAC Recommended |
|--|-------------------------|------------------------------------|---------------------------|----------------------------|------------------|
| | | Previous Lane Geometry | Recommended Lane Geometry | | |
| 56 th Street & Denali Boulevard (#3) | NB Left-turn | 311 / 255 | 257 / 211 | 275 feet | 550 feet |
| | NB Through | 307 / 256 | 46 / 23 | Continuous | Continuous |
| | NB Right-turn | 54 / 44 | 42 / 36 | Continuous | Continuous |
| | EB Left-turn | 61 / 29 | 56 / 28 | 75 feet | 75 feet |
| | EB Through | 300 / 312 | 277 / 296 | Continuous | Continuous |
| | EB Right-turn | 20 / 46 | 20 / 46 | 150 feet | 875 feet |
| | WB Left-turn | m151 / m193 | m151 / m193 | 200 feet | 550 feet |
| | WB Through ⁺ | 169 / 317 | 162 / 260 | Continuous | Continuous |
| | SB Left-turn | 51 / 58 | 34 / 41 | 50 feet | 50 feet |
| | SB Through | 17 / 17 | 7 / 17 | Continuous | Continuous |
| SB Right-turn | 0 / 8 | 0 / 0 | 50 feet | 75 feet | |
| *shared lane # - 95 th percentile volume exceeds capacity; queues may be longer m – volume for 95 th percentile queue is metered by upstream signal | | | | | |

Based on the queue analysis conducted, the change in lane geometry and phasing is anticipated to reduce the queuing at the intersection. Specifically, the northbound left-turn movement is expected to decrease from 311-feet to 257-feet and the northbound through queue would reduce from 307-feet to 46-feet during the AM peak hour.

Summary and Recommendations

A change to the lane geometry for the northbound approach was proposed at the intersection of 56th Street with Denali Boulevard from the previously recommended left-turn lane, shared left-turn/through lane, and right-turn lane assignments. The proposed change would shift the left-turn lane into the proposed median in order to provide exclusive dual left-turns lanes, a through lane, and right-turn lane. The change in lane assignment and geometry was analyzed under the Future (2040) traffic conditions. Based on the analysis conducted, it was determined that the change would improve traffic operations by reducing queuing and allow for non-split signal phasing to be used for the north-south movements. Additionally, the anticipated LOS at the intersection would not be affected with the lane change, however delay is expected to reduce for several movements at the intersection.

Appendix

- A. Previous Geometry Synchro LOS Worksheets
- B. Proposed Geometry Synchro LOS Worksheets

APPENDIX C

Trip Generation Worksheets



Project Revolve at Windler
 Subject Trip Generation for Multifamily Housing (Low-Rise)
 Designed by TES Date January 05, 2023 Job No. 196140008
 Checked by _____ Date _____ Sheet No. _____ of _____

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 11th Edition, Average Rate Equations

Land Use Code - Multifamily Housing (Low-Rise) (220)

Independent Variable - Dwelling Units (X)

X = 201
 T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (200 Series Page 255)

| | | | |
|----------------------|---------------------------|---------------------------|-----------|
| Average Weekday | Directional Distribution: | 24% ent. | 76% exit. |
| (T) = 0.40 (X) | T = 80 | Average Vehicle Trip Ends | |
| (T) = 0.40 * (201.0) | 19 entering | 61 | exiting |
| | 19 + 61 = 80 | | |

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (200 Series Page 256)

| | | | |
|----------------------|---------------------------|---------------------------|-----------|
| Average Weekday | Directional Distribution: | 63% ent. | 37% exit. |
| (T) = 0.51 (X) | T = 103 | Average Vehicle Trip Ends | |
| (T) = 0.51 * (201.0) | 65 entering | 38 | exiting |
| | 65 + 38 = 103 | | |

Weekday (200 Series Page 254)

| | | | |
|----------------------|---------------------------|---------------------------|---------|
| Average Weekday | Directional Distribution: | 50% entering, 50% exiting | |
| (T) = 6.74 (X) | T = 1356 | Average Vehicle Trip Ends | |
| (T) = 6.74 * (201.0) | 678 entering | 678 | exiting |
| | 678 + 678 = 1356 | | |

APPENDIX D

Intersection Analysis Worksheets

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.7 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↑ | ↗ | ↖ | ↑ | ↗ | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 50 | 320 | 17 | 1 | 226 | 50 | 55 | 0 | 5 | 50 | 0 | 50 |
| Future Vol, veh/h | 50 | 320 | 17 | 1 | 226 | 50 | 55 | 0 | 5 | 50 | 0 | 50 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None |
| Storage Length | 150 | - | 150 | 150 | - | 150 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 54 | 348 | 18 | 1 | 246 | 54 | 60 | 0 | 5 | 54 | 0 | 54 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-------|-------|--------|-------|-------|
| Conflicting Flow All | 300 | 0 | 0 | 366 | 0 | 0 | 758 | 758 | 348 | 716 | 722 | 246 |
| Stage 1 | - | - | - | - | - | - | 456 | 456 | - | 248 | 248 | - |
| Stage 2 | - | - | - | - | - | - | 302 | 302 | - | 468 | 474 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1261 | - | - | 1193 | - | - | 324 | 336 | 695 | 345 | 353 | 793 |
| Stage 1 | - | - | - | - | - | - | 584 | 568 | - | 756 | 701 | - |
| Stage 2 | - | - | - | - | - | - | 707 | 664 | - | 575 | 558 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | 1261 | - | - | 1193 | - | - | 292 | 321 | 695 | 331 | 337 | 793 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 292 | 321 | - | 331 | 337 | - |
| Stage 1 | - | - | - | - | - | - | 559 | 544 | - | 723 | 700 | - |
| Stage 2 | - | - | - | - | - | - | 658 | 663 | - | 546 | 534 | - |

| Approach | EB | | | WB | | | NB | | | SB | | |
|----------------------|----|--|--|----|--|--|------|--|--|----|--|--|
| HCM Control Delay, s | 1 | | | 0 | | | 19.9 | | | 15 | | |
| HCM LOS | | | | | | | C | | | C | | |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 307 | 1261 | - | - | 1193 | - | - | 467 |
| HCM Lane V/C Ratio | 0.212 | 0.043 | - | - | 0.001 | - | - | 0.233 |
| HCM Control Delay (s) | 19.9 | 8 | - | - | 8 | - | - | 15 |
| HCM Lane LOS | C | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.8 | 0.1 | - | - | 0 | - | - | 0.9 |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 3.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | ↖ | ↑ | ↗ | ↖ | ↑ | ↗ | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 50 | 230 | 59 | 5 | 361 | 50 | 34 | 0 | 1 | 50 | 0 | 50 |
| Future Vol, veh/h | 50 | 230 | 59 | 5 | 361 | 50 | 34 | 0 | 1 | 50 | 0 | 50 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None |
| Storage Length | 150 | - | 150 | 150 | - | 150 | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 54 | 250 | 64 | 5 | 392 | 54 | 37 | 0 | 1 | 54 | 0 | 54 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-------|-------|--------|-------|-------|
| Conflicting Flow All | 446 | 0 | 0 | 314 | 0 | 0 | 814 | 814 | 250 | 793 | 824 | 392 |
| Stage 1 | - | - | - | - | - | - | 358 | 358 | - | 402 | 402 | - |
| Stage 2 | - | - | - | - | - | - | 456 | 456 | - | 391 | 422 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1114 | - | - | 1246 | - | - | 297 | 312 | 789 | 306 | 308 | 657 |
| Stage 1 | - | - | - | - | - | - | 660 | 628 | - | 625 | 600 | - |
| Stage 2 | - | - | - | - | - | - | 584 | 568 | - | 633 | 588 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | 1114 | - | - | 1246 | - | - | 262 | 296 | 789 | 293 | 292 | 657 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 262 | 296 | - | 293 | 292 | - |
| Stage 1 | - | - | - | - | - | - | 628 | 598 | - | 595 | 598 | - |
| Stage 2 | - | - | - | - | - | - | 534 | 566 | - | 601 | 560 | - |

| Approach | EB | | | WB | | | NB | | | SB | | |
|----------------------|-----|--|--|-----|--|--|------|--|--|------|--|--|
| HCM Control Delay, s | 1.2 | | | 0.1 | | | 20.7 | | | 17.1 | | |
| HCM LOS | | | | | | | C | | | C | | |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 267 | 1114 | - | - | 1246 | - | - | 405 |
| HCM Lane V/C Ratio | 0.142 | 0.049 | - | - | 0.004 | - | - | 0.268 |
| HCM Control Delay (s) | 20.7 | 8.4 | - | - | 7.9 | - | - | 17.1 |
| HCM Lane LOS | C | A | - | - | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.5 | 0.2 | - | - | 0 | - | - | 1.1 |

Timings
1: Denali St & 56th Ave

2040 Total AM
12/21/2023

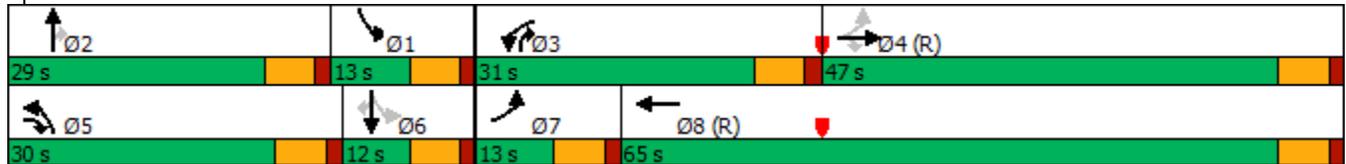


| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖ | ↑↑↑ | ↗ | ↖↗ | ↑↑↑ | ↖↗ | ↑ | ↗ | ↖ | ↑ | ↗ |
| Traffic Volume (vph) | 50 | 905 | 378 | 315 | 835 | 357 | 30 | 325 | 25 | 5 | 40 |
| Future Volume (vph) | 50 | 905 | 378 | 315 | 835 | 357 | 30 | 325 | 25 | 5 | 40 |
| Turn Type | pm+pt | NA | pm+ov | Prot | NA | Prot | NA | pm+ov | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | 5 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | 4 | | 4 | | | | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 5 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | 6 |
| Switch Phase | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 27.2 | 11.0 | 11.0 | 11.0 | 11.0 |
| Total Split (s) | 13.0 | 47.0 | 30.0 | 31.0 | 65.0 | 30.0 | 29.0 | 31.0 | 13.0 | 12.0 | 12.0 |
| Total Split (%) | 10.8% | 39.2% | 25.0% | 25.8% | 54.2% | 25.0% | 24.2% | 25.8% | 10.8% | 10.0% | 10.0% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| All-Red Time (s) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 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 | 6.0 | 6.0 | 6.0 | 6.0 |
| Lead/Lag | Lead | Lag | Lead | Lead | Lag | Lead | Lead | Lead | Lag | Lag | Lag |
| Lead-Lag Optimize? | Yes |
| Recall Mode | None | C-Max | None | None | C-Max | None | Max | None | None | None | None |
| Act Effect Green (s) | 59.1 | 52.6 | 79.6 | 17.5 | 65.9 | 21.0 | 24.1 | 44.0 | 8.6 | 7.2 | 7.2 |
| Actuated g/C Ratio | 0.49 | 0.44 | 0.66 | 0.15 | 0.55 | 0.18 | 0.20 | 0.37 | 0.07 | 0.06 | 0.06 |
| v/c Ratio | 0.16 | 0.44 | 0.35 | 0.68 | 0.34 | 0.65 | 0.09 | 0.55 | 0.21 | 0.05 | 0.16 |
| Control Delay | 12.5 | 25.7 | 3.2 | 52.1 | 14.8 | 51.5 | 40.4 | 18.9 | 56.7 | 54.2 | 1.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 12.5 | 25.7 | 3.2 | 52.1 | 14.8 | 51.5 | 40.4 | 18.9 | 56.7 | 54.2 | 1.2 |
| LOS | B | C | A | D | B | D | D | B | E | D | A |
| Approach Delay | | 18.8 | | | 24.7 | | 36.2 | | | 24.7 | |
| Approach LOS | | B | | | C | | D | | | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Green
 Natural Cycle: 75
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.68
 Intersection Signal Delay: 24.8
 Intersection LOS: C
 Intersection Capacity Utilization 58.3%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 1: Denali St & 56th Ave

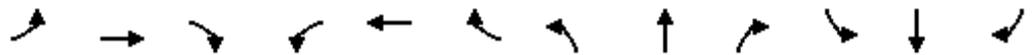


HCM 6th Signalized Intersection Summary

2040 Total AM

1: Denali St & 56th Ave

12/21/2023



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (veh/h) | 50 | 905 | 378 | 315 | 835 | 30 | 357 | 30 | 325 | 25 | 5 | 40 |
| Future Volume (veh/h) | 50 | 905 | 378 | 315 | 835 | 30 | 357 | 30 | 325 | 25 | 5 | 40 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 54 | 984 | 411 | 342 | 908 | 33 | 388 | 33 | 353 | 27 | 5 | 43 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 399 | 2374 | 950 | 410 | 2776 | 101 | 464 | 358 | 492 | 105 | 154 | 130 |
| Arrive On Green | 0.03 | 0.46 | 0.46 | 0.24 | 1.00 | 1.00 | 0.13 | 0.19 | 0.19 | 0.02 | 0.08 | 0.08 |
| Sat Flow, veh/h | 1781 | 5106 | 1585 | 3456 | 5058 | 184 | 3456 | 1870 | 1585 | 1781 | 1870 | 1585 |
| Grp Volume(v), veh/h | 54 | 984 | 411 | 342 | 611 | 330 | 388 | 33 | 353 | 27 | 5 | 43 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1585 | 1728 | 1702 | 1837 | 1728 | 1870 | 1585 | 1781 | 1870 | 1585 |
| Q Serve(g_s), s | 1.9 | 15.3 | 16.8 | 11.3 | 0.0 | 0.0 | 13.1 | 1.7 | 17.7 | 0.0 | 0.3 | 3.1 |
| Cycle Q Clear(g_c), s | 1.9 | 15.3 | 16.8 | 11.3 | 0.0 | 0.0 | 13.1 | 1.7 | 17.7 | 0.0 | 0.3 | 3.1 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.10 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 399 | 2374 | 950 | 410 | 1868 | 1008 | 464 | 358 | 492 | 105 | 154 | 130 |
| V/C Ratio(X) | 0.14 | 0.41 | 0.43 | 0.83 | 0.33 | 0.33 | 0.84 | 0.09 | 0.72 | 0.26 | 0.03 | 0.33 |
| Avail Cap(c_a), veh/h | 441 | 2374 | 950 | 720 | 1868 | 1008 | 691 | 358 | 492 | 165 | 154 | 130 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(l) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 15.5 | 21.3 | 13.0 | 44.6 | 0.0 | 0.0 | 50.7 | 39.9 | 20.9 | 57.1 | 50.7 | 51.9 |
| Incr Delay (d2), s/veh | 0.2 | 0.5 | 1.4 | 4.5 | 0.5 | 0.9 | 5.8 | 0.5 | 8.7 | 1.3 | 0.1 | 1.5 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.8 | 6.2 | 6.2 | 4.5 | 0.1 | 0.2 | 6.1 | 0.9 | 7.7 | 0.8 | 0.1 | 1.3 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 15.6 | 21.8 | 14.5 | 49.1 | 0.5 | 0.9 | 56.4 | 40.4 | 29.6 | 58.3 | 50.8 | 53.4 |
| LnGrp LOS | B | C | B | D | A | A | E | D | C | E | D | D |
| Approach Vol, veh/h | | 1449 | | | 1283 | | | 774 | | | 75 | |
| Approach Delay, s/veh | | 19.5 | | | 13.5 | | | 43.5 | | | 55.0 | |
| Approach LOS | | B | | | B | | | D | | | E | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 9.0 | 29.0 | 20.2 | 61.8 | 22.1 | 15.9 | 10.2 | 71.9 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 7.0 | 23.0 | 25.0 | 41.0 | 24.0 | 6.0 | 7.0 | 59.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 19.7 | 13.3 | 18.8 | 15.1 | 5.1 | 3.9 | 2.0 | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.5 | 0.9 | 9.2 | 1.0 | 0.0 | 0.0 | 7.8 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | | 23.3 | | | | | | | | |
| HCM 6th LOS | | | | C | | | | | | | | |

Timings
1: Denali St & 56th Ave

2040 Total PM
12/21/2023

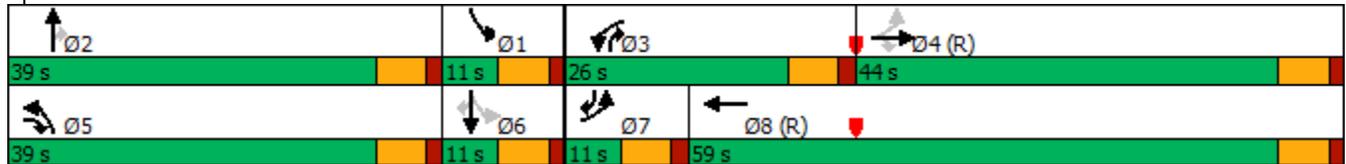


| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Lane Configurations | ↖ | ↑↑↑ | ↗ | ↖↗ | ↑↑↑ | ↖↗ | ↑ | ↗ | ↖ | ↑ | ↗ |
| Traffic Volume (vph) | 20 | 1010 | 604 | 340 | 1130 | 416 | 10 | 200 | 30 | 5 | 50 |
| Future Volume (vph) | 20 | 1010 | 604 | 340 | 1130 | 416 | 10 | 200 | 30 | 5 | 50 |
| Turn Type | pm+pt | NA | pm+ov | Prot | NA | Prot | NA | pm+ov | pm+pt | NA | pm+ov |
| Protected Phases | 7 | 4 | 5 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | 7 |
| Permitted Phases | 4 | | 4 | | | | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 5 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | 7 |
| Switch Phase | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 11.0 | 27.2 | 11.0 | 11.0 | 11.0 | 11.0 |
| Total Split (s) | 11.0 | 44.0 | 39.0 | 26.0 | 59.0 | 39.0 | 39.0 | 26.0 | 11.0 | 11.0 | 11.0 |
| Total Split (%) | 9.2% | 36.7% | 32.5% | 21.7% | 49.2% | 32.5% | 32.5% | 21.7% | 9.2% | 9.2% | 9.2% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| All-Red Time (s) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 0.0 | 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 | 6.0 | 6.0 | 6.0 | 6.0 |
| Lead/Lag | Lead | Lag | Lead | Lead | Lag | Lead | Lead | Lead | Lag | Lag | Lead |
| Lead-Lag Optimize? | Yes | Yes | Yes |
| Recall Mode | None | C-Max | None | None | C-Max | None | Max | None | None | None | None |
| Act Effect Green (s) | 50.1 | 44.9 | 87.5 | 17.5 | 59.5 | 36.7 | 33.0 | 52.9 | 5.0 | 6.3 | 8.2 |
| Actuated g/C Ratio | 0.42 | 0.37 | 0.73 | 0.15 | 0.50 | 0.31 | 0.28 | 0.44 | 0.04 | 0.05 | 0.07 |
| v/c Ratio | 0.10 | 0.58 | 0.53 | 0.74 | 0.49 | 0.43 | 0.02 | 0.29 | 0.45 | 0.05 | 0.23 |
| Control Delay | 15.9 | 32.8 | 6.3 | 48.3 | 23.8 | 35.1 | 32.0 | 10.0 | 75.7 | 54.2 | 2.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.9 | 32.8 | 6.3 | 48.3 | 23.8 | 35.1 | 32.0 | 10.0 | 75.7 | 54.2 | 2.3 |
| LOS | B | C | A | D | C | D | C | B | E | D | A |
| Approach Delay | | 22.8 | | | 29.4 | | 27.0 | | | 31.4 | |
| Approach LOS | | C | | | C | | C | | | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 4:EBTL and 8:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 26.2
 Intersection LOS: C
 Intersection Capacity Utilization 66.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Denali St & 56th Ave

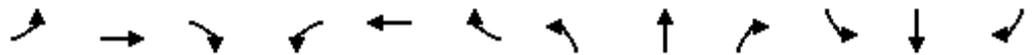


HCM 6th Signalized Intersection Summary

2040 Total PM

1: Denali St & 56th Ave

12/21/2023



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↘ | ↑↑↑ | ↗ | ↘↗ | ↑↑↑ | | ↘↗ | ↑ | ↗ | ↘ | ↑ | ↗ |
| Traffic Volume (veh/h) | 20 | 1010 | 604 | 340 | 1130 | 10 | 416 | 10 | 200 | 30 | 5 | 50 |
| Future Volume (veh/h) | 20 | 1010 | 604 | 340 | 1130 | 10 | 416 | 10 | 200 | 30 | 5 | 50 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 22 | 1098 | 657 | 370 | 1228 | 11 | 452 | 11 | 217 | 33 | 5 | 54 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 266 | 1902 | 838 | 431 | 2482 | 22 | 539 | 514 | 633 | 170 | 275 | 267 |
| Arrive On Green | 0.02 | 0.37 | 0.37 | 0.25 | 0.95 | 0.95 | 0.16 | 0.28 | 0.28 | 0.03 | 0.15 | 0.15 |
| Sat Flow, veh/h | 1781 | 5106 | 1585 | 3456 | 5219 | 47 | 3456 | 1870 | 1585 | 1781 | 1870 | 1585 |
| Grp Volume(v), veh/h | 22 | 1098 | 657 | 370 | 801 | 438 | 452 | 11 | 217 | 33 | 5 | 54 |
| Grp Sat Flow(s),veh/h/ln | 1781 | 1702 | 1585 | 1728 | 1702 | 1862 | 1728 | 1870 | 1585 | 1781 | 1870 | 1585 |
| Q Serve(g_s), s | 0.9 | 20.6 | 40.0 | 12.3 | 2.6 | 2.6 | 15.2 | 0.5 | 8.0 | 0.0 | 0.3 | 3.5 |
| Cycle Q Clear(g_c), s | 0.9 | 20.6 | 40.0 | 12.3 | 2.6 | 2.6 | 15.2 | 0.5 | 8.0 | 0.0 | 0.3 | 3.5 |
| Prop In Lane | 1.00 | | 1.00 | 1.00 | | 0.03 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 266 | 1902 | 838 | 431 | 1619 | 885 | 539 | 514 | 633 | 170 | 275 | 267 |
| V/C Ratio(X) | 0.08 | 0.58 | 0.78 | 0.86 | 0.49 | 0.49 | 0.84 | 0.02 | 0.34 | 0.19 | 0.02 | 0.20 |
| Avail Cap(c_a), veh/h | 302 | 1902 | 838 | 576 | 1619 | 885 | 950 | 514 | 633 | 195 | 275 | 267 |
| HCM Platoon Ratio | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 22.3 | 30.1 | 22.8 | 44.0 | 1.6 | 1.6 | 49.2 | 31.7 | 12.8 | 52.3 | 43.8 | 43.0 |
| Incr Delay (d2), s/veh | 0.1 | 1.3 | 7.3 | 9.7 | 1.1 | 2.0 | 3.6 | 0.1 | 1.5 | 0.6 | 0.0 | 0.4 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 0.4 | 8.6 | 16.1 | 5.2 | 0.8 | 1.1 | 6.8 | 0.2 | 3.1 | 1.0 | 0.1 | 1.4 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 22.4 | 31.4 | 30.0 | 53.7 | 2.7 | 3.6 | 52.7 | 31.8 | 14.3 | 52.8 | 43.8 | 43.3 |
| LnGrp LOS | C | C | C | D | A | A | D | C | B | D | D | D |
| Approach Vol, veh/h | | 1777 | | | 1609 | | | 680 | | | 92 | |
| Approach Delay, s/veh | | 30.8 | | | 14.7 | | | 40.1 | | | 46.8 | |
| Approach LOS | | C | | | B | | | D | | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 9.3 | 39.0 | 21.0 | 50.7 | 24.7 | 23.6 | 8.6 | 63.1 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 5.0 | 33.0 | 20.0 | 38.0 | 33.0 | 5.0 | 5.0 | 53.0 | | | | |
| Max Q Clear Time (g_c+I1), s | 2.0 | 10.0 | 14.3 | 42.0 | 17.2 | 5.5 | 2.9 | 4.6 | | | | |
| Green Ext Time (p_c), s | 0.0 | 0.7 | 0.7 | 0.0 | 1.5 | 0.0 | 0.0 | 11.5 | | | | |

Intersection Summary

| | |
|--------------------|------|
| HCM 6th Ctrl Delay | 26.4 |
| HCM 6th LOS | C |

Notes

User approved volume balancing among the lanes for turning movement.

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.2 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 375 | 1 | 2 | 277 | 5 | 6 |
| Future Vol, veh/h | 375 | 1 | 2 | 277 | 5 | 6 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 408 | 1 | 2 | 301 | 5 | 7 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 0 | 0 | 409 | 0 | 714 |
| Stage 1 | - | - | - | - | 409 |
| Stage 2 | - | - | - | - | 305 |
| Critical Hdwy | - | - | 4.12 | - | 6.42 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 |
| Pot Cap-1 Maneuver | - | - | 1150 | - | 398 |
| Stage 1 | - | - | - | - | 671 |
| Stage 2 | - | - | - | - | 748 |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1150 | - | 397 |
| Mov Cap-2 Maneuver | - | - | - | - | 397 |
| Stage 1 | - | - | - | - | 671 |
| Stage 2 | - | - | - | - | 747 |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.1 | 12.4 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 501 | - | - | 1150 | - |
| HCM Lane V/C Ratio | 0.024 | - | - | 0.002 | - |
| HCM Control Delay (s) | 12.4 | - | - | 8.1 | 0 |
| HCM Lane LOS | B | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0 | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.1 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | | | | | | |
| Traffic Vol, veh/h | 281 | 5 | 7 | 416 | 1 | 4 |
| Future Vol, veh/h | 281 | 5 | 7 | 416 | 1 | 4 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | - | - |
| Veh in Median Storage, # | 0 | - | - | 0 | 0 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 305 | 5 | 8 | 452 | 1 | 4 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 0 | 0 | 310 | 0 | 776 308 |
| Stage 1 | - | - | - | - | 308 - |
| Stage 2 | - | - | - | - | 468 - |
| Critical Hdwy | - | - | 4.12 | - | 6.42 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 - |
| Follow-up Hdwy | - | - | 2.218 | - | 3.518 3.318 |
| Pot Cap-1 Maneuver | - | - | 1250 | - | 366 732 |
| Stage 1 | - | - | - | - | 745 - |
| Stage 2 | - | - | - | - | 630 - |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | - | - | 1250 | - | 363 732 |
| Mov Cap-2 Maneuver | - | - | - | - | 363 - |
| Stage 1 | - | - | - | - | 745 - |
| Stage 2 | - | - | - | - | 624 - |

| Approach | EB | WB | NB |
|----------------------|----|-----|----|
| HCM Control Delay, s | 0 | 0.1 | 11 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 608 | - | - | 1250 | - |
| HCM Lane V/C Ratio | 0.009 | - | - | 0.006 | - |
| HCM Control Delay (s) | 11 | - | - | 7.9 | 0 |
| HCM Lane LOS | B | - | - | A | A |
| HCM 95th %tile Q(veh) | 0 | - | - | 0 | - |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖ | ↑↑↑ | ↖ | ↖ |
| Traffic Vol, veh/h | 1205 | 35 | 15 | 1120 | 45 | 19 |
| Future Vol, veh/h | 1205 | 35 | 15 | 1120 | 45 | 19 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | 100 |
| Veh in Median Storage, # | 0 | - | - | 0 | 1 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1310 | 38 | 16 | 1217 | 49 | 21 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|------|
| Conflicting Flow All | 0 | 0 | 1348 | 0 | 1848 |
| Stage 1 | - | - | - | - | 1329 |
| Stage 2 | - | - | - | - | 519 |
| Critical Hdwy | - | - | 5.34 | - | 5.74 |
| Critical Hdwy Stg 1 | - | - | - | - | 6.64 |
| Critical Hdwy Stg 2 | - | - | - | - | 6.04 |
| Follow-up Hdwy | - | - | 3.12 | - | 3.82 |
| Pot Cap-1 Maneuver | - | - | 792 | - | *407 |
| Stage 1 | - | - | - | - | *663 |
| Stage 2 | - | - | - | - | *685 |
| Platoon blocked, % | - | - | 1 | - | 1 |
| Mov Cap-1 Maneuver | - | - | 792 | - | *399 |
| Mov Cap-2 Maneuver | - | - | - | - | *487 |
| Stage 1 | - | - | - | - | *663 |
| Stage 2 | - | - | - | - | *672 |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.1 | 12.5 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 487 | 646 | - | - | 792 | - |
| HCM Lane V/C Ratio | 0.1 | 0.032 | - | - | 0.021 | - |
| HCM Control Delay (s) | 13.2 | 10.8 | - | - | 9.6 | - |
| HCM Lane LOS | B | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.3 | 0.1 | - | - | 0.1 | - |

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 0.4 | | | | | |
| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
| Lane Configurations | ↑↑↑ | | ↖ | ↑↑↑ | ↖ | ↖ |
| Traffic Vol, veh/h | 1310 | 80 | 30 | 1475 | 45 | 20 |
| Future Vol, veh/h | 1310 | 80 | 30 | 1475 | 45 | 20 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | 150 | - | 0 | 100 |
| Veh in Median Storage, # | 0 | - | - | 0 | 1 | - |
| Grade, % | 0 | - | - | 0 | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 1424 | 87 | 33 | 1603 | 49 | 22 |

| Major/Minor | Major1 | Major2 | Minor1 | | |
|----------------------|--------|--------|--------|---|------|
| Conflicting Flow All | 0 | 0 | 1511 | 0 | 2175 |
| Stage 1 | - | - | - | - | 1468 |
| Stage 2 | - | - | - | - | 707 |
| Critical Hdwy | - | - | 5.34 | - | 5.74 |
| Critical Hdwy Stg 1 | - | - | - | - | 6.64 |
| Critical Hdwy Stg 2 | - | - | - | - | 6.04 |
| Follow-up Hdwy | - | - | 3.12 | - | 3.82 |
| Pot Cap-1 Maneuver | - | - | *757 | - | *290 |
| Stage 1 | - | - | - | - | *618 |
| Stage 2 | - | - | - | - | *595 |
| Platoon blocked, % | - | - | 1 | - | 1 |
| Mov Cap-1 Maneuver | - | - | *757 | - | *277 |
| Mov Cap-2 Maneuver | - | - | - | - | *396 |
| Stage 1 | - | - | - | - | *618 |
| Stage 2 | - | - | - | - | *569 |

| Approach | EB | WB | NB |
|----------------------|----|-----|------|
| HCM Control Delay, s | 0 | 0.2 | 14.1 |
| HCM LOS | | | B |

| Minor Lane/Major Mvmt | NBLn1 | NBLn2 | EBT | EBR | WBL | WBT |
|-----------------------|-------|-------|-----|-----|-------|-----|
| Capacity (veh/h) | 396 | 602 | - | - | * 757 | - |
| HCM Lane V/C Ratio | 0.124 | 0.036 | - | - | 0.043 | - |
| HCM Control Delay (s) | 15.4 | 11.2 | - | - | 10 | - |
| HCM Lane LOS | C | B | - | - | A | - |
| HCM 95th %tile Q(veh) | 0.4 | 0.1 | - | - | 0.1 | - |

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Timings
3: Harvest Rd & 56th Ave

2040 Total AM
05/17/2023



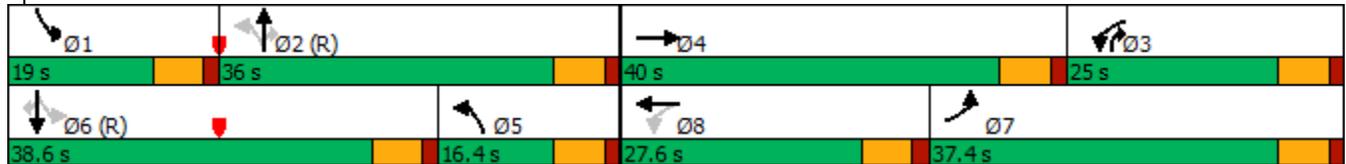
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖↗ | ↑↑↓ | ↖ | ↑↑↑ | ↖ | ↑↑ | ↖ | ↖ | ↑↑ | ↖ |
| Traffic Volume (vph) | 595 | 509 | 200 | 645 | 150 | 840 | 100 | 130 | 400 | 360 |
| Future Volume (vph) | 595 | 509 | 200 | 645 | 150 | 840 | 100 | 130 | 400 | 360 |
| Turn Type | Prot | NA | pm+pt | NA | pm+pt | NA | pm+ov | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | | | 8 | | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | 6 |
| Switch Phase | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 11.0 | 37.4 | 11.0 | 37.4 | 11.0 | 37.4 | 11.0 | 11.0 | 37.4 | 37.4 |
| Total Split (s) | 37.4 | 40.0 | 25.0 | 27.6 | 16.4 | 36.0 | 25.0 | 19.0 | 38.6 | 38.6 |
| Total Split (%) | 31.2% | 33.3% | 20.8% | 23.0% | 13.7% | 30.0% | 20.8% | 15.8% | 32.2% | 32.2% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| All-Red Time (s) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 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 | 6.0 | 6.0 | 6.0 |
| Lead/Lag | Lag | Lead | Lag | Lead | Lag | Lag | Lag | Lead | Lead | Lead |
| Lead-Lag Optimize? | Yes |
| Recall Mode | None | None | None | None | None | C-Max | None | None | C-Max | C-Max |
| Act Effect Green (s) | 27.4 | 22.6 | 48.0 | 21.6 | 35.4 | 35.4 | 61.8 | 36.6 | 36.6 | 36.6 |
| Actuated g/C Ratio | 0.23 | 0.19 | 0.40 | 0.18 | 0.30 | 0.30 | 0.52 | 0.30 | 0.30 | 0.30 |
| v/c Ratio | 0.83 | 0.71 | 0.48 | 1.03 | 0.47 | 0.88 | 0.12 | 0.61 | 0.40 | 0.52 |
| Control Delay | 65.9 | 37.9 | 37.0 | 82.5 | 43.8 | 51.7 | 1.1 | 44.3 | 35.2 | 6.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 65.9 | 37.9 | 37.0 | 82.5 | 43.8 | 51.7 | 1.1 | 44.3 | 35.2 | 6.1 |
| LOS | E | D | D | F | D | D | A | D | D | A |
| Approach Delay | | 51.4 | | 74.1 | | 46.0 | | | 24.7 | |
| Approach LOS | | D | | E | | D | | | C | |

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 50.2
 Intersection Capacity Utilization 85.2%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 3: Harvest Rd & 56th Ave

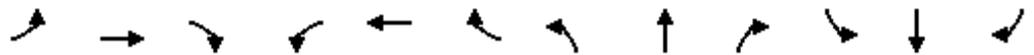


HCM 6th Signalized Intersection Summary

2040 Total AM

3: Harvest Rd & 56th Ave

05/17/2023



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↖↗ | ↑↑↘ | | ↖ | ↑↑↘ | | ↖ | ↑↑ | ↗ | ↖ | ↑↑ | ↗ |
| Traffic Volume (veh/h) | 595 | 509 | 130 | 200 | 645 | 240 | 150 | 840 | 100 | 130 | 400 | 360 |
| Future Volume (veh/h) | 595 | 509 | 130 | 200 | 645 | 240 | 150 | 840 | 100 | 130 | 400 | 360 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 647 | 553 | 76 | 217 | 701 | 98 | 163 | 913 | 44 | 141 | 435 | 228 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 743 | 773 | 105 | 491 | 793 | 110 | 401 | 1165 | 868 | 206 | 965 | 431 |
| Arrive On Green | 0.07 | 0.06 | 0.06 | 0.22 | 0.17 | 0.17 | 0.14 | 0.33 | 0.33 | 0.08 | 0.27 | 0.27 |
| Sat Flow, veh/h | 3456 | 4548 | 616 | 1781 | 4533 | 628 | 1781 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 647 | 412 | 217 | 217 | 525 | 274 | 163 | 913 | 44 | 141 | 435 | 228 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1702 | 1759 | 1781 | 1702 | 1757 | 1781 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 22.2 | 14.3 | 14.6 | 5.4 | 18.0 | 18.3 | 0.0 | 27.9 | 0.5 | 7.9 | 12.2 | 14.7 |
| Cycle Q Clear(g_c), s | 22.2 | 14.3 | 14.6 | 5.4 | 18.0 | 18.3 | 0.0 | 27.9 | 0.5 | 7.9 | 12.2 | 14.7 |
| Prop In Lane | 1.00 | | 0.35 | 1.00 | | 0.36 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 743 | 579 | 299 | 491 | 595 | 307 | 401 | 1165 | 868 | 206 | 965 | 431 |
| V/C Ratio(X) | 0.87 | 0.71 | 0.73 | 0.44 | 0.88 | 0.89 | 0.41 | 0.78 | 0.05 | 0.68 | 0.45 | 0.53 |
| Avail Cap(c_a), veh/h | 904 | 964 | 499 | 491 | 613 | 316 | 401 | 1165 | 868 | 253 | 965 | 431 |
| HCM Platoon Ratio | 0.33 | 0.33 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(I) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 54.1 | 53.7 | 53.9 | 36.9 | 48.3 | 48.4 | 40.3 | 36.5 | 4.1 | 39.3 | 36.3 | 37.2 |
| Incr Delay (d2), s/veh | 7.9 | 1.6 | 3.3 | 0.6 | 13.8 | 25.3 | 0.7 | 5.3 | 0.1 | 5.5 | 1.5 | 4.6 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 11.2 | 6.7 | 7.2 | 5.3 | 8.8 | 10.2 | 4.3 | 12.9 | 0.2 | 3.8 | 5.5 | 6.2 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 62.0 | 55.4 | 57.2 | 37.5 | 62.1 | 73.7 | 40.9 | 41.8 | 4.2 | 44.8 | 37.8 | 41.8 |
| LnGrp LOS | E | E | E | D | E | E | D | D | A | D | D | D |
| Approach Vol, veh/h | | 1276 | | | 1016 | | | 1120 | | | 804 | |
| Approach Delay, s/veh | | 59.1 | | | 60.0 | | | 40.2 | | | 40.1 | |
| Approach LOS | | E | | | E | | | D | | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 15.9 | 45.3 | 32.4 | 26.4 | 22.6 | 38.6 | 31.8 | 27.0 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 13.0 | 30.0 | 19.0 | 34.0 | 10.4 | 32.6 | 31.4 | 21.6 | | | | |
| Max Q Clear Time (g_c+I1), s | 9.9 | 29.9 | 7.4 | 16.6 | 2.0 | 16.7 | 24.2 | 20.3 | | | | |
| Green Ext Time (p_c), s | 0.1 | 0.1 | 0.5 | 3.8 | 0.3 | 3.3 | 1.6 | 0.7 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | 50.7 | | | | | | | | | |
| HCM 6th LOS | | | D | | | | | | | | | |

Timings
3: Harvest Rd & 56th Ave

2040 Total PM
05/17/2023

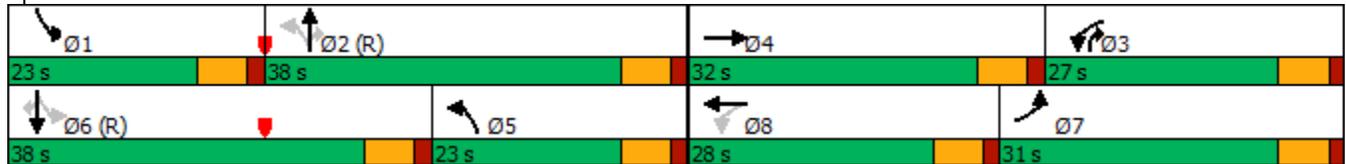


| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Lane Configurations | ↖↗ | ↑↑↓ | ↖ | ↑↑↓ | ↖ | ↑↑ | ↖ | ↖ | ↑↑ | ↖ |
| Traffic Volume (vph) | 580 | 465 | 255 | 670 | 230 | 845 | 275 | 220 | 710 | 635 |
| Future Volume (vph) | 580 | 465 | 255 | 670 | 230 | 845 | 275 | 220 | 710 | 635 |
| Turn Type | Prot | NA | pm+pt | NA | pm+pt | NA | pm+ov | pm+pt | NA | Perm |
| Protected Phases | 7 | 4 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | | | 8 | | 2 | | 2 | 6 | | 6 |
| Detector Phase | 7 | 4 | 3 | 8 | 5 | 2 | 3 | 1 | 6 | 6 |
| Switch Phase | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Minimum Split (s) | 11.0 | 19.0 | 11.0 | 19.0 | 11.0 | 37.4 | 11.0 | 11.0 | 37.4 | 37.4 |
| Total Split (s) | 31.0 | 32.0 | 27.0 | 28.0 | 23.0 | 38.0 | 27.0 | 23.0 | 38.0 | 38.0 |
| Total Split (%) | 25.8% | 26.7% | 22.5% | 23.3% | 19.2% | 31.7% | 22.5% | 19.2% | 31.7% | 31.7% |
| Yellow Time (s) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| All-Red Time (s) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Lost Time Adjust (s) | 0.0 | 0.0 | 0.0 | 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 | 6.0 | 6.0 | 6.0 |
| Lead/Lag | Lag | Lead | Lag | Lead | Lag | Lag | Lag | Lead | Lead | Lead |
| Lead-Lag Optimize? | Yes |
| Recall Mode | None | None | None | None | None | C-Max | None | None | C-Max | C-Max |
| Act Effct Green (s) | 24.4 | 24.0 | 44.4 | 22.0 | 33.5 | 33.5 | 55.9 | 32.6 | 32.6 | 32.6 |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.37 | 0.18 | 0.28 | 0.28 | 0.47 | 0.27 | 0.27 | 0.27 |
| v/c Ratio | 0.90 | 0.79 | 0.71 | 0.95 | 0.73 | 0.93 | 0.38 | 0.80 | 0.80 | 0.92 |
| Control Delay | 76.6 | 38.8 | 50.8 | 65.9 | 57.4 | 59.0 | 8.4 | 57.5 | 48.4 | 34.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 76.6 | 38.8 | 50.8 | 65.9 | 57.4 | 59.0 | 8.4 | 57.5 | 48.4 | 34.6 |
| LOS | E | D | D | E | E | E | A | E | D | C |
| Approach Delay | | 55.1 | | 62.3 | | 48.5 | | | 44.0 | |
| Approach LOS | | E | | E | | D | | | D | |

Intersection Summary

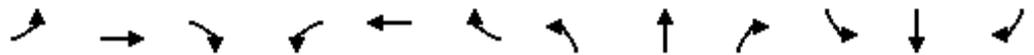
Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 51.6
 Intersection LOS: D
 Intersection Capacity Utilization 88.3%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 3: Harvest Rd & 56th Ave



HCM 6th Signalized Intersection Summary
 3: Harvest Rd & 56th Ave

2040 Total PM
 05/17/2023



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Configurations | ↖↗ | ↑↑↘ | | ↖ | ↑↑↘ | | ↖ | ↑↑ | ↗ | ↖ | ↑↑ | ↗ |
| Traffic Volume (veh/h) | 580 | 465 | 300 | 255 | 670 | 145 | 230 | 845 | 275 | 220 | 710 | 635 |
| Future Volume (veh/h) | 580 | 465 | 300 | 255 | 670 | 145 | 230 | 845 | 275 | 220 | 710 | 635 |
| Initial Q (Qb), veh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ped-Bike Adj(A_pbT) | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Parking Bus, Adj | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Work Zone On Approach | | No | | | No | | | No | | | No | |
| Adj Sat Flow, veh/h/ln | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 | 1870 |
| Adj Flow Rate, veh/h | 630 | 505 | 163 | 277 | 728 | 82 | 250 | 918 | 299 | 239 | 772 | 364 |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Percent Heavy Veh, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cap, veh/h | 694 | 665 | 208 | 456 | 826 | 92 | 360 | 1016 | 779 | 302 | 948 | 423 |
| Arrive On Green | 0.07 | 0.06 | 0.06 | 0.21 | 0.18 | 0.18 | 0.16 | 0.29 | 0.29 | 0.14 | 0.27 | 0.27 |
| Sat Flow, veh/h | 3456 | 3852 | 1206 | 1781 | 4660 | 521 | 1781 | 3554 | 1585 | 1781 | 3554 | 1585 |
| Grp Volume(v), veh/h | 630 | 444 | 224 | 277 | 530 | 280 | 250 | 918 | 299 | 239 | 772 | 364 |
| Grp Sat Flow(s),veh/h/ln | 1728 | 1702 | 1653 | 1781 | 1702 | 1777 | 1781 | 1777 | 1585 | 1781 | 1777 | 1585 |
| Q Serve(g_s), s | 21.7 | 15.4 | 16.0 | 10.4 | 18.2 | 18.4 | 10.0 | 29.8 | 5.2 | 14.3 | 24.4 | 26.2 |
| Cycle Q Clear(g_c), s | 21.7 | 15.4 | 16.0 | 10.4 | 18.2 | 18.4 | 10.0 | 29.8 | 5.2 | 14.3 | 24.4 | 26.2 |
| Prop In Lane | 1.00 | | 0.73 | 1.00 | | 0.29 | 1.00 | | 1.00 | 1.00 | | 1.00 |
| Lane Grp Cap(c), veh/h | 694 | 588 | 285 | 456 | 603 | 315 | 360 | 1016 | 779 | 302 | 948 | 423 |
| V/C Ratio(X) | 0.91 | 0.76 | 0.78 | 0.61 | 0.88 | 0.89 | 0.70 | 0.90 | 0.38 | 0.79 | 0.81 | 0.86 |
| Avail Cap(c_a), veh/h | 720 | 738 | 358 | 456 | 624 | 326 | 360 | 1016 | 779 | 312 | 948 | 423 |
| HCM Platoon Ratio | 0.33 | 0.33 | 0.33 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Upstream Filter(l) | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Uniform Delay (d), s/veh | 54.9 | 54.1 | 54.4 | 40.1 | 48.1 | 48.2 | 45.1 | 41.2 | 6.2 | 41.3 | 41.2 | 41.9 |
| Incr Delay (d2), s/veh | 15.0 | 3.5 | 8.6 | 2.3 | 13.4 | 24.0 | 5.7 | 12.8 | 1.4 | 12.6 | 7.6 | 20.0 |
| Initial Q Delay(d3),s/veh | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| %ile BackOfQ(50%),veh/ln | 11.6 | 7.4 | 7.8 | 7.5 | 8.8 | 10.2 | 7.5 | 14.7 | 2.5 | 7.3 | 11.6 | 12.5 |
| Unsig. Movement Delay, s/veh | | | | | | | | | | | | |
| LnGrp Delay(d),s/veh | 69.9 | 57.6 | 63.0 | 42.4 | 61.5 | 72.2 | 50.9 | 54.0 | 7.7 | 53.9 | 48.9 | 61.9 |
| LnGrp LOS | E | E | E | D | E | E | D | D | A | D | D | E |
| Approach Vol, veh/h | | 1298 | | | 1087 | | | 1467 | | | 1375 | |
| Approach Delay, s/veh | | 64.5 | | | 59.4 | | | 44.0 | | | 53.2 | |
| Approach LOS | | E | | | E | | | D | | | D | |
| Timer - Assigned Phs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | | | |
| Phs Duration (G+Y+Rc), s | 22.3 | 40.3 | 30.7 | 26.7 | 24.6 | 38.0 | 30.1 | 27.3 | | | | |
| Change Period (Y+Rc), s | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | | | |
| Max Green Setting (Gmax), s | 17.0 | 32.0 | 21.0 | 26.0 | 17.0 | 32.0 | 25.0 | 22.0 | | | | |
| Max Q Clear Time (g_c+l1), s | 16.3 | 31.8 | 12.4 | 18.0 | 12.0 | 28.2 | 23.7 | 20.4 | | | | |
| Green Ext Time (p_c), s | 0.1 | 0.1 | 0.5 | 2.7 | 0.3 | 2.2 | 0.4 | 0.8 | | | | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 6th Ctrl Delay | | | 54.7 | | | | | | | | | |
| HCM 6th LOS | | | D | | | | | | | | | |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 1 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | ↕ | ↕ | | ↕ | ↕ | |
| Traffic Vol, veh/h | 25 | 5 | 15 | 9 | 4 | 37 | 15 | 665 | 10 | 18 | 660 | 20 |
| Future Vol, veh/h | 25 | 5 | 15 | 9 | 4 | 37 | 15 | 665 | 10 | 18 | 660 | 20 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None |
| Storage Length | - | - | - | - | - | - | 150 | - | - | 150 | - | - |
| Veh in Median Storage, # | - | 1 | - | - | 1 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 27 | 5 | 16 | 10 | 4 | 40 | 16 | 723 | 11 | 20 | 717 | 22 |

| Major/Minor | Minor2 | | Minor1 | | | Major1 | | Major2 | | | | |
|----------------------|--------|------|--------|------|------|--------|-------|--------|---|------|---|---|
| Conflicting Flow All | 1164 | 1534 | 370 | 1162 | 1540 | 367 | 739 | 0 | 0 | 734 | 0 | 0 |
| Stage 1 | 768 | 768 | - | 761 | 761 | - | - | - | - | - | - | - |
| Stage 2 | 396 | 766 | - | 401 | 779 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 | 4.14 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 | 2.22 | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 309 | 169 | *815 | *311 | 168 | 630 | *1219 | - | - | 867 | - | - |
| Stage 1 | 736 | 652 | - | *364 | 412 | - | - | - | - | - | - | - |
| Stage 2 | 601 | 410 | - | *768 | 643 | - | - | - | - | - | - | - |
| Platoon blocked, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - |
| Mov Cap-1 Maneuver | 278 | 163 | *815 | *292 | 162 | 630 | *1219 | - | - | 867 | - | - |
| Mov Cap-2 Maneuver | 401 | 287 | - | *319 | 293 | - | - | - | - | - | - | - |
| Stage 1 | 726 | 637 | - | *359 | 407 | - | - | - | - | - | - | - |
| Stage 2 | 549 | 405 | - | *729 | 628 | - | - | - | - | - | - | - |

| Approach | EB | | WB | | | NB | | SB | | |
|----------------------|------|--|------|--|--|-----|--|-----|--|--|
| HCM Control Delay, s | 13.8 | | 13.1 | | | 0.2 | | 0.2 | | |
| HCM LOS | B | | B | | | | | | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1WBLn1 | SBL | SBT | SBR |
|-----------------------|--------|-----|-----|------------|-------|-------|-----|
| Capacity (veh/h) | * 1219 | - | - | 458 | 497 | 867 | - |
| HCM Lane V/C Ratio | 0.013 | - | - | 0.107 | 0.109 | 0.023 | - |
| HCM Control Delay (s) | 8 | - | - | 13.8 | 13.1 | 9.2 | - |
| HCM Lane LOS | A | - | - | B | B | A | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.4 | 0.4 | 0.1 | - |

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | ↕ | ↕ | | ↕ | ↕ | |
| Traffic Vol, veh/h | 55 | 5 | 35 | 10 | 11 | 41 | 55 | 540 | 20 | 39 | 850 | 60 |
| Future Vol, veh/h | 55 | 5 | 35 | 10 | 11 | 41 | 55 | 540 | 20 | 39 | 850 | 60 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None |
| Storage Length | - | - | - | - | - | - | 150 | - | - | 150 | - | - |
| Veh in Median Storage, # | - | 1 | - | - | 1 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 60 | 5 | 38 | 11 | 12 | 45 | 60 | 587 | 22 | 42 | 924 | 65 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | | Major2 | | | | |
|----------------------|--------|------|--------|------|--------|------|------|--------|---|------|---|---|
| Conflicting Flow All | 1461 | 1770 | 495 | 1267 | 1791 | 305 | 989 | 0 | 0 | 609 | 0 | 0 |
| Stage 1 | 1041 | 1041 | - | 718 | 718 | - | - | - | - | - | - | - |
| Stage 2 | 420 | 729 | - | 549 | 1073 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 | 4.14 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 | 2.22 | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 208 | 127 | *737 | *333 | 121 | 691 | 1063 | - | - | 966 | - | - |
| Stage 1 | 593 | 541 | - | *386 | 431 | - | - | - | - | - | - | - |
| Stage 2 | 581 | 426 | - | *695 | 516 | - | - | - | - | - | - | - |
| Platoon blocked, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - |
| Mov Cap-1 Maneuver | 173 | 114 | *737 | *288 | 109 | 691 | 1063 | - | - | 966 | - | - |
| Mov Cap-2 Maneuver | 307 | 244 | - | *317 | 241 | - | - | - | - | - | - | - |
| Stage 1 | 559 | 518 | - | *364 | 407 | - | - | - | - | - | - | - |
| Stage 2 | 498 | 402 | - | *624 | 494 | - | - | - | - | - | - | - |

| Approach | EB | WB | NB | SB |
|----------------------|------|------|-----|-----|
| HCM Control Delay, s | 17.8 | 14.3 | 0.8 | 0.4 |
| HCM LOS | C | B | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1WBLn1 | SBL | SBT | SBR |
|-----------------------|-------|-----|-----|------------|-------|-------|-----|
| Capacity (veh/h) | 1063 | - | - | 384 | 454 | 966 | - |
| HCM Lane V/C Ratio | 0.056 | - | - | 0.269 | 0.148 | 0.044 | - |
| HCM Control Delay (s) | 8.6 | - | - | 17.8 | 14.3 | 8.9 | - |
| HCM Lane LOS | A | - | - | C | B | A | - |
| HCM 95th %tile Q(veh) | 0.2 | - | - | 1.1 | 0.5 | 0.1 | - |

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 4.9 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 22 | 20 | 13 | 4 | 2 | 19 | 2 | 23 | 2 | 2 | 42 | 3 |
| Future Vol, veh/h | 22 | 20 | 13 | 4 | 2 | 19 | 2 | 23 | 2 | 2 | 42 | 3 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 24 | 22 | 14 | 4 | 2 | 21 | 2 | 25 | 2 | 2 | 46 | 3 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | | Major2 | | | | |
|----------------------|--------|-------|--------|-------|--------|-------|-------|--------|---|-------|---|---|
| Conflicting Flow All | 94 | 83 | 48 | 100 | 83 | 26 | 49 | 0 | 0 | 27 | 0 | 0 |
| Stage 1 | 52 | 52 | - | 30 | 30 | - | - | - | - | - | - | - |
| Stage 2 | 42 | 31 | - | 70 | 53 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 | 4.12 | - | - | 4.12 | - | - |
| Critical Hdwy Stg 1 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 | 2.218 | - | - | 2.218 | - | - |
| Pot Cap-1 Maneuver | 889 | 807 | 1021 | 881 | 807 | 1050 | 1558 | - | - | 1587 | - | - |
| Stage 1 | 961 | 852 | - | 987 | 870 | - | - | - | - | - | - | - |
| Stage 2 | 972 | 869 | - | 940 | 851 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | - | - | - |
| Mov Cap-1 Maneuver | 869 | 805 | 1021 | 849 | 805 | 1050 | 1558 | - | - | 1587 | - | - |
| Mov Cap-2 Maneuver | 869 | 805 | - | 849 | 805 | - | - | - | - | - | - | - |
| Stage 1 | 960 | 851 | - | 986 | 869 | - | - | - | - | - | - | - |
| Stage 2 | 950 | 868 | - | 902 | 850 | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | SB | |
|----------------------|-----|--|-----|--|-----|--|-----|--|
| HCM Control Delay, s | 9.4 | | 8.7 | | 0.5 | | 0.3 | |
| HCM LOS | A | | A | | | | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1WBLn1 | SBL | SBT | SBR |
|-----------------------|-------|-----|-----|------------|-------|-------|-----|
| Capacity (veh/h) | 1558 | - | - | 874 | 988 | 1587 | - |
| HCM Lane V/C Ratio | 0.001 | - | - | 0.068 | 0.028 | 0.001 | - |
| HCM Control Delay (s) | 7.3 | 0 | - | 9.4 | 8.7 | 7.3 | 0 |
| HCM Lane LOS | A | A | - | A | A | A | A |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.2 | 0.1 | 0 | - |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 4 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 15 | 14 | 9 | 7 | 34 | 14 | 1 | 36 | 3 | 3 | 73 | 27 |
| Future Vol, veh/h | 15 | 14 | 9 | 7 | 34 | 14 | 1 | 36 | 3 | 3 | 73 | 27 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 16 | 15 | 10 | 8 | 37 | 15 | 1 | 39 | 3 | 3 | 79 | 29 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | Major2 | | | | | |
|----------------------|--------|-------|--------|-------|--------|-------|--------|---|---|-------|---|---|
| Conflicting Flow All | 169 | 144 | 94 | 155 | 157 | 41 | 108 | 0 | 0 | 42 | 0 | 0 |
| Stage 1 | 100 | 100 | - | 43 | 43 | - | - | - | - | - | - | - |
| Stage 2 | 69 | 44 | - | 112 | 114 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 | 4.12 | - | - | 4.12 | - | - |
| Critical Hdwy Stg 1 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.12 | 5.52 | - | 6.12 | 5.52 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 | 2.218 | - | - | 2.218 | - | - |
| Pot Cap-1 Maneuver | 795 | 747 | 963 | 812 | 735 | 1030 | 1483 | - | - | 1567 | - | - |
| Stage 1 | 906 | 812 | - | 971 | 859 | - | - | - | - | - | - | - |
| Stage 2 | 941 | 858 | - | 893 | 801 | - | - | - | - | - | - | - |
| Platoon blocked, % | | | | | | | | - | - | - | - | - |
| Mov Cap-1 Maneuver | 751 | 745 | 963 | 789 | 733 | 1030 | 1483 | - | - | 1567 | - | - |
| Mov Cap-2 Maneuver | 751 | 745 | - | 789 | 733 | - | - | - | - | - | - | - |
| Stage 1 | 905 | 810 | - | 970 | 858 | - | - | - | - | - | - | - |
| Stage 2 | 886 | 857 | - | 866 | 799 | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | SB | |
|----------------------|-----|--|-----|--|-----|--|-----|--|
| HCM Control Delay, s | 9.8 | | 9.9 | | 0.2 | | 0.2 | |
| HCM LOS | A | | A | | | | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1WBLn1 | SBL | SBT | SBR |
|-----------------------|-------|-----|-----|------------|-------|-------|-----|
| Capacity (veh/h) | 1483 | - | - | 790 | 799 | 1567 | - |
| HCM Lane V/C Ratio | 0.001 | - | - | 0.052 | 0.075 | 0.002 | - |
| HCM Control Delay (s) | 7.4 | 0 | - | 9.8 | 9.9 | 7.3 | 0 |
| HCM Lane LOS | A | A | - | A | A | A | A |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.2 | 0.2 | 0 | - |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.8 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | ↕ | | ↕ | ↕ | ↕ | ↕↕ | ↕ | ↕ | ↕↕ | ↕ |
| Traffic Vol, veh/h | 15 | 0 | 9 | 15 | 0 | 190 | 10 | 885 | 90 | 125 | 585 | 15 |
| Future Vol, veh/h | 15 | 0 | 9 | 15 | 0 | 190 | 10 | 885 | 90 | 125 | 585 | 15 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None |
| Storage Length | - | - | 150 | - | - | 150 | 150 | - | 150 | 150 | - | 150 |
| Veh in Median Storage, # | - | 2 | - | - | 2 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 16 | 0 | 10 | 16 | 0 | 207 | 11 | 962 | 98 | 136 | 636 | 16 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | Major2 | | | | | |
|----------------------|--------|------|--------|------|--------|------|--------|---|---|------|---|---|
| Conflicting Flow All | 1411 | 1990 | 318 | 1574 | 1908 | 481 | 652 | 0 | 0 | 1060 | 0 | 0 |
| Stage 1 | 908 | 908 | - | 984 | 984 | - | - | - | - | - | - | - |
| Stage 2 | 503 | 1082 | - | 590 | 924 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 | 4.14 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 | 2.22 | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 165 | 71 | *841 | *116 | 82 | 531 | *1258 | - | - | 653 | - | - |
| Stage 1 | 527 | 513 | - | *267 | 325 | - | - | - | - | - | - | - |
| Stage 2 | 519 | 292 | - | *793 | 502 | - | - | - | - | - | - | - |
| Platoon blocked, % | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | 84 | 55 | *841 | *96 | 65 | 531 | *1258 | - | - | 653 | - | - |
| Mov Cap-2 Maneuver | 166 | 140 | - | *239 | 242 | - | - | - | - | - | - | - |
| Stage 1 | 523 | 406 | - | *265 | 322 | - | - | - | - | - | - | - |
| Stage 2 | 314 | 289 | - | *620 | 397 | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | SB | |
|----------------------|------|--|------|--|-----|--|-----|--|
| HCM Control Delay, s | 21.6 | | 16.4 | | 0.1 | | 2.1 | |
| HCM LOS | C | | C | | | | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|-----------------------|--------|-----|-----|-------|-------|-------|-------|-------|-----|-----|
| Capacity (veh/h) | * 1258 | - | - | 166 | 841 | 239 | 531 | 653 | - | - |
| HCM Lane V/C Ratio | 0.009 | - | - | 0.098 | 0.012 | 0.068 | 0.389 | 0.208 | - | - |
| HCM Control Delay (s) | 7.9 | - | - | 29 | 9.3 | 21.2 | 16 | 12 | - | - |
| HCM Lane LOS | A | - | - | D | A | C | C | B | - | - |
| HCM 95th %tile Q(veh) | 0 | - | - | 0.3 | 0 | 0.2 | 1.8 | 0.8 | - | - |

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 2.2 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | ↕ | | ↕ | ↕ | ↕ | ↕↕ | ↕ | ↕ | ↕↕ | ↕ |
| Traffic Vol, veh/h | 10 | 0 | 10 | 15 | 0 | 160 | 20 | 1175 | 85 | 120 | 1110 | 35 |
| Future Vol, veh/h | 10 | 0 | 10 | 15 | 0 | 160 | 20 | 1175 | 85 | 120 | 1110 | 35 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Stop | Stop | Stop | Stop | Stop | Stop | Free | Free | Free | Free | Free | Free |
| RT Channelized | - | - | None |
| Storage Length | - | - | 150 | - | - | 150 | 150 | - | 150 | 150 | - | 150 |
| Veh in Median Storage, # | - | 2 | - | - | 2 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 0 | 11 | 16 | 0 | 174 | 22 | 1277 | 92 | 130 | 1207 | 38 |

| Major/Minor | Minor2 | | Minor1 | | Major1 | | | Major2 | | | | |
|----------------------|--------|------|--------|------|--------|------|------|--------|---|------|---|---|
| Conflicting Flow All | 2150 | 2880 | 604 | 2185 | 2826 | 639 | 1245 | 0 | 0 | 1369 | 0 | 0 |
| Stage 1 | 1467 | 1467 | - | 1321 | 1321 | - | - | - | - | - | - | - |
| Stage 2 | 683 | 1413 | - | 864 | 1505 | - | - | - | - | - | - | - |
| Critical Hdwy | 7.54 | 6.54 | 6.94 | 7.54 | 6.54 | 6.94 | 4.14 | - | - | 4.14 | - | - |
| Critical Hdwy Stg 1 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Critical Hdwy Stg 2 | 6.54 | 5.54 | - | 6.54 | 5.54 | - | - | - | - | - | - | - |
| Follow-up Hdwy | 3.52 | 4.02 | 3.32 | 3.52 | 4.02 | 3.32 | 2.22 | - | - | 2.22 | - | - |
| Pot Cap-1 Maneuver | 49 | 10 | *607 | *44 | 12 | 419 | *907 | - | - | 497 | - | - |
| Stage 1 | 403 | 386 | - | *165 | 224 | - | - | - | - | - | - | - |
| Stage 2 | 405 | 202 | - | *572 | 361 | - | - | - | - | - | - | - |
| Platoon blocked, % | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - |
| Mov Cap-1 Maneuver | 22 | 7 | *607 | *34 | 8 | 419 | *907 | - | - | 497 | - | - |
| Mov Cap-2 Maneuver | 93 | 61 | - | *143 | 148 | - | - | - | - | - | - | - |
| Stage 1 | 394 | 285 | - | *161 | 219 | - | - | - | - | - | - | - |
| Stage 2 | 231 | 197 | - | *415 | 266 | - | - | - | - | - | - | - |

| Approach | EB | | WB | | NB | | SB | |
|----------------------|------|--|------|--|-----|--|-----|--|
| HCM Control Delay, s | 29.9 | | 20.8 | | 0.1 | | 1.4 | |
| HCM LOS | D | | C | | | | | |

| Minor Lane/Major Mvmt | NBL | NBT | NBR | EBLn1 | EBLn2 | WBLn1 | WBLn2 | SBL | SBT | SBR |
|-----------------------|-------|-----|-----|-------|-------|-------|-------|-------|-----|-----|
| Capacity (veh/h) | *907 | - | - | 93 | 607 | 143 | 419 | 497 | - | - |
| HCM Lane V/C Ratio | 0.024 | - | - | 0.117 | 0.018 | 0.114 | 0.415 | 0.262 | - | - |
| HCM Control Delay (s) | 9.1 | - | - | 48.8 | 11 | 33.4 | 19.6 | 14.8 | - | - |
| HCM Lane LOS | A | - | - | E | B | D | C | B | - | - |
| HCM 95th %tile Q(veh) | 0.1 | - | - | 0.4 | 0.1 | 0.4 | 2 | 1 | - | - |

Notes
 -: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5.5 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↶ | ↷ | | ↶ | ↷ |
| Traffic Vol, veh/h | 11 | 6 | 18 | 1 | 2 | 37 |
| Future Vol, veh/h | 11 | 6 | 18 | 1 | 2 | 37 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 12 | 7 | 20 | 1 | 2 | 40 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 21 | 0 | - | 0 | 52 21 |
| Stage 1 | - | - | - | - | 21 - |
| Stage 2 | - | - | - | - | 31 - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 3.318 |
| Pot Cap-1 Maneuver | 1595 | - | - | - | 957 1056 |
| Stage 1 | - | - | - | - | 1002 - |
| Stage 2 | - | - | - | - | 992 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1595 | - | - | - | 949 1056 |
| Mov Cap-2 Maneuver | - | - | - | - | 949 - |
| Stage 1 | - | - | - | - | 994 - |
| Stage 2 | - | - | - | - | 992 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 4.7 | 0 | 8.6 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1595 | - | - | - | 1050 |
| HCM Lane V/C Ratio | 0.007 | - | - | - | 0.04 |
| HCM Control Delay (s) | 7.3 | 0 | - | - | 8.6 |
| HCM Lane LOS | A | A | - | - | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 5.1 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↔ | ↔ | | ↔ | |
| Traffic Vol, veh/h | 39 | 20 | 11 | 2 | 1 | 23 |
| Future Vol, veh/h | 39 | 20 | 11 | 2 | 1 | 23 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 42 | 22 | 12 | 2 | 1 | 25 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 14 | 0 | - | 0 | 119 13 |
| Stage 1 | - | - | - | - | 13 - |
| Stage 2 | - | - | - | - | 106 - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 3.318 |
| Pot Cap-1 Maneuver | 1604 | - | - | - | 877 1067 |
| Stage 1 | - | - | - | - | 1010 - |
| Stage 2 | - | - | - | - | 918 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1604 | - | - | - | 853 1067 |
| Mov Cap-2 Maneuver | - | - | - | - | 853 - |
| Stage 1 | - | - | - | - | 983 - |
| Stage 2 | - | - | - | - | 918 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 4.8 | 0 | 8.5 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1604 | - | - | - | 1056 |
| HCM Lane V/C Ratio | 0.026 | - | - | - | 0.025 |
| HCM Control Delay (s) | 7.3 | 0 | - | - | 8.5 |
| HCM Lane LOS | A | A | - | - | A |
| HCM 95th %tile Q(veh) | 0.1 | - | - | - | 0.1 |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 5.6 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 10 | 16 | 8 | 3 | 15 | 2 | 5 | 0 | 29 | 5 | 0 | 31 |
| Future Vol, veh/h | 10 | 16 | 8 | 3 | 15 | 2 | 5 | 0 | 29 | 5 | 0 | 31 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 11 | 17 | 9 | 3 | 16 | 2 | 5 | 0 | 32 | 5 | 0 | 34 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-------|-------|--------|-------|-------|
| Conflicting Flow All | 18 | 0 | 0 | 26 | 0 | 0 | 84 | 68 | 22 | 83 | 71 | 17 |
| Stage 1 | - | - | - | - | - | - | 44 | 44 | - | 23 | 23 | - |
| Stage 2 | - | - | - | - | - | - | 40 | 24 | - | 60 | 48 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1599 | - | - | 1588 | - | - | 903 | 823 | 1055 | 904 | 819 | 1062 |
| Stage 1 | - | - | - | - | - | - | 970 | 858 | - | 995 | 876 | - |
| Stage 2 | - | - | - | - | - | - | 975 | 875 | - | 951 | 855 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | 1599 | - | - | 1588 | - | - | 869 | 816 | 1055 | 871 | 812 | 1062 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 869 | 816 | - | 871 | 812 | - |
| Stage 1 | - | - | - | - | - | - | 963 | 852 | - | 988 | 874 | - |
| Stage 2 | - | - | - | - | - | - | 942 | 873 | - | 916 | 849 | - |

| Approach | EB | | | WB | | | NB | | | SB | | |
|----------------------|-----|--|--|-----|--|--|-----|--|--|-----|--|--|
| HCM Control Delay, s | 2.1 | | | 1.1 | | | 8.7 | | | 8.6 | | |
| HCM LOS | | | | | | | A | | | A | | |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 1023 | 1599 | - | - | 1588 | - | - | 1031 |
| HCM Lane V/C Ratio | 0.036 | 0.007 | - | - | 0.002 | - | - | 0.038 |
| HCM Control Delay (s) | 8.7 | 7.3 | 0 | - | 7.3 | 0 | - | 8.6 |
| HCM Lane LOS | A | A | A | - | A | A | - | A |
| HCM 95th %tile Q(veh) | 0.1 | 0 | - | - | 0 | - | - | 0.1 |

| Intersection | | | | | | | | | | | | |
|--------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Int Delay, s/veh | 6 | | | | | | | | | | | |
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Traffic Vol, veh/h | 33 | 16 | 15 | 42 | 19 | 6 | 22 | 0 | 28 | 3 | 0 | 19 |
| Future Vol, veh/h | 33 | 16 | 15 | 42 | 19 | 6 | 22 | 0 | 28 | 3 | 0 | 19 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Free | Free | Stop | Stop | Stop | Stop | Stop | Stop |
| RT Channelized | - | - | None |
| Storage Length | - | - | - | - | - | - | - | - | - | - | - | - |
| Veh in Median Storage, # | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Grade, % | - | 0 | - | - | 0 | - | - | 0 | - | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 36 | 17 | 16 | 46 | 21 | 7 | 24 | 0 | 30 | 3 | 0 | 21 |

| Major/Minor | Major1 | | | Major2 | | | Minor1 | | | Minor2 | | |
|----------------------|--------|---|---|--------|---|---|--------|-------|-------|--------|-------|-------|
| Conflicting Flow All | 28 | 0 | 0 | 33 | 0 | 0 | 224 | 217 | 25 | 229 | 222 | 25 |
| Stage 1 | - | - | - | - | - | - | 97 | 97 | - | 117 | 117 | - |
| Stage 2 | - | - | - | - | - | - | 127 | 120 | - | 112 | 105 | - |
| Critical Hdwy | 4.12 | - | - | 4.12 | - | - | 7.12 | 6.52 | 6.22 | 7.12 | 6.52 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Critical Hdwy Stg 2 | - | - | - | - | - | - | 6.12 | 5.52 | - | 6.12 | 5.52 | - |
| Follow-up Hdwy | 2.218 | - | - | 2.218 | - | - | 3.518 | 4.018 | 3.318 | 3.518 | 4.018 | 3.318 |
| Pot Cap-1 Maneuver | 1585 | - | - | 1579 | - | - | 732 | 681 | 1051 | 726 | 677 | 1051 |
| Stage 1 | - | - | - | - | - | - | 910 | 815 | - | 888 | 799 | - |
| Stage 2 | - | - | - | - | - | - | 877 | 796 | - | 893 | 808 | - |
| Platoon blocked, % | - | - | - | - | - | - | - | - | - | - | - | - |
| Mov Cap-1 Maneuver | 1585 | - | - | 1579 | - | - | 689 | 646 | 1051 | 677 | 642 | 1051 |
| Mov Cap-2 Maneuver | - | - | - | - | - | - | 689 | 646 | - | 677 | 642 | - |
| Stage 1 | - | - | - | - | - | - | 889 | 796 | - | 868 | 775 | - |
| Stage 2 | - | - | - | - | - | - | 834 | 772 | - | 847 | 789 | - |

| Approach | EB | | | WB | | | NB | | | SB | | |
|----------------------|-----|--|--|-----|--|--|-----|--|--|-----|--|--|
| HCM Control Delay, s | 3.8 | | | 4.6 | | | 9.5 | | | 8.8 | | |
| HCM LOS | | | | | | | A | | | A | | |

| Minor Lane/Major Mvmt | NBLn1 | EBL | EBT | EBR | WBL | WBT | WBR | SBLn1 |
|-----------------------|-------|-------|-----|-----|-------|-----|-----|-------|
| Capacity (veh/h) | 854 | 1585 | - | - | 1579 | - | - | 977 |
| HCM Lane V/C Ratio | 0.064 | 0.023 | - | - | 0.029 | - | - | 0.024 |
| HCM Control Delay (s) | 9.5 | 7.3 | 0 | - | 7.3 | 0 | - | 8.8 |
| HCM Lane LOS | A | A | A | - | A | A | - | A |
| HCM 95th %tile Q(veh) | 0.2 | 0.1 | - | - | 0.1 | - | - | 0.1 |

Intersection

Int Delay, s/veh 7.2

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|--------------------------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | ↕ | | ↕ | |
| Traffic Vol, veh/h | 6 | 2 | 1 | 1 | 4 | 18 |
| Future Vol, veh/h | 6 | 2 | 1 | 1 | 4 | 18 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 7 | 2 | 1 | 1 | 4 | 20 |

| Major/Minor | Major1 | Major2 | Minor2 |
|----------------------|--------|--------|---------------|
| Conflicting Flow All | 2 | 0 | 0 18 2 |
| Stage 1 | - | - | - - 2 - |
| Stage 2 | - | - | - - 16 - |
| Critical Hdwy | 4.12 | - | - 6.42 6.22 |
| Critical Hdwy Stg 1 | - | - | - 5.42 - |
| Critical Hdwy Stg 2 | - | - | - 5.42 - |
| Follow-up Hdwy | 2.218 | - | - 3.518 3.318 |
| Pot Cap-1 Maneuver | 1620 | - | - 1000 1082 |
| Stage 1 | - | - | - 1021 - |
| Stage 2 | - | - | - 1007 - |
| Platoon blocked, % | - | - | - |
| Mov Cap-1 Maneuver | 1620 | - | - 996 1082 |
| Mov Cap-2 Maneuver | - | - | - 996 - |
| Stage 1 | - | - | - 1017 - |
| Stage 2 | - | - | - 1007 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 5.4 | 0 | 8.5 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1620 | - | - | - | 1065 |
| HCM Lane V/C Ratio | 0.004 | - | - | - | 0.022 |
| HCM Control Delay (s) | 7.2 | 0 | - | - | 8.5 |
| HCM Lane LOS | A | A | - | - | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 6.3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↕ | ↕ | | ↕ | |
| Traffic Vol, veh/h | 20 | 1 | 2 | 5 | 3 | 11 |
| Future Vol, veh/h | 20 | 1 | 2 | 5 | 3 | 11 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 22 | 1 | 2 | 5 | 3 | 12 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------|
| Conflicting Flow All | 7 | 0 | - | 0 | 50 |
| Stage 1 | - | - | - | - | 5 |
| Stage 2 | - | - | - | - | 45 |
| Critical Hdwy | 4.12 | - | - | - | 6.42 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 |
| Pot Cap-1 Maneuver | 1614 | - | - | - | 959 |
| Stage 1 | - | - | - | - | 1018 |
| Stage 2 | - | - | - | - | 977 |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1614 | - | - | - | 946 |
| Mov Cap-2 Maneuver | - | - | - | - | 946 |
| Stage 1 | - | - | - | - | 1004 |
| Stage 2 | - | - | - | - | 977 |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 6.9 | 0 | 8.5 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1614 | - | - | - | 1047 |
| HCM Lane V/C Ratio | 0.013 | - | - | - | 0.015 |
| HCM Control Delay (s) | 7.3 | 0 | - | - | 8.5 |
| HCM Lane LOS | A | A | - | - | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 3 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↕ | ↕ | | ↕ | |
| Traffic Vol, veh/h | 5 | 45 | 5 | 3 | 10 | 15 |
| Future Vol, veh/h | 5 | 45 | 5 | 3 | 10 | 15 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 5 | 49 | 5 | 3 | 11 | 16 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|---|-------------|
| Conflicting Flow All | 8 | 0 | - | 0 | 66 7 |
| Stage 1 | - | - | - | - | 7 - |
| Stage 2 | - | - | - | - | 59 - |
| Critical Hdwy | 4.12 | - | - | - | 6.42 6.22 |
| Critical Hdwy Stg 1 | - | - | - | - | 5.42 - |
| Critical Hdwy Stg 2 | - | - | - | - | 5.42 - |
| Follow-up Hdwy | 2.218 | - | - | - | 3.518 3.318 |
| Pot Cap-1 Maneuver | 1612 | - | - | - | 939 1075 |
| Stage 1 | - | - | - | - | 1016 - |
| Stage 2 | - | - | - | - | 964 - |
| Platoon blocked, % | | - | - | - | |
| Mov Cap-1 Maneuver | 1612 | - | - | - | 936 1075 |
| Mov Cap-2 Maneuver | - | - | - | - | 936 - |
| Stage 1 | - | - | - | - | 1013 - |
| Stage 2 | - | - | - | - | 964 - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 0.7 | 0 | 8.6 |
| HCM LOS | | | A |

| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1612 | - | - | - | 1015 |
| HCM Lane V/C Ratio | 0.003 | - | - | - | 0.027 |
| HCM Control Delay (s) | 7.2 | 0 | - | - | 8.6 |
| HCM Lane LOS | A | A | - | - | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

| Intersection | | | | | | |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh | 1.9 | | | | | |
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
| Lane Configurations | | ↶ | ↷ | | ↶ | ↷ |
| Traffic Vol, veh/h | 16 | 31 | 58 | 11 | 6 | 9 |
| Future Vol, veh/h | 16 | 31 | 58 | 11 | 6 | 9 |
| Conflicting Peds, #/hr | 0 | 0 | 0 | 0 | 0 | 0 |
| Sign Control | Free | Free | Free | Free | Stop | Stop |
| RT Channelized | - | None | - | None | - | None |
| Storage Length | - | - | - | - | 0 | - |
| Veh in Median Storage, # | - | 0 | 0 | - | 0 | - |
| Grade, % | - | 0 | 0 | - | 0 | - |
| Peak Hour Factor | 92 | 92 | 92 | 92 | 92 | 92 |
| Heavy Vehicles, % | 2 | 2 | 2 | 2 | 2 | 2 |
| Mvmt Flow | 17 | 34 | 63 | 12 | 7 | 10 |

| Major/Minor | Major1 | Major2 | Minor2 | | |
|----------------------|--------|--------|--------|-------|-------|
| Conflicting Flow All | 75 | 0 | 0 | 137 | 69 |
| Stage 1 | - | - | - | 69 | - |
| Stage 2 | - | - | - | 68 | - |
| Critical Hdwy | 4.12 | - | - | 6.42 | 6.22 |
| Critical Hdwy Stg 1 | - | - | - | 5.42 | - |
| Critical Hdwy Stg 2 | - | - | - | 5.42 | - |
| Follow-up Hdwy | 2.218 | - | - | 3.518 | 3.318 |
| Pot Cap-1 Maneuver | 1524 | - | - | 856 | 994 |
| Stage 1 | - | - | - | 954 | - |
| Stage 2 | - | - | - | 955 | - |
| Platoon blocked, % | - | - | - | - | - |
| Mov Cap-1 Maneuver | 1524 | - | - | 847 | 994 |
| Mov Cap-2 Maneuver | - | - | - | 847 | - |
| Stage 1 | - | - | - | 944 | - |
| Stage 2 | - | - | - | 955 | - |

| Approach | EB | WB | SB |
|----------------------|-----|----|-----|
| HCM Control Delay, s | 2.5 | 0 | 8.9 |
| HCM LOS | | | A |

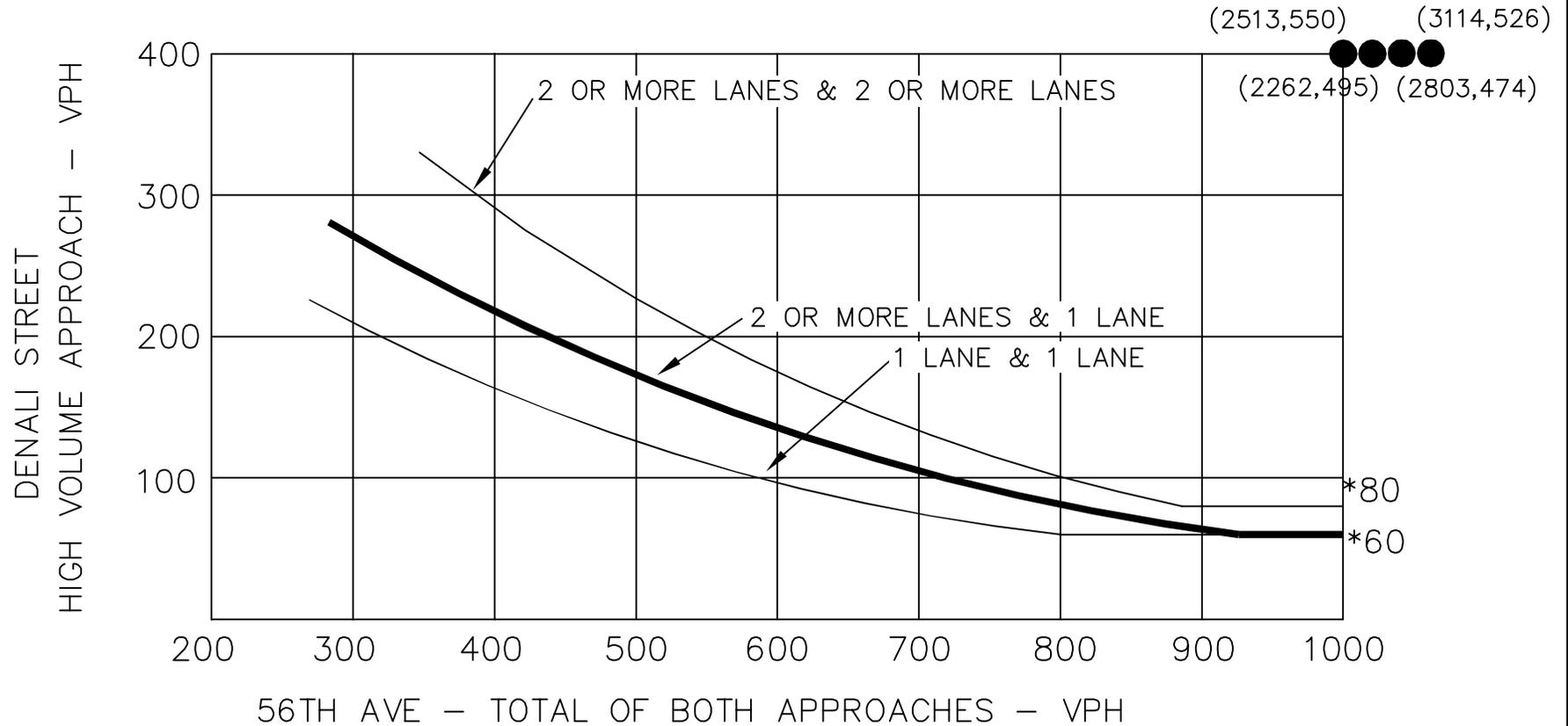
| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|-----------------------|-------|-----|-----|-----|-------|
| Capacity (veh/h) | 1524 | - | - | - | 929 |
| HCM Lane V/C Ratio | 0.011 | - | - | - | 0.018 |
| HCM Control Delay (s) | 7.4 | 0 | - | - | 8.9 |
| HCM Lane LOS | A | A | - | - | A |
| HCM 95th %tile Q(veh) | 0 | - | - | - | 0.1 |

APPENDIX E

Signal Warrant Analysis Worksheets

WARRANT 2 - FOUR HOUR VEHICULAR VOLUME (70% FACTOR)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



* NOTE: 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

56TH AVE & DENALI ST
SIGNAL WARRANT ANALYSIS
FOUR HOUR VOLUME WARRANT

● 2040 TOTAL TRAFFIC DATA POINT WITH PROJECT

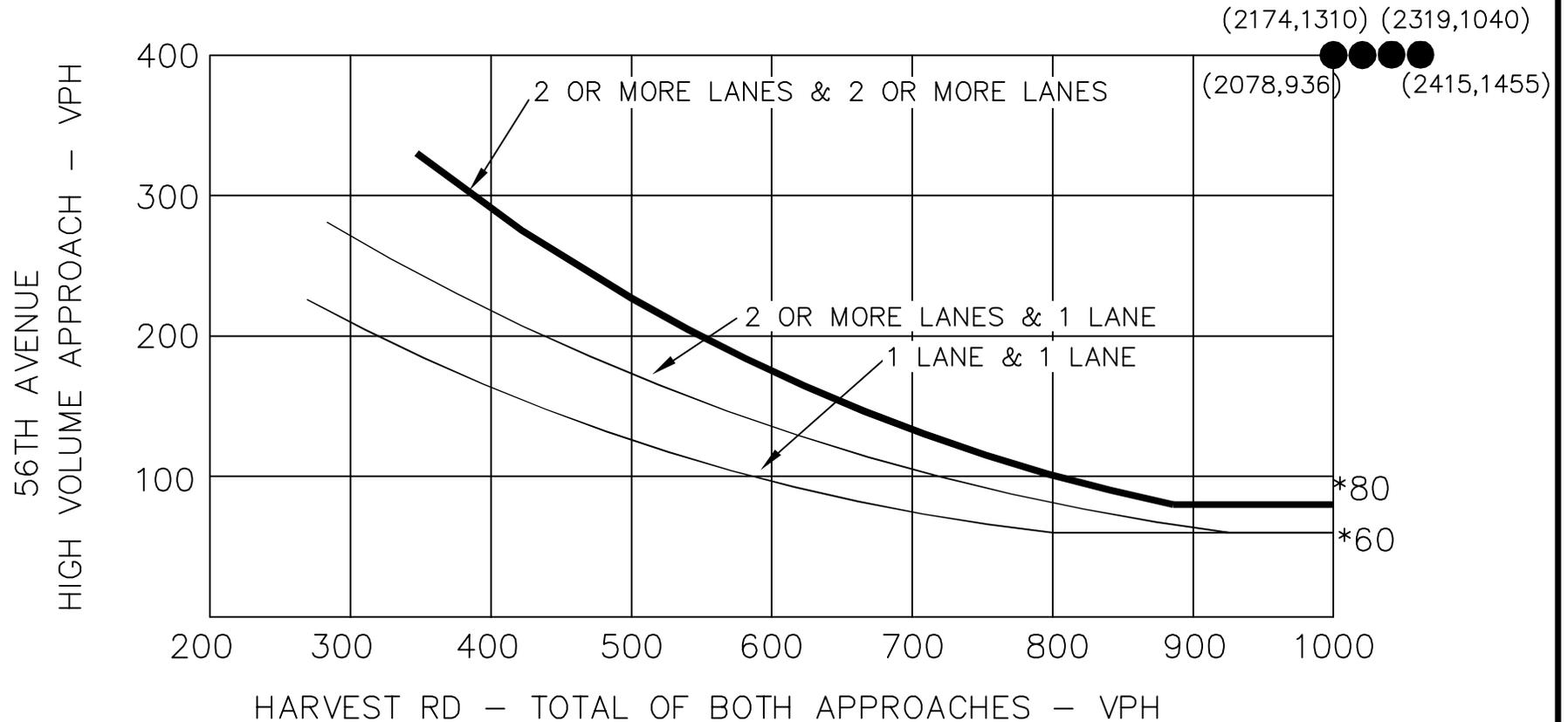
FIGURE 1

Source: Manual of Uniform Traffic Control Devices 2009



WARRANT 2 - FOUR HOUR VEHICULAR VOLUME (70% FACTOR)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



* NOTE: 80 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 60 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

56TH AVE & HARVEST RD
SIGNAL WARRANT ANALYSIS
FOUR HOUR VOLUME WARRANT

● 2040 TOTAL TRAFFIC DATA POINT WITH PROJECT

FIGURE 2

Source: Manual of Uniform Traffic Control Devices 2009



APPENDIX F

Queue Analysis Worksheets

Queues
1: Denali St & 56th Ave

2040 Total AM
12/21/2023



| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph) | 54 | 984 | 411 | 342 | 941 | 388 | 33 | 353 | 27 | 5 | 43 |
| v/c Ratio | 0.16 | 0.44 | 0.35 | 0.68 | 0.34 | 0.65 | 0.09 | 0.55 | 0.21 | 0.05 | 0.16 |
| Control Delay | 12.5 | 25.7 | 3.2 | 52.1 | 14.8 | 51.5 | 40.4 | 18.9 | 56.7 | 54.2 | 1.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 12.5 | 25.7 | 3.2 | 52.1 | 14.8 | 51.5 | 40.4 | 18.9 | 56.7 | 54.2 | 1.2 |
| Queue Length 50th (ft) | 16 | 202 | 25 | 104 | 213 | 147 | 21 | 121 | 20 | 4 | 0 |
| Queue Length 95th (ft) | 34 | 263 | 68 | m97 | m265 | 192 | 51 | 178 | 52 | 18 | 0 |
| Internal Link Dist (ft) | | 1301 | | | 1255 | | 655 | | | 300 | |
| Turn Bay Length (ft) | 150 | | 650 | 275 | | 250 | | 100 | 100 | | 100 |
| Base Capacity (vph) | 341 | 2228 | 1191 | 715 | 2781 | 686 | 373 | 733 | 138 | 114 | 276 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.16 | 0.44 | 0.35 | 0.48 | 0.34 | 0.57 | 0.09 | 0.48 | 0.20 | 0.04 | 0.16 |

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Queues
1: Denali St & 56th Ave

2040 Total PM
12/21/2023



| Lane Group | EBL | EBT | EBR | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------|------|------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph) | 22 | 1098 | 657 | 370 | 1239 | 452 | 11 | 217 | 33 | 5 | 54 |
| v/c Ratio | 0.10 | 0.58 | 0.53 | 0.74 | 0.49 | 0.43 | 0.02 | 0.29 | 0.45 | 0.05 | 0.23 |
| Control Delay | 15.9 | 32.8 | 6.3 | 48.3 | 23.8 | 35.1 | 32.0 | 10.0 | 75.7 | 54.2 | 2.3 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 15.9 | 32.8 | 6.3 | 48.3 | 23.8 | 35.1 | 32.0 | 10.0 | 75.7 | 54.2 | 2.3 |
| Queue Length 50th (ft) | 8 | 264 | 86 | 107 | 344 | 130 | 6 | 47 | 26 | 4 | 0 |
| Queue Length 95th (ft) | 21 | 323 | 268 | m116 | m377 | 211 | 21 | 85 | #65 | 17 | 0 |
| Internal Link Dist (ft) | | 1301 | | | 1255 | | 655 | | | 300 | |
| Turn Bay Length (ft) | 150 | | 650 | 275 | | 250 | | 100 | 100 | | 100 |
| Base Capacity (vph) | 215 | 1900 | 1240 | 572 | 2517 | 1070 | 512 | 774 | 73 | 97 | 234 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.10 | 0.58 | 0.53 | 0.65 | 0.49 | 0.42 | 0.02 | 0.28 | 0.45 | 0.05 | 0.23 |

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

Queues
3: Harvest Rd & 56th Ave

2040 Total AM
05/17/2023



| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------|------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph) | 647 | 694 | 217 | 962 | 163 | 913 | 109 | 141 | 435 | 391 |
| v/c Ratio | 0.83 | 0.71 | 0.48 | 1.03 | 0.47 | 0.88 | 0.12 | 0.61 | 0.40 | 0.52 |
| Control Delay | 65.9 | 37.9 | 37.0 | 82.5 | 43.8 | 51.7 | 1.1 | 44.3 | 35.2 | 6.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 65.9 | 37.9 | 37.0 | 82.5 | 43.8 | 51.7 | 1.1 | 44.3 | 35.2 | 6.1 |
| Queue Length 50th (ft) | 269 | 193 | 101 | ~275 | 100 | 360 | 0 | 83 | 141 | 0 |
| Queue Length 95th (ft) | 327 | 235 | 146 | #368 | 170 | #530 | 12 | 144 | 198 | 77 |
| Internal Link Dist (ft) | | 1200 | | 568 | | 660 | | | 474 | |
| Turn Bay Length (ft) | 375 | | 325 | | 375 | | 450 | 375 | | 600 |
| Base Capacity (vph) | 898 | 1434 | 456 | 933 | 347 | 1043 | 880 | 251 | 1080 | 754 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.72 | 0.48 | 0.48 | 1.03 | 0.47 | 0.88 | 0.12 | 0.56 | 0.40 | 0.52 |

Intersection Summary

- ~ 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.

Queues
3: Harvest Rd & 56th Ave

2040 Total PM
05/17/2023



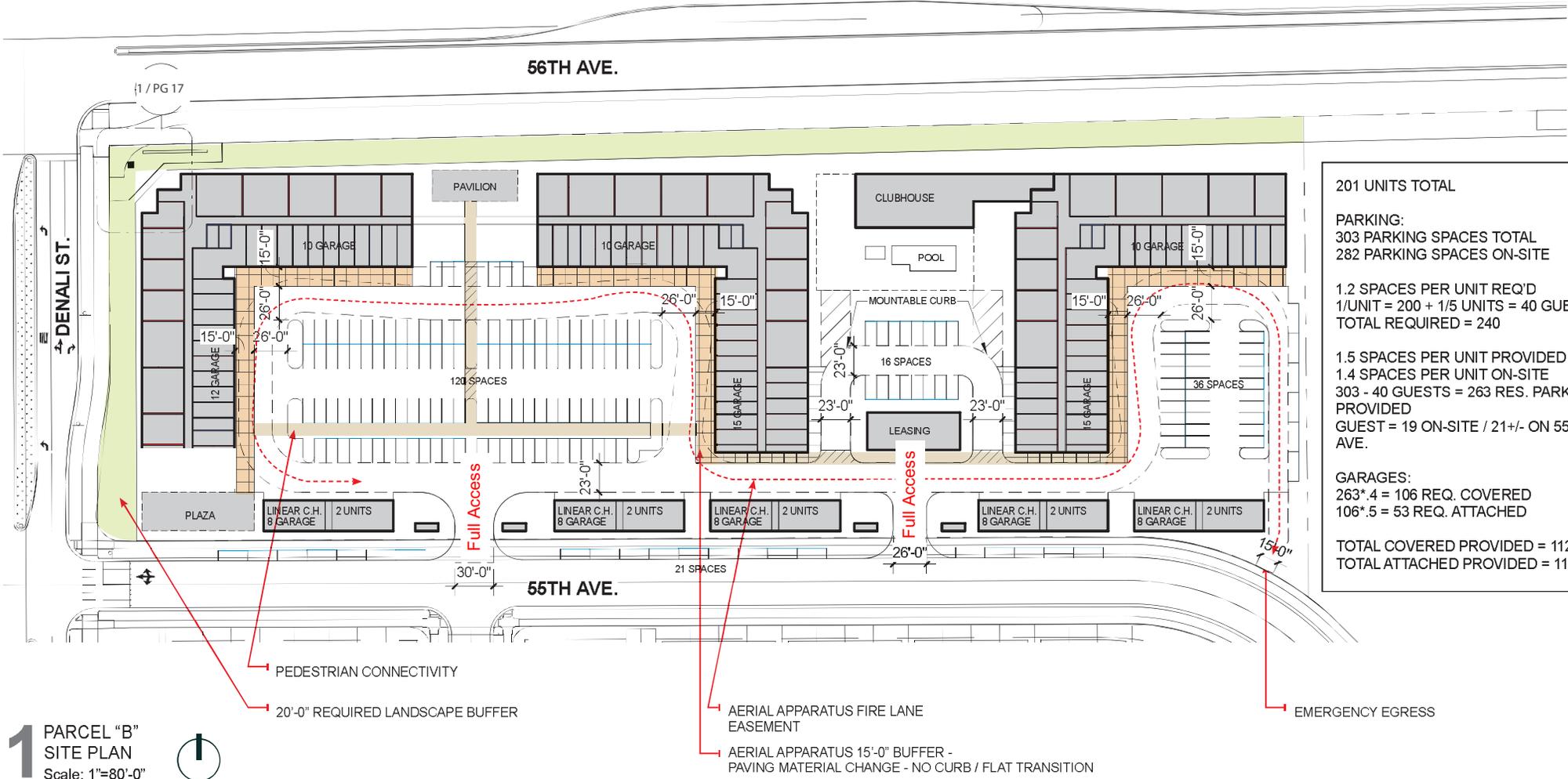
| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | NBR | SBL | SBT | SBR |
|-------------------------|------|------|------|------|------|------|------|------|------|------|
| Lane Group Flow (vph) | 630 | 831 | 277 | 886 | 250 | 918 | 299 | 239 | 772 | 690 |
| v/c Ratio | 0.90 | 0.79 | 0.71 | 0.95 | 0.73 | 0.93 | 0.38 | 0.80 | 0.80 | 0.92 |
| Control Delay | 76.6 | 38.8 | 50.8 | 65.9 | 57.4 | 59.0 | 8.4 | 57.5 | 48.4 | 34.6 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 76.6 | 38.8 | 50.8 | 65.9 | 57.4 | 59.0 | 8.4 | 57.5 | 48.4 | 34.6 |
| Queue Length 50th (ft) | 263 | 213 | 139 | 242 | 166 | 371 | 49 | 157 | 295 | 222 |
| Queue Length 95th (ft) | #350 | 260 | #268 | #329 | #269 | #508 | 85 | #253 | 372 | #480 |
| Internal Link Dist (ft) | | 1200 | | 568 | | 660 | | | 474 | |
| Turn Bay Length (ft) | 375 | | 325 | | 375 | | 450 | 375 | | 600 |
| Base Capacity (vph) | 715 | 1133 | 392 | 935 | 342 | 986 | 793 | 309 | 961 | 749 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.88 | 0.73 | 0.71 | 0.95 | 0.73 | 0.93 | 0.38 | 0.77 | 0.80 | 0.92 |

Intersection Summary

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

APPENDIX G

Conceptual Site Plan



201 UNITS TOTAL

PARKING:
303 PARKING SPACES TOTAL
282 PARKING SPACES ON-SITE

1.2 SPACES PER UNIT REQ'D
1/UNIT = 200 + 1/5 UNITS = 40 GUEST
TOTAL REQUIRED = 240

1.5 SPACES PER UNIT PROVIDED
1.4 SPACES PER UNIT ON-SITE
303 - 40 GUESTS = 263 RES. PARKING PROVIDED
GUEST = 19 ON-SITE / 21+/- ON 55TH AVE.

GARAGES:
263 * 4 = 106 REQ. COVERED
106 * 5 = 53 REQ. ATTACHED

TOTAL COVERED PROVIDED = 112
TOTAL ATTACHED PROVIDED = 112