

January 09, 2025

Mr. Chris Fellows  
Windler Public Improvement Authority  
9155 E. Nicholls Ave, Suite 360  
Greenwood Village, CO 80112

**RE: Windler – Master Plan Amendment  
FHU Project No. 122259-01**

Dear Mr. Fellows:

Felsburg Holt & Ullevig (FHU) prepared a traffic impact study for the Windler Homestead development in July 2023. The initial master plan has been adjusted to represent current aspirations for the development. These adjustments to the initial master plan include refinements to the residential unit counts and provide refinements to commercial development summarized below:

- PA-1:
  - One 125 room hotel
  - One 16 pump gas station and convenience store
- PA-14:
  - 130,000 sf of commercial which will include a Supermarket anchor
- PA-16:
  - Three 125 room hotels
  - One 16 pump gas station and convenience store

These uses have been analyzed under the assumption that the hotels would occupy 3-acre sites, and the gas stations would occupy 2-acre sites with the balance of developable acreage analyzed using the standard commercial land uses identified in the Institute of Transportation Engineers' (ITE) publication Trip Generation Manual, 11<sup>th</sup> Edition, 2021.

It should also be noted that the single-family housing was split into 60% single-family attached housing and 40% single-family detached housing across the entire development which is consistent with prior Windler site plan submittals. NCHRP Report 684 for internal capture trips and pass-by trips were also updated. The updated land use plan is depicted in **Figure 1**. The land use plan from the MTIS can be found in the **Appendix** for comparison.

# LEGEND

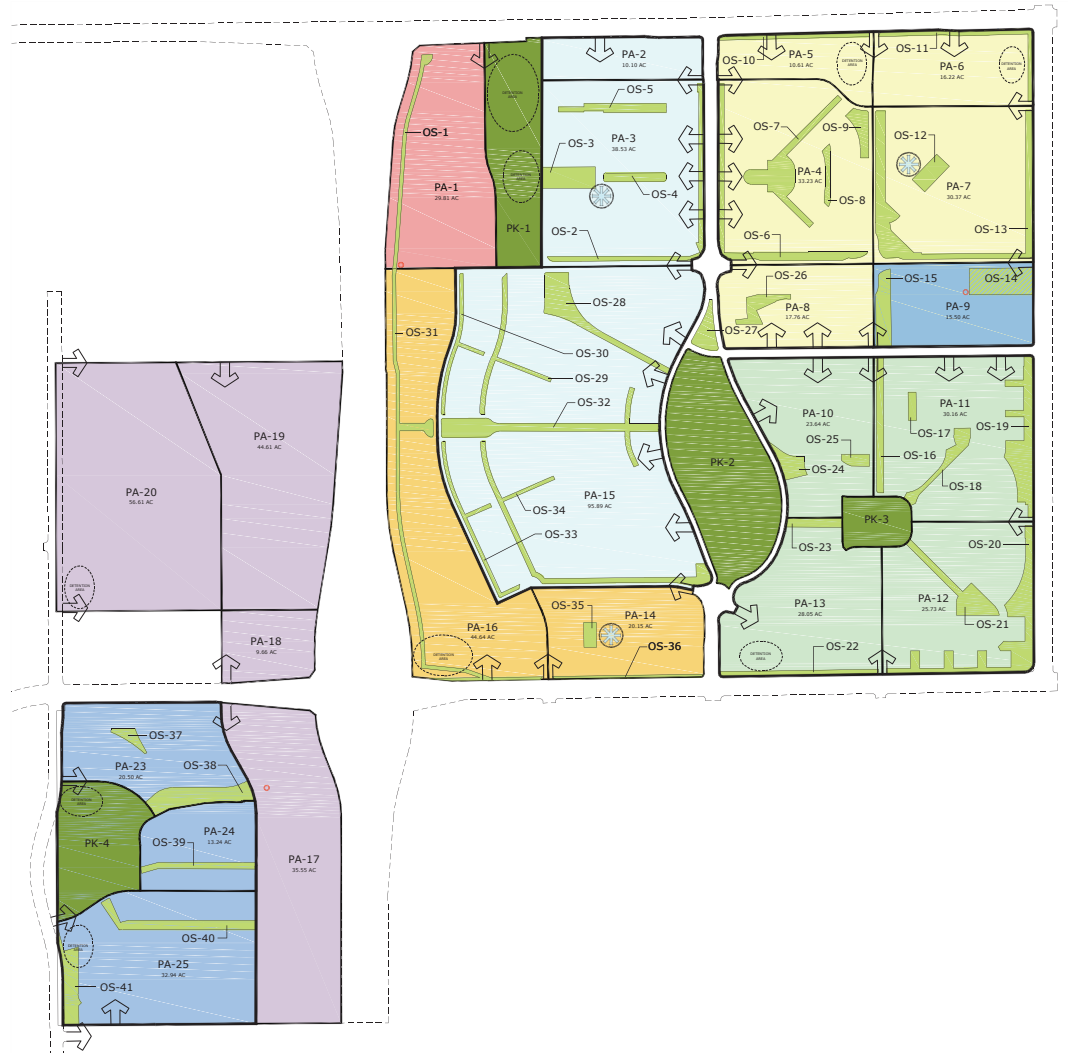
- OPEN SPACE
- NEIGHBORHOOD PARK
- FLEX RES - 1  
(145.6 Acres Gross)
- FLEX RES - 2  
(130.4 Acres Gross)
- FLEX RES - 3  
(153.4 Acres Gross)
- FLEX RES - 4  
(89.7 Acres Gross)
- MIXED USE
- COMMERCIAL
- INDUSTRIAL
- SCHOOL
- SHARED USE OPEN SPACE
- ADMINISTRATIVE  
ACTIVITY CENTER

 ADMINISTRATIVE  
ACTIVITY CENTER
- WHELEN WARNING  
SYSTEM LOCATION

 WHELEN WARNING  
SYSTEM LOCATION
- RECREATION  
CENTER

 RECREATION  
CENTER
- LOCAL STREET  
CONNECTION

 LOCAL STREET  
CONNECTION



## Traffic Volume Analysis

2040 average daily traffic (ADT) volumes and peak hour volumes are illustrated in **Figure I**. These volumes are a product of the 2040 background volumes from the Master TIS (MTIS) and the updated external and internal site-generated traffic volumes. A comparison of 2040 volumes along Denali Boulevard, Biloxi Street, 48<sup>th</sup> Avenue, and 56<sup>th</sup> Avenue can be found in **Table I**.

**Table I. 2040 ADT Comparison**

| Location                | MTIS 2040 ADT   | Master Plan Amendment 2040 ADT |
|-------------------------|-----------------|--------------------------------|
| Denali Boulevard        | 14,100 - 15,700 | 14,300 - 17,400                |
| Biloxi Street           | 2,600 - 3,100   | 2,800 - 3,800                  |
| 48 <sup>th</sup> Avenue | 34,500 - 55,400 | 34,500 - 56,800                |
| 56 <sup>th</sup> Avenue | 20,000 - 34,200 | 20,200 - 35,000                |

## Trip Generation Analysis

The MTIS used the *Institute of Transportation Engineers' (ITE) publication Trip Generation Manual, 11<sup>th</sup> Edition, 2021* to forecast vehicle-trips based on the land use types and sizes. Land use types and sizes were modified based on the amendment to the master site plan. **Table 2** displays the comparison of total external site generated trips for the MTIS and the updated trip generation. A more detailed table of the updated site generated trips and a table comparing the MTIS trip generation with the updated trip generation can be found in the **Appendix**.

The updated site trip estimates have increased compared to the MTIS due to the inclusion of more specific land uses in PA-I, PA-I4, and PA-I6. Notably, key contributors to the rise in daily trips include Hotels (ITE Code 310) and Gas Stations (ITE Code 945) in PA-I and PA-I6, as well as the Shopping Plaza with Supermarket (ITE Code 821) in PA-I4.

**Table 2. ITE Trip Generation Comparison**

|                    | Daily  | AM Peak Hour |       | PM Peak Hour |       |       |       |
|--------------------|--------|--------------|-------|--------------|-------|-------|-------|
|                    | Total  | In           | Out   | Total        | In    | Out   | Total |
| MTIS Site Trips    | 88,699 | 2,346        | 2,755 | 5,101        | 3,580 | 3,236 | 6,816 |
| Updated Site Trips | 96,712 | 2,546        | 2,954 | 5,500        | 3,639 | 3,296 | 6,934 |

## Master Plan Amendment Impact

A minor adjustment to the internal roadway network involves the removal of 54<sup>th</sup> Place between Buchanan Street and Biloxi Street. This change is not anticipated to have a significant impact on travel patterns. Trips previously assigned to 54<sup>th</sup> Place were distributed to 55<sup>th</sup> Avenue and 53<sup>rd</sup> Avenue. The intersections of 55<sup>th</sup> Avenue and 53<sup>rd</sup> Avenue with Denali Boulevard will still operate adequately with the increase in traffic. It should be noted that internal site intersections were not evaluated due to the limited details available for the internal site network, and because these intersections are considered less critical.

## Detailed Intersection Analysis

As part of the amendment analysis, the following intersections were further analyzed:

- 56<sup>th</sup> Avenue & Biloxi Street
- 56<sup>th</sup> Avenue & Denali Boulevard
- 48<sup>th</sup> Avenue & Denali Boulevard
- 48<sup>th</sup> Avenue & Addison Street / 48<sup>th</sup> Avenue & Drive 7
- 48<sup>th</sup> Avenue & Biloxi Street

- Northern and Southern roundabouts along Denali Boulevard

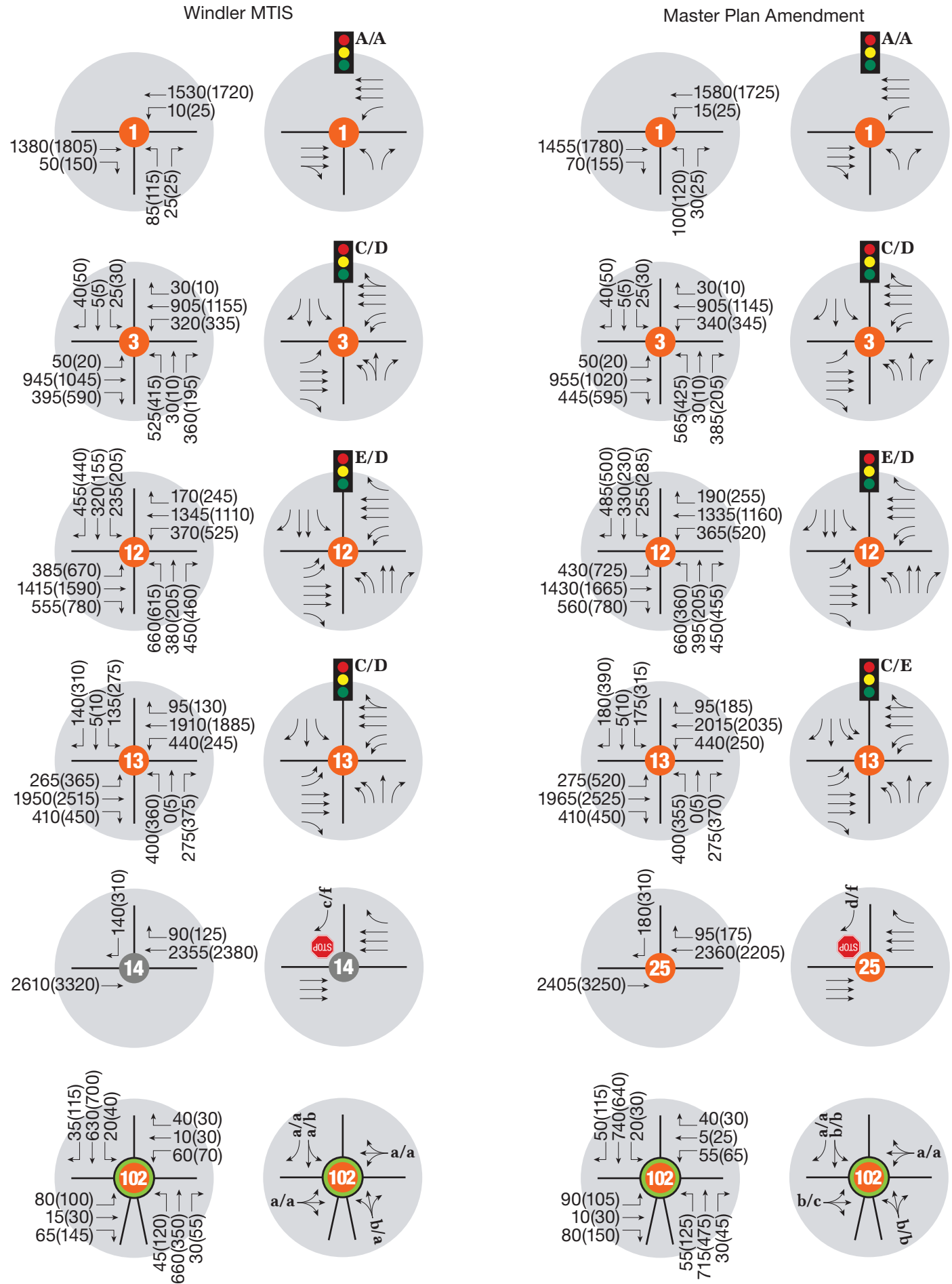
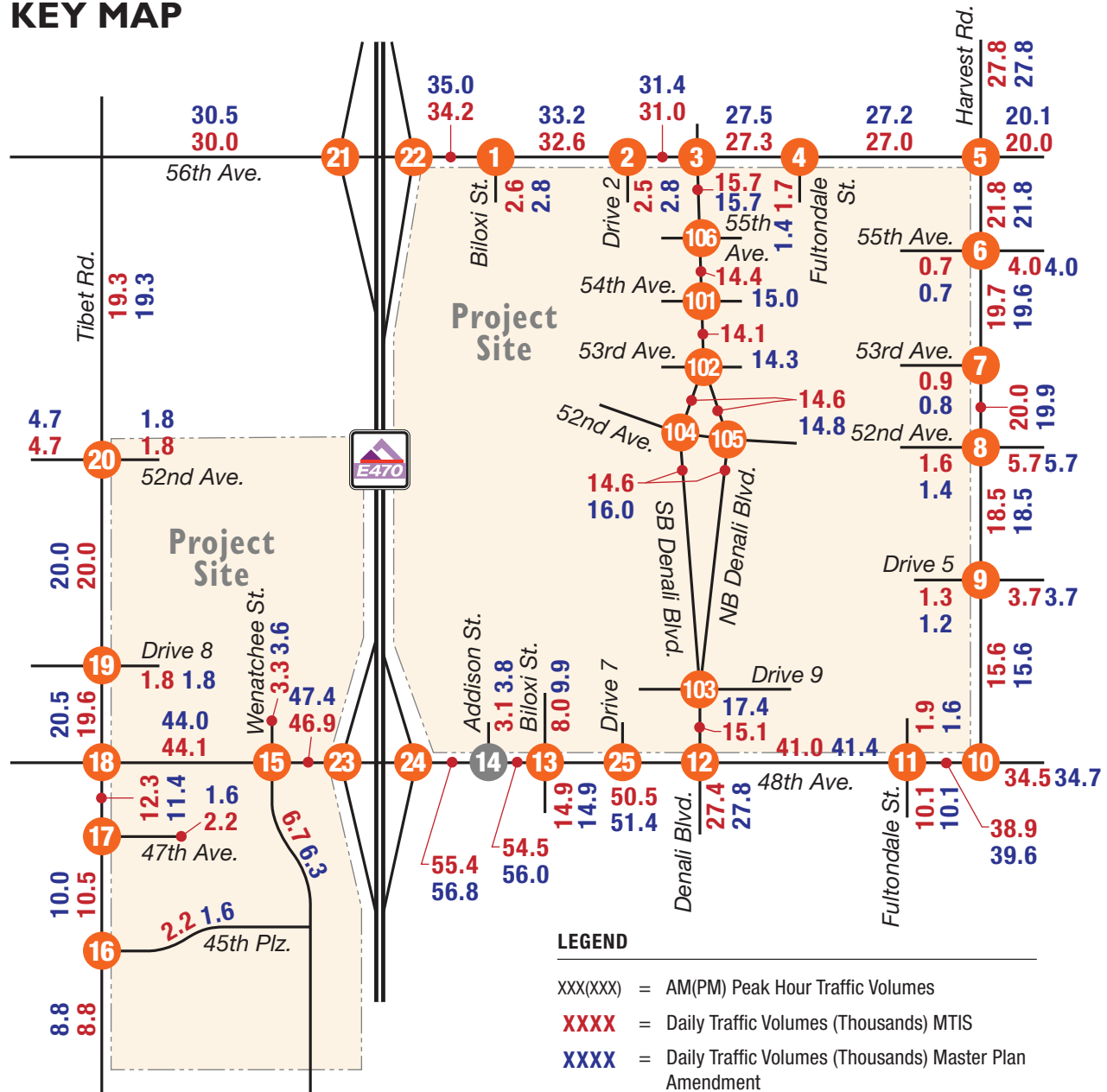
It should be noted that the intersection of 48<sup>th</sup> Avenue with Addison Street is no longer proposed with the updated site plan. Instead, the intersection of 48<sup>th</sup> Avenue with Drive 7, located between Biloxi Street and Denali Boulevard, was evaluated. The intersection of 48<sup>th</sup> Avenue with Drive 7 was not included in the MTIS site plan.

The evaluation of these intersections included Level of Service (LOS), delay, and queueing. **Figure 2** illustrates the comparison of the LOS at the analyzed intersections under MTIS conditions and the updated conditions. As illustrated, updated traffic conditions do not have a significant impact on the LOS at the intersections analyzed at the City of Aurora staff request. All intersections operate at LOS D or better with the exception of the signalized intersection of 48<sup>th</sup> Avenue with Denali Boulevard which is projected to operate at LOS E during the AM peak hour which is consistent with the findings of the MTIS.

In general, the changes in anticipated land use proposed in this master plan amendment do not adversely impact traffic operations when compared to the previous MTIS. However, given the variability in traffic generation for commercial uses it would be recommended to further evaluate as site plans are developed, in particular for intersections along 56<sup>th</sup> and 48<sup>th</sup> Avenues between E-470 and Denali Boulevard. The movements that result in a different LOS from the MTIS are as follows:

- 48<sup>th</sup> Avenue & Biloxi Street
  - Provide southbound dual left-turn lanes.
  - Overall intersection LOS changed from LOS D to LOS E in the PM peak hour.
- Northern roundabout along Denali Boulevard
  - Northbound movements changed from LOS B to LOS C in the AM peak hour and LOS A to LOS B in the PM peak hour.
  - Eastbound movement changed from LOS A in the AM and PM peak hours to LOS B.
  - Southbound through/left-turn movement changed from LOS A in the AM peak hour to LOS B.
- Southern roundabout along Denali Boulevard
  - Southbound through/right-turn movement changed from LOS A in the AM and PM peak hours to LOS B.
  - Southbound through/left-turn movement changed from LOS B in the AM and PM peak hours to LOS C.
  - Westbound movements changed from LOS B in the AM peak hour to LOS A.

## KEY MAP



## Pedestrian Connectivity Analysis

The development should provide adequate sidewalk connectivity throughout the site. Midblock crossing should be considered along Denali Boulevard to enhance pedestrian access to Discovery Park. In addition to the access to Discovery Park, the sidewalk should provide connectivity to the regional trail network including the trail west of E-470.

The removal of 54<sup>th</sup> Place discussed in master plan amendment impact section will have negligible impacts on pedestrian connectivity.

## Traffic Calming Measures

The development should be designed to adhere to the City of Aroura traffic calming guidelines. The guidelines include using design tools such as automated speed radar signs, curb extensions/neckdowns, speed cushions, and mini roundabouts. In addition to the City of Aroura guidance, on-street parking, narrowing of roadways and intersection bump-outs should be incorporated into the roadway network design in accordance with the FHWA traffic calming toolkit.

## Conclusions

The study resulted in the following conclusions:

- The newly proposed master plan generates more traffic as compared to the values analyzed in the master TIS. These increases are approximately 8,013 daily trips, 399 in the AM peak hour and 118 in the PM peak hour. This equates to a roughly 9 percent increase in daily traffic, a 8 percent increase in the AM peak hour and a 2 percent increase in the PM peak hour, with PM peak hour generating the most traffic of the two peak hours.
- The analyzed intersections are anticipated to continue to operate acceptably with the recommendations provided in the Windler Master TIS.
- The following is a list of changes to auxiliary lane requirements:
  - Provide dual southbound left-turn lanes at 48<sup>th</sup> Street & Biloxi Street.
  - Recommended northbound left-turn storage length at 56<sup>th</sup> Avenue & Denali Boulevard changes from 325 feet to 300 feet.
  - Recommended northbound left-turn storage length at 48<sup>th</sup> Avenue & Denali Boulevard changes from 400 feet to 450 feet.
  - Recommended eastbound left-turn storage length at 48<sup>th</sup> Avenue & Denali Boulevard changes from 300 feet to 375 feet.
  - Recommended southbound left-turn storage length at 48<sup>th</sup> Avenue & Denali Boulevard changes from 375 feet to 400 feet.
  - Recommended eastbound left-turn storage length at 48<sup>th</sup> Avenue & Biloxi Street changes from 175 feet to 225 feet.

Please let me know if you have any questions about this letter or need any additional information.



Philip Dunham, PE, PTOE  
Transportation Engineer

## APPENDIX A. TRIP GENERATION MATERIALS

# Site Trip Generation

| Map Code | ITE Code | Land Use Description                                 | Size  | Unit     | Daily  | AM Peak Hour          |     |       | Internal Capture |     |       | AM Peak Hour   |     |       | AM<br>Pass-By % | AM Pass-By<br>Trips | PM Peak Hour          |     |       | Internal Capture |     |       | PM Peak Hour   |     |       | PM<br>Pass-By % | PM Pass-By<br>Trips |
|----------|----------|--|-------|----------|--------|-----------------------|-----|-------|------------------|-----|-------|----------------|-----|-------|-----------------|---------------------|-----------------------|-----|-------|------------------|-----|-------|----------------|-----|-------|-----------------|---------------------|
|          |          |  |       |          | Total  | Total Trip Generation |     |       | Trips            |     |       | External Trips |     |       |                 |                     | Total Trip Generation |     |       | Trips            |     |       | External Trips |     |       |                 |                     |
|          |          |  |       |          |        | In                    | Out | Total | In               | Out | Total | In             | Out | Total |                 |                     | In                    | Out | Total | In               | Out | Total | In             | Out | Total |                 |                     |
| PA-1.1   | 820      | Shopping Center                                      | 270.0 | KSF      | 12,913 | 182                   | 111 | 293   | 9                | 2   | 11    | 173            | 109 | 282   | -               | -                   | 554                   | 600 | 1,154 | 63               | 149 | 212   | 491            | 451 | 942   | 29%             | 142                 |
| PA-1.2   | 310      | Hotel  | 125   | Rooms    | 931    | 31                    | 24  | 55    | 0                | 3   | 3     | 31             | 21  | 52    | -               | -                   | 33                    | 32  | 65    | 9                | 5   | 14    | 24             | 27  | 51    | -               | -                   |
| PA-1.3   | 945      | Gas Station  | 16    | Pumps    | 3,383  | 128                   | 129 | 257   | 0                | 0   | 0     | 128            | 129 | 257   | 63%             | 81                  | 147                   | 148 | 295   | 0                | 0   | 0     | 147            | 148 | 295   | 57%             | 84                  |
| PA-2     | 220      | Multifamily Housing (Low-Rise)                       | 303   | DU       | 2,018  | 28                    | 89  | 117   | 1                | 2   | 3     | 27             | 87  | 114   | -               | -                   | 95                    | 56  | 151   | 20               | 8   | 28    | 75             | 48  | 123   | -               | -                   |
| PA-3.1   | 210      | Single Family Detached Housing                       | 160   | DU       | 1,555  | 28                    | 86  | 114   | 1                | 2   | 3     | 27             | 84  | 111   | -               | -                   | 98                    | 57  | 155   | 21               | 8   | 29    | 77             | 49  | 126   | -               | -                   |
| PA-3.2   | 215      | Single Family Attached Housing                       | 240   | DU       | 1,778  | 30                    | 89  | 119   | 1                | 2   | 3     | 29             | 87  | 116   | -               | -                   | 79                    | 55  | 134   | 17               | 8   | 25    | 62             | 47  | 109   | -               | -                   |
| PA-3.3   | 822      | Strip Retail Plaza                                   | 25.0  | KSF      | 1,285  | 35                    | 24  | 59    | 2                | 1   | 3     | 33             | 23  | 56    | -               | -                   | 75                    | 75  | 149   | 9                | 19  | 28    | 66             | 56  | 121   | 40%             | 26                  |
| PA-4.1   | 210      | Single Family Detached Housing                       | 126   | DU       | 1,248  | 23                    | 69  | 92    | 0                | 1   | 1     | 23             | 68  | 91    | -               | -                   | 77                    | 46  | 123   | 17               | 6   | 23    | 60             | 40  | 100   | -               | -                   |
| PA-4.2   | 215      | Single Family Attached Housing                       | 190   | DU       | 1,397  | 23                    | 70  | 93    | 0                | 1   | 1     | 23             | 69  | 92    | -               | -                   | 61                    | 43  | 104   | 13               | 6   | 19    | 48             | 37  | 85    | -               | -                   |
| PA-5     | 220      | Multifamily Housing (Low-Rise)                       | 228   | DU       | 1,537  | 23                    | 71  | 94    | 0                | 1   | 1     | 23             | 70  | 93    | -               | -                   | 75                    | 44  | 119   | 16               | 6   | 22    | 59             | 38  | 97    | -               | -                   |
| PA-6     | 220      | Multifamily Housing (Low-Rise)                       | 322   | DU       | 2,139  | 30                    | 93  | 123   | 1                | 1   | 2     | 29             | 92  | 121   | -               | -                   | 100                   | 59  | 159   | 22               | 8   | 30    | 78             | 51  | 129   | -               | -                   |
| PA-7.1   | 210      | Single Family Detached Housing                       | 108   | DU       | 1,083  | 20                    | 60  | 80    | 1                | 1   | 2     | 19             | 59  | 78    | -               | -                   | 67                    | 40  | 107   | 14               | 6   | 20    | 53             | 34  | 87    | -               | -                   |
| PA-7.2   | 215      | Single Family Attached Housing                       | 161   | DU       | 1,176  | 20                    | 58  | 78    | 1                | 1   | 2     | 19             | 57  | 76    | -               | -                   | 51                    | 36  | 87    | 11               | 5   | 16    | 40             | 31  | 71    | -               | -                   |
| PA-7.3   | 822      | Strip Retail Plaza                                   | 5.0   | KSF      | 441    | 7                     | 5   | 12    | 0                | 0   | 0     | 7              | 5   | 12    | -               | -                   | 24                    | 24  | 48    | 3                | 6   | 9     | 21             | 18  | 39    | 40%             | 8                   |
| PA-8.1   | 210      | Single Family Detached Housing                       | 64    | DU       | 669    | 13                    | 37  | 50    | 0                | 0   | 0     | 13             | 37  | 50    | -               | -                   | 41                    | 24  | 65    | 9                | 3   | 12    | 32             | 21  | 53    | -               | -                   |
| PA-8.2   | 215      | Single Family Attached Housing                       | 96    | DU       | 681    | 11                    | 33  | 44    | 0                | 0   | 0     | 11             | 33  | 44    | -               | -                   | 28                    | 20  | 48    | 2                | 1   | 3     | 26             | 19  | 45    | -               | -                   |
| PA-9     | 520      | Elementary School                                    | 300   | Students | 681    | 120                   | 102 | 222   | 0                | 0   | 0     | 120            | 102 | 222   | -               | -                   | 22                    | 26  | 48    | 0                | 0   | 0     | 22             | 26  | 48    | -               | -                   |
| PA-10.1  | 210      | Single Family Detached Housing                       | 74    | DU       | 765    | 14                    | 43  | 57    | 0                | 0   | 0     | 14             | 43  | 57    | -               | -                   | 47                    | 28  | 75    | 10               | 4   | 14    | 37             | 24  | 61    | -               | -                   |
| PA-10.2  | 215      | Single Family Attached Housing                       | 111   | DU       | 795    | 13                    | 39  | 52    | 0                | 0   | 0     | 13             | 39  | 52    | -               | -                   | 34                    | 23  | 57    | 7                | 3   | 10    | 27             | 20  | 47    | -               | -                   |
| PA-11.1  | 210      | Single Family Detached Housing                       | 82    | DU       | 841    | 16                    | 46  | 62    | 0                | 0   | 0     | 16             | 46  | 62    | -               | -                   | 52                    | 30  | 82    | 11               | 4   | 15    | 41             | 26  | 67    | -               | -                   |
| PA-11.2  | 215      | Single Family Attached Housing                       | 124   | DU       | 894    | 15                    | 44  | 59    | 0                | 0   | 0     | 15             | 44  | 59    | -               | -                   | 38                    | 26  | 64    | 8                | 4   | 12    | 30             | 22  | 52    | -               | -                   |
| PA-12.1  | 210      | Single Family Detached Housing                       | 82    | DU       | 841    | 16                    | 46  | 62    | 0                | 0   | 0     | 16             | 46  | 62    | -               | -                   | 52                    | 30  | 82    | 11               | 4   | 15    | 41             | 26  | 67    | -               | -                   |
| PA-12.2  | 215      | Single Family Attached Housing                       | 123   | DU       | 887    | 15                    | 43  | 58    | 0                | 0   | 0     | 15             | 43  | 58    | -               | -                   | 38                    | 26  | 64    | 8                | 4   | 12    | 30             | 22  | 52    | -               | -                   |
| PA-13.1  | 210      | Single Family Detached Housing                       | 64    | DU       | 669    | 13                    | 37  | 50    | 0                | 0   | 0     | 13             | 37  | 50    | -               | -                   | 41                    | 24  | 65    | 9                | 3   | 12    | 32             | 21  | 53    | -               | -                   |
| PA-13.2  | 215      | Single Family Attached Housing                       | 96    | DU       | 681    | 11                    | 33  | 44    | 0                | 0   | 0     | 11             | 33  | 44    | -               | -                   | 28                    | 20  | 48    | 6                | 3   | 9     | 22             | 17  | 39    | -               | -                   |
| PA-13.3  | 220      | Multifamily Housing (Low-Rise)                       | 338   | DU       | 2,242  | 31                    | 97  | 128   | 1                | 1   | 2     | 30             | 96  | 126   | -               | -                   | 105                   | 61  | 166   | 23               | 9   | 32    | 82             | 52  | 134   | -               | -                   |
| PA-14.1  | 210      | Single Family Detached Housing                       | 34    | DU       | 374    | 7                     | 21  | 28    | 0                | 0   | 0     | 7              | 21  | 28    | -               | -                   | 23                    | 13  | 36    | 5                | 2   | 7     | 18             | 11  | 29    | -               | -                   |
| PA-14.2  | 215      | Single Family Attached Housing                       | 52    | DU       | 346    | 5                     | 16  | 21    | 0                | 0   | 0     | 5              | 16  | 21    | -               | -                   | 12                    | 9   | 21    | 3                | 1   | 4     | 9              | 8   | 17    | -               | -                   |
| PA-14.3  | 220      | Multifamily Housing (Low-Rise)                       | 320   | DU       | 2,127  | 29                    | 93  | 122   | 1                | 1   | 2     | 28             | 92  | 120   | -               | -                   | 100                   | 58  | 158   | 22               | 8   | 30    | 78             | 50  | 128   | -               | -                   |
| PA-14.4  | 821      | Shopping Plaza with Supermarket                      | 130   | KSF      | 11,418 | 285                   | 174 | 459   | 14               | 5   | 19    | 271            | 169 | 440   | -               | -                   | 536                   | 580 | 1,116 | 61               | 144 | 205   | 475            | 436 | 911   | -               | -                   |
| PA-15.1  | 210      | Single Family Detached Housing                       | 279   | DU       | 2,593  | 48                    | 142 | 190   | 1                | 1   | 2     | 47             | 141 | 188   | -               | -                   | 164                   | 97  | 261   | 35               | 14  | 49    | 129            | 83  | 212   | -               | -                   |
| PA-15.2  | 215      | Single Family Attached Housing                       | 418   | DU       | 3,135  | 53                    | 159 | 212   | 1                | 2   | 3     | 52             | 157 | 209   | -               | -                   | 142                   | 99  | 241   | 30               | 15  | 45    | 112            | 84  | 196   | -               | -                   |
| PA-15.3  | 220      | Multifamily Housing (Low-Rise)                       | 90    | DU       | 652    | 12                    | 39  | 51    | 0                | 0   | 0     | 12             | 39  | 51    | -               | -                   | 37                    | 22  | 59    | 8                | 3   | 11    | 29             | 19  | 48    | -               | -                   |
| PA-16.1  | 220      | Multifamily Housing (Low-Rise)                       | 345   | DU       | 2,287  | 31                    | 99  | 130   | 1                | 1   | 2     | 30             | 98  | 128   | -               | -                   | 106                   | 63  | 169   | 23               | 9   | 32    | 83             | 54  | 137   | -               | -                   |
| PA-16.2  | 820      | Strip Retail Plaza                                   | 257   | KSF      | 12,574 | 177                   | 108 | 285   | 10               | 3   | 13    | 167            | 105 | 272   | -               | -                   | 535                   | 579 | 1,114 | 61               | 143 | 204   | 474            | 436 | 910   | 40%             | 190                 |
| PA-16.3  | 310      | Hotel  | 375   | Rooms    | 3,641  | 101                   | 79  | 180   | 0                | 11  | 11    | 101            | 68  | 169   | -               | -                   | 127                   | 123 | 250   | 37               | 20  | 57    | 90             | 103 | 193   | -               | -                   |
| PA-16.4  | 945      | Gas Station  | 16    | Pumps    | 3,383  | 128                   | 129 | 257   | 0                | 0   | 0     | 128            | 129 | 257   | 63%             | 81                  | 147                   | 148 | 295   | 0                | 0   | 0     | 147            | 148 | 295   | 57%             | 84                  |
| PA-17.1  | 154      | High-Cube Transload and Short-Term Storage Warehouse | 250   | KSF      | 350    | 15                    | 5   | 20    | 0                | 0   | 0     | 15             | 5   | 20    | -               | -                   | 7                     | 18  | 25    | 0                | 0   | 0     | 7              | 18  | 25    | -               | -                   |
| PA-17.2  | 110      | General Light Industrial                             | 250   | KSF      | 990    | 153                   | 21  | 174   | 0                | 0   | 0     | 153            | 21  | 174   | -               | -                   | 11                    | 67  | 78    | 0                | 0   | 0     | 11             | 67  | 78    | -               | -                   |
| PA-18.1  | 154      | High-Cube Transload and Short-Term Storage Warehouse | 100   | KSF      | 140    | 6                     | 2   | 8     | 0                | 0   | 0     | 6              | 2   | 8     | -               | -                   | 3                     | 7   | 10    | 0                | 0   | 0     | 3              | 7   | 10    | -               | -                   |
| PA-18.2  | 110      | General Light Industrial                             | 100   | KSF      | 426    | 63                    | 9   | 72    | 0                | 0   | 0     | 63             | 9   | 72    | -               | -                   | 6                     | 34  | 40    | 0                | 0   | 0     | 6              | 34  | 40    | -               | -                   |
| PA-19.1  | 154      | High-Cube Transload and Short-Term Storage Warehouse | 375   | KSF      | 525    | 23                    | 7   | 30    | 0                | 0   | 0     | 23             | 7   | 30    | -               | -                   | 11                    | 27  | 38    | 0                | 0   | 0     | 11             | 27  | 38    | -               | -                   |
| PA-19.2  | 110      | General Light Industrial                             | 375   | KSF      | 1,460  | 228                   | 31  | 259   | 0                | 0   | 0     | 228            | 31  | 259   | -               | -                   | 15                    | 89  | 104   | 0                | 0   | 0     | 15             | 89  | 104   | -               | -                   |
| PA-20.1  | 154      | High-Cube Transload and Short-Term Storage Warehouse | 375   | KSF      | 525    | 23                    | 7   | 30    | 0                | 0   | 0     | 23             | 7   | 30    | -               | -                   | 11                    | 27  | 38    | 0                | 0   | 0     | 11             | 27  | 38    | -               | -                   |
| PA-20.2  | 110      | General Light Industrial                             | 375   | KSF      | 1,460  | 228                   | 31  | 259   | 0                | 0   | 0     | 228            | 31  | 259   | -               | -                   | 15                    | 89  | 104   | 0</              |     |       |                |     |       |                 |                     |

| NCHRP 684 Internal Trip Capture Estimation Tool |                     |  |  |               |                         |
|---|---------------------|--|--|---------------|-------------------------|
| Project Name:                                   | Windler TIA         |  |  | Organization: | Felsburg Holt & Ullevig |
| Project Location:                               | Aurora, CO          |  |  | Performed By: | TL                      |
| Scenario Description:                           | Full Buildout       |  |  | Date:         | 12/4/2024               |
| Analysis Year:                                  | 2040                |  |  | Checked By:   |                         |
| Analysis Period:                                | AM Street Peak Hour |  |  | Date:         |                         |

| Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate) |   |          |       |                                      |          |         |
|--|---|----------|-------|--------------------------------------|----------|---------|
| Land Use   | Development Data (For Information Only) |          |       | Estimated Vehicle-Trips <sup>3</sup> |          |         |
|  | ITE LUCs <sup>1</sup>                   | Quantity | Units | Total                                | Entering | Exiting |
| Office   |   |          |       | 0                                    |          |         |
| Retail   | 820,821,822                             | 974      | KSF   | 1,108                                | 686      | 422     |
| Restaurant   | -                                       | -        | -     | 0                                    | 0        | 0       |
| Cinema/Entertainment   | -                                       | -        | -     | 0                                    | 0        | 0       |
| Residential  | 210, 215, 220                           | 5,782    | DU    | 2,662                                | 661      | 2,001   |
| Hotel  | 310                                     | 500      | Rooms | 235                                  | 132      | 103     |
| All Other Land Uses <sup>2</sup>   | 0, 154, 520, 9                          | 2,200    | KSF   | 1,588                                | 1,115    | 473     |
|  |   |          |       | 5,593                                | 2,594    | 2,999   |

| Table 2-A: Mode Split and Vehicle Occupancy Estimates |                        |           |                 |                        |           |                 |
|---|------------------------|-----------|-----------------|------------------------|-----------|-----------------|
| Land Use  | Entering Trips         |           |                 | Exiting Trips          |           |                 |
|   | Veh. Occ. <sup>4</sup> | % Transit | % Non-Motorized | Veh. Occ. <sup>4</sup> | % Transit | % Non-Motorized |
| Office  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Retail  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Restaurant  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Cinema/Entertainment                                  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Residential   | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Hotel   | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| All Other Land Uses <sup>2</sup>                      | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |

| Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance) |                  |        |            |                      |             |       |
|---|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)   | Destination (To) |        |            |                      |             |       |
|   | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office  |                  |        |            |                      |             |       |
| Retail  |                  |        |            |                      |             |       |
| Restaurant  |                  |        |            |                      |             |       |
| Cinema/Entertainment  |                  |        |            |                      |             |       |
| Residential   |                  |        |            |                      |             |       |
| Hotel   |                  |        |            |                      |             |       |

| Table 4-A: Internal Person-Trip Origin-Destination Matrix* |                  |        |            |                      |             |       |
|--|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)  | Destination (To) |        |            |                      |             |       |
|  | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office   |                  | 0      | 0          | 0                    | 0           | 0     |
| Retail   | 0                |        | 0          | 0                    | 13          | 0     |
| Restaurant   | 0                | 0      |            | 0                    | 0           | 0     |
| Cinema/Entertainment                                       | 0                | 0      | 0          |                      | 0           | 0     |
| Residential  | 0                | 20     | 0          | 0                    |             | 0     |
| Hotel  | 0                | 14     | 0          | 0                    | 0           |       |

| Table 5-A: Computations Summary           |       |          |         |
|---|-------|----------|---------|
|   | Total | Entering | Exiting |
| All Person-Trips                          | 5,593 | 2,594    | 2,999   |
| Internal Capture Percentage               | 2%    | 2%       | 2%      |
| External Vehicle-Trips <sup>5</sup>       | 5,499 | 2,547    | 2,952   |
| External Transit-Trips <sup>6</sup>       | 0     | 0        | 0       |
| External Non-Motorized Trips <sup>6</sup> | 0     | 0        | 0       |

| Table 6-A: Internal Trip Capture Percentages by Land Use |                |               |
|--|----------------|---------------|
| Land Use   | Entering Trips | Exiting Trips |
| Office   | N/A            | N/A           |
| Retail   | 5%             | 3%            |
| Restaurant   | N/A            | N/A           |
| Cinema/Entertainment                                     | N/A            | N/A           |
| Residential  | 2%             | 1%            |
| Hotel  | 0%             | 14%           |

|   |
|---|
| <sup>1</sup> Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.   |
| <sup>2</sup> Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.   |
| <sup>3</sup> Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i> ).   |
| <sup>4</sup> Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete. |
| <sup>5</sup> Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.  |
| <sup>6</sup> Person-Trips   |
| *Indicates computation that has been rounded to the nearest whole number.   |
| Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1  |

|                         |                     |
|-------------------------|---------------------|
| <b>Project Name:</b>    | Windler TIA         |
| <b>Analysis Period:</b> | AM Street Peak Hour |

| Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends |                               |               |               |                              |               |               |
|--|-------------------------------|---------------|---------------|------------------------------|---------------|---------------|
| Land Use   | Table 7-A (D): Entering Trips |               |               | Table 7-A (O): Exiting Trips |               |               |
|  | Veh. Occ.                     | Vehicle-Trips | Person-Trips* | Veh. Occ.                    | Vehicle-Trips | Person-Trips* |
| Office   | 1.00                          | 0             | 0             | 1.00                         | 0             | 0             |
| Retail   | 1.00                          | 686           | 686           | 1.00                         | 422           | 422           |
| Restaurant   | 1.00                          | 0             | 0             | 1.00                         | 0             | 0             |
| Cinema/Entertainment   | 1.00                          | 0             | 0             | 1.00                         | 0             | 0             |
| Residential  | 1.00                          | 661           | 661           | 1.00                         | 2001          | 2001          |
| Hotel  | 1.00                          | 132           | 132           | 1.00                         | 103           | 103           |

| Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin) |                  |        |            |                      |             |       |
|--|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)  | Destination (To) |        |            |                      |             |       |
|  | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office   |                  | 0      | 0          | 0                    | 0           | 0     |
| Retail   | 122              |        | 55         | 0                    | 59          | 0     |
| Restaurant   | 0                | 0      |            | 0                    | 0           | 0     |
| Cinema/Entertainment   | 0                | 0      | 0          |                      | 0           | 0     |
| Residential  | 40               | 20     | 400        | 0                    |             | 0     |
| Hotel  | 77               | 14     | 9          | 0                    | 0           |       |

| Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination) |                  |        |            |                      |             |       |
|---|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)   | Destination (To) |        |            |                      |             |       |
|   | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office  |                  | 220    | 0          | 0                    | 0           | 0     |
| Retail  | 0                |        | 0          | 0                    | 13          | 0     |
| Restaurant  | 0                | 55     |            | 0                    | 33          | 5     |
| Cinema/Entertainment  | 0                | 0      | 0          |                      | 0           | 0     |
| Residential   | 0                | 117    | 0          | 0                    |             | 0     |
| Hotel   | 0                | 27     | 0          | 0                    | 0           |       |

| Table 9-A (D): Internal and External Trips Summary (Entering Trips) |                       |          |       |                         |                      |                            |
|---|-----------------------|----------|-------|-------------------------|----------------------|----------------------------|
| Destination Land Use  | Person-Trip Estimates |          |       | External Trips by Mode* |                      |                            |
|   | Internal              | External | Total | Vehicles <sup>1</sup>   | Transit <sup>2</sup> | Non-Motorized <sup>2</sup> |
| Office  | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Retail  | 34                    | 652      | 686   | 652                     | 0                    | 0                          |
| Restaurant  | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Cinema/Entertainment  | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Residential   | 13                    | 648      | 661   | 648                     | 0                    | 0                          |
| Hotel   | 0                     | 132      | 132   | 132                     | 0                    | 0                          |
| All Other Land Uses <sup>3</sup>                                    | 0                     | 1115     | 1115  | 1115                    | 0                    | 0                          |

| Table 9-A (O): Internal and External Trips Summary (Exiting Trips) |                       |          |       |                         |                      |                            |
|--|-----------------------|----------|-------|-------------------------|----------------------|----------------------------|
| Origin Land Use  | Person-Trip Estimates |          |       | External Trips by Mode* |                      |                            |
|  | Internal              | External | Total | Vehicles <sup>1</sup>   | Transit <sup>2</sup> | Non-Motorized <sup>2</sup> |
| Office   | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Retail   | 13                    | 409      | 422   | 409                     | 0                    | 0                          |
| Restaurant   | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Cinema/Entertainment   | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Residential  | 20                    | 1981     | 2001  | 1981                    | 0                    | 0                          |
| Hotel  | 14                    | 89       | 103   | 89                      | 0                    | 0                          |
| All Other Land Uses <sup>3</sup>                                   | 0                     | 473      | 473   | 473                     | 0                    | 0                          |

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

<sup>2</sup>Person-Trips

<sup>3</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

\*Indicates computation that has been rounded to the nearest whole number.

| NCHRP 684 Internal Trip Capture Estimation Tool |                     |  |  |               |                         |
|---|---------------------|--|--|---------------|-------------------------|
| Project Name:                                   | Windler TIA         |  |  | Organization: | Felsburg Holt & Ullevig |
| Project Location:                               | Aurora, CO          |  |  | Performed By: | TL                      |
| Scenario Description:                           | Full Buildout       |  |  | Date:         | 12/4/2024               |
| Analysis Year:                                  | 2040                |  |  | Checked By:   |                         |
| Analysis Period:                                | PM Street Peak Hour |  |  | Date:         |                         |

| Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate) |   |          |       |                                      |          |         |
|--|---|----------|-------|--------------------------------------|----------|---------|
| Land Use   | Development Data (For Information Only) |          |       | Estimated Vehicle-Trips <sup>3</sup> |          |         |
|  | ITE LUCs <sup>1</sup>                   | Quantity | Units | Total                                | Entering | Exiting |
| Office   |   |          |       | 0                                    |          |         |
| Retail   | 820,821,822                             | 974      | KSF   | 3,582                                | 1,724    | 1,858   |
| Restaurant   | -                                       | -        | -     | 0                                    | 0        | 0       |
| Cinema/Entertainment   | -                                       | -        | -     | 0                                    | 0        | 0       |
| Residential  | 210, 215, 220                           | 5,782    | DU    | 3,303                                | 2,037    | 1,266   |
| Hotel  | 310                                     | 500      | Rooms | 315                                  | 160      | 155     |
| All Other Land Uses <sup>2</sup>   | 0, 154, 520, 9                          | 2,200    | KSF   | 1,075                                | 395      | 680     |
|  |   |          |       | 8,275                                | 4,316    | 3,959   |

| Table 2-P: Mode Split and Vehicle Occupancy Estimates |                        |           |                 |                        |           |                 |
|---|------------------------|-----------|-----------------|------------------------|-----------|-----------------|
| Land Use  | Entering Trips         |           |                 | Exiting Trips          |           |                 |
|   | Veh. Occ. <sup>4</sup> | % Transit | % Non-Motorized | Veh. Occ. <sup>4</sup> | % Transit | % Non-Motorized |
| Office  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Retail  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Restaurant  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Cinema/Entertainment                                  | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Residential   | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| Hotel   | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |
| All Other Land Uses <sup>2</sup>                      | 1.00                   | 0%        | 0%              | 1.00                   | 0%        | 0%              |

| Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance) |                  |        |            |                      |             |       |
|---|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)   | Destination (To) |        |            |                      |             |       |
|   | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office  |                  | 0      | 0          |                      | 0           |       |
| Retail  |                  |        |            |                      | 0           |       |
| Restaurant  |                  |        |            |                      | 0           |       |
| Cinema/Entertainment  |                  |        |            |                      | 0           |       |
| Residential   |                  | 0      | 0          |                      |             |       |
| Hotel   |                  |        |            |                      | 0           |       |

| Table 4-P: Internal Person-Trip Origin-Destination Matrix* |                  |        |            |                      |             |       |
|--|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)  | Destination (To) |        |            |                      |             |       |
|  | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office   |                  | 0      | 0          | 0                    | 0           | 0     |
| Retail   | 0                |        | 0          | 0                    | 483         | 27    |
| Restaurant   | 0                | 0      |            | 0                    | 0           | 0     |
| Cinema/Entertainment                                       | 0                | 0      | 0          |                      | 0           | 0     |
| Residential  | 0                | 172    | 0          | 0                    |             | 19    |
| Hotel  | 0                | 25     | 0          | 0                    | 0           |       |

| Table 5-P: Computations Summary           |       |          |         |
|---|-------|----------|---------|
|   | Total | Entering | Exiting |
| All Person-Trips                          | 8,275 | 4,316    | 3,959   |
| Internal Capture Percentage               | 18%   | 17%      | 18%     |
|   |       |          |         |
| External Vehicle-Trips <sup>5</sup>       | 6,823 | 3,590    | 3,233   |
| External Transit-Trips <sup>6</sup>       | 0     | 0        | 0       |
| External Non-Motorized Trips <sup>6</sup> | 0     | 0        | 0       |

| Table 6-P: Internal Trip Capture Percentages by Land Use |                |               |
|--|----------------|---------------|
| Land Use   | Entering Trips | Exiting Trips |
| Office   | N/A            | N/A           |
| Retail   | 11%            | 27%           |
| Restaurant   | N/A            | N/A           |
| Cinema/Entertainment                                     | N/A            | N/A           |
| Residential  | 24%            | 15%           |
| Hotel  | 29%            | 16%           |

|   |
|---|
| <sup>1</sup> Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.                                       |
| <sup>2</sup> Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.             |
| <sup>3</sup> Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i> ).   |
| <sup>4</sup> Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made |
| <sup>5</sup> Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.  |
| <sup>6</sup> Person-Trips   |
| *Indicates computation that has been rounded to the nearest whole number.   |
| Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1  |

|                         |                     |
|-------------------------|---------------------|
| <b>Project Name:</b>    | Windler TIA         |
| <b>Analysis Period:</b> | PM Street Peak Hour |

| Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends |                               |               |               |                              |               |               |
|--|-------------------------------|---------------|---------------|------------------------------|---------------|---------------|
| Land Use   | Table 7-P (D): Entering Trips |               |               | Table 7-P (O): Exiting Trips |               |               |
|  | Veh. Occ.                     | Vehicle-Trips | Person-Trips* | Veh. Occ.                    | Vehicle-Trips | Person-Trips* |
| Office   | 1.00                          | 0             | 0             | 1.00                         | 0             | 0             |
| Retail   | 1.00                          | 1724          | 1724          | 1.00                         | 1858          | 1858          |
| Restaurant   | 1.00                          | 0             | 0             | 1.00                         | 0             | 0             |
| Cinema/Entertainment   | 1.00                          | 0             | 0             | 1.00                         | 0             | 0             |
| Residential  | 1.00                          | 2037          | 2037          | 1.00                         | 1266          | 1266          |
| Hotel  | 1.00                          | 160           | 160           | 1.00                         | 155           | 155           |

| Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin) |                  |        |            |                      |             |       |
|--|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)  | Destination (To) |        |            |                      |             |       |
|  | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office   |                  | 0      | 0          | 0                    | 0           | 0     |
| Retail   | 37               |        | 539        | 74                   | 483         | 93    |
| Restaurant   | 0                | 0      |            | 0                    | 0           | 0     |
| Cinema/Entertainment   | 0                | 0      | 0          |                      | 0           | 0     |
| Residential  | 51               | 532    | 266        | 0                    |             | 38    |
| Hotel  | 0                | 25     | 105        | 0                    | 3           |       |

| Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination) |                  |        |            |                      |             |       |
|---|------------------|--------|------------|----------------------|-------------|-------|
| Origin (From)   | Destination (To) |        |            |                      |             |       |
|   | Office           | Retail | Restaurant | Cinema/Entertainment | Residential | Hotel |
| Office  |                  | 138    | 0          | 0                    | 81          | 0     |
| Retail  | 0                |        | 0          | 0                    | 937         | 27    |
| Restaurant  | 0                | 862    |            | 0                    | 326         | 114   |
| Cinema/Entertainment  | 0                | 69     | 0          |                      | 81          | 2     |
| Residential   | 0                | 172    | 0          | 0                    |             | 19    |
| Hotel   | 0                | 34     | 0          | 0                    | 0           |       |

| Table 9-P (D): Internal and External Trips Summary (Entering Trips) |                       |          |       |                         |                      |                            |
|---|-----------------------|----------|-------|-------------------------|----------------------|----------------------------|
| Destination Land Use  | Person-Trip Estimates |          |       | External Trips by Mode* |                      |                            |
|   | Internal              | External | Total | Vehicles <sup>1</sup>   | Transit <sup>2</sup> | Non-Motorized <sup>2</sup> |
| Office  | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Retail  | 197                   | 1527     | 1724  | 1527                    | 0                    | 0                          |
| Restaurant  | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Cinema/Entertainment  | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Residential   | 483                   | 1554     | 2037  | 1554                    | 0                    | 0                          |
| Hotel   | 46                    | 114      | 160   | 114                     | 0                    | 0                          |
| All Other Land Uses <sup>3</sup>                                    | 0                     | 395      | 395   | 395                     | 0                    | 0                          |

| Table 9-P (O): Internal and External Trips Summary (Exiting Trips) |                       |          |       |                         |                      |                            |
|--|-----------------------|----------|-------|-------------------------|----------------------|----------------------------|
| Origin Land Use  | Person-Trip Estimates |          |       | External Trips by Mode* |                      |                            |
|  | Internal              | External | Total | Vehicles <sup>1</sup>   | Transit <sup>2</sup> | Non-Motorized <sup>2</sup> |
| Office   | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Retail   | 510                   | 1348     | 1858  | 1348                    | 0                    | 0                          |
| Restaurant   | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Cinema/Entertainment   | 0                     | 0        | 0     | 0                       | 0                    | 0                          |
| Residential  | 191                   | 1075     | 1266  | 1075                    | 0                    | 0                          |
| Hotel  | 25                    | 130      | 155   | 130                     | 0                    | 0                          |
| All Other Land Uses <sup>3</sup>                                   | 0                     | 680      | 680   | 680                     | 0                    | 0                          |

<sup>1</sup>Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

<sup>2</sup>Person-Trips

<sup>3</sup>Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

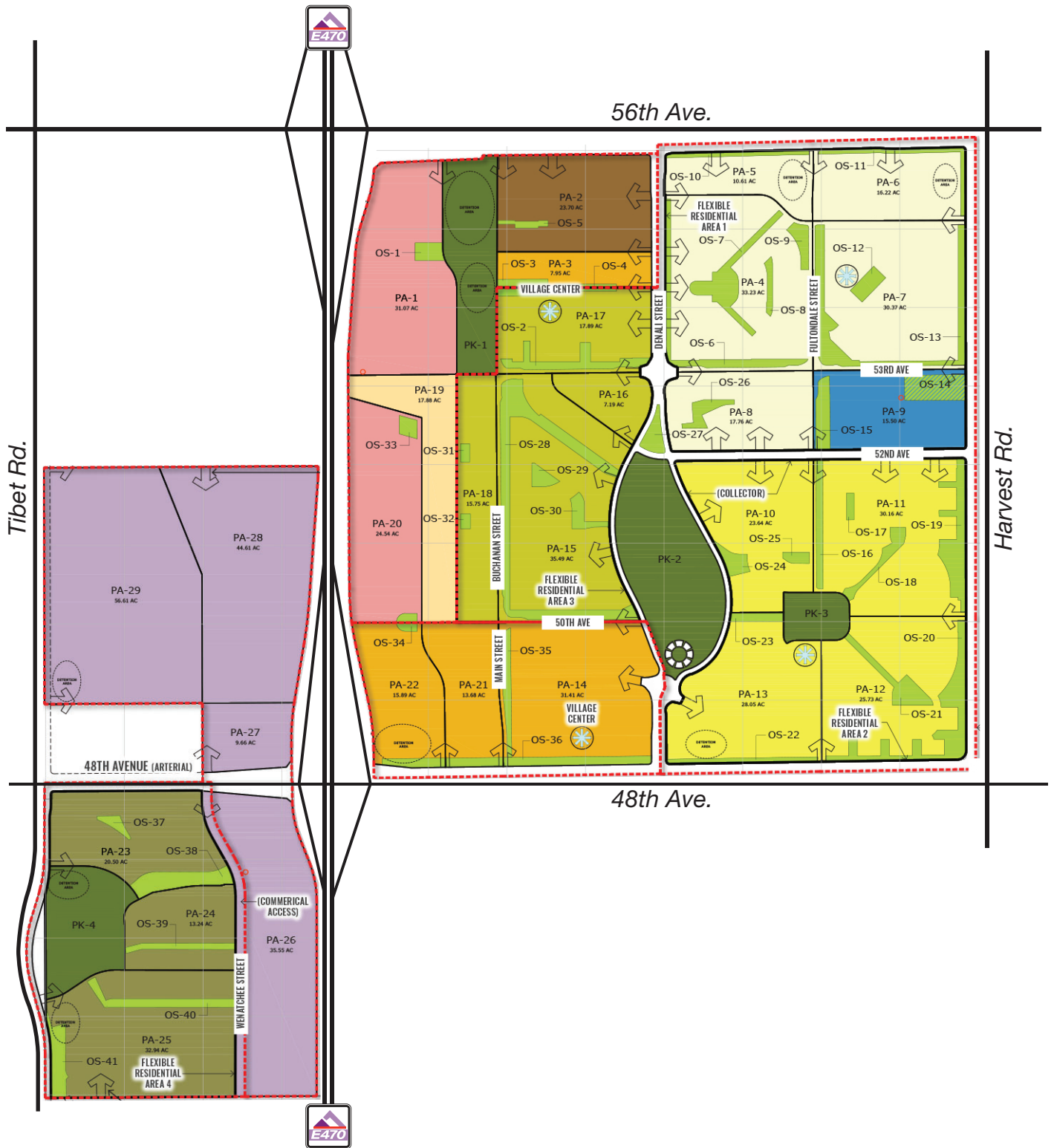
\*Indicates computation that has been rounded to the nearest whole number.

## ITE Trip Generation Rates and Equations

| Land Use  | ITE Code | Unit     | Daily                            | Peak | Equations & Rates                | Distributions |     |
|---|----------|----------|----------------------------------|------|----------------------------------|---------------|-----|
|   |          |          |                                  |      |                                  | In            | Out |
| General Light Industrial                            | 110      | KSF      | $T=3.76 \times X+50.47$          | AM   | $T=0.68 \times X+3.81$           | 88%           | 12% |
|   |          |          |                                  | PM   | $\ln(T)=0.72 \times \ln(X)+0.38$ | 14%           | 86% |
| High-Cube Transload & Short-Term Storage Warehouse  | 154      | KSF      | $T=6.41 \times X+75.31$          | AM   | $T=0.31 \times X+22.85$          | 24%           | 76% |
|   |          |          |                                  | PM   | $T=0.43 \times X+20.55$          | 63%           | 37% |
| Single-family Detached                              | 210      | DU       | $\ln(T)=0.92 \times \ln(X)+2.68$ | AM   | $\ln(T)=0.91 \times \ln(T)+0.12$ | 26%           | 74% |
|   |          |          |                                  | PM   | $\ln(T)=0.94 \times \ln(X)+0.27$ | 63%           | 37% |
| Single-family Attached                              | 215      | DU       | $T=7.62 \times X-50.48$          | AM   | $T=0.52 \times X-5.70$           | 25%           | 75% |
|   |          |          |                                  | PM   | $T=0.60 \times X-3.93$           | 59%           | 41% |
| Multifamily (Low-Rise)                              | 220      | DU       | $T=6.41 \times X+75.31$          | AM   | $T=0.31 \times X+22.85$          | 24%           | 76% |
|   |          |          |                                  | PM   | $T=0.43 \times X+20.55$          | 63%           | 37% |
| Elementary School                                   | 520      | Students | $T=2.27 \times X$                | AM   | $T=0.74 \times X$                | 54%           | 46% |
|   |          |          |                                  | PM   | $T=0.16 \times X$                | 46%           | 54% |
| General Office                                      | 710      | KSF      | $T=10.84 \times X$               | AM   | $T=1.52 \times X$                | 88%           | 12% |
|   |          |          |                                  | PM   | $T=1.44 \times X$                | 17%           | 83% |
| Shopping Center (>150 KSF)                          | 820      | KSF      | $T=10.84 \times X$               | AM   | $T=1.52 \times X$                | 88%           | 12% |
|   |          |          |                                  | PM   | $T=1.44 \times X$                | 17%           | 83% |
| Shopping Plaza (40-150 KSF) with Supermarket anchor | 821      | KSF      | $T=67.52 \times X$               | AM   | $T=1.73 \times X$                | 62%           | 38% |
|   |          |          |                                  | PM   | $T=5.19 \times X$                | 49%           | 51% |
| Strip Retail Plaza (<40KSF)                         | 822      | KSF      | $T=42.2 \times X+229.68$         | AM   | $T=2.36 \times X$                | 60%           | 40% |
|   |          |          |                                  | PM   | $T=6.59 \times X$                | 50%           | 50% |
| Hotel   | 310      | Rooms    | $T=10384 \times X-423.51$        | AM   | $T=0.50 \times X-7.45$           | 56%           | 44% |
|   |          |          |                                  | PM   | $T=0.74 \times X-27.89$          | 51%           | 49% |
| Gas Station   | 945      | Pumps    | $T=158.28 \times X+850.23$       | AM   | $T=16.06 \times X$               | 50%           | 50% |
|   |          |          |                                  | PM   | $T=18.42 \times X$               | 50%           | 50% |
| DU = Dwelling Units    KSF = 1,000 SF               |          |          |                                  |      |                                  |               |     |

# Site Trip Generation Comparison

| MTIS           |   | Master Plan Amendment |   | Daily Total |           | AM Peak Hour External Total |           | PM Peak Hour External Total |           |
|----------------|---|-----------------------|---|-------------|-----------|-----------------------------|-----------|-----------------------------|-----------|
| Map Code       | Land Use Description  | Map Code              | Land Use Discription  | MTIS        | Amendment | MTIS                        | Amendment | MTIS                        | Amendment |
| PA-1           | Shopping Center   | PA-1                  | Shopping Center, Hotel, Gas Station   | 14,689      | 17,227    | 241                         | 591       | 1,061                       | 1,288     |
| PA-2           | Multifamily Housing (Low-Rise)  | PA-2                  | Multifamily Housing (Low-Rise)  | 4,633       | 2,018     | 238                         | 114       | 273                         | 123       |
| PA-3           | Single Family Detached Housing, Strip Retail Plaza                                      | PA-3                  | Single Family Detached Housing, Single Family Attached Housing, Strip Retail Plaza  | 3,609       | 4,618     | 205                         | 283       | 320                         | 356       |
| PA-17          | Single Family Detached Housing, Strip Retail Plaza                                      |                       |   |             |           |                             |           |                             |           |
| PA-4           | Single Family Detached Housing  | PA-4                  | Single Family Detached Housing, Single Family Attached Housing  | 2,908       | 2,645     | 202                         | 183       | 245                         | 185       |
| PA-5           | Multifamily Housing (Low-Rise)  | PA-5                  | Multifamily Housing (Low-Rise)  | 1,537       | 1,537     | 91                          | 93        | 102                         | 97        |
| PA-6           | Multifamily Housing (Low-Rise)  | PA-6                  | Multifamily Housing (Low-Rise)  | 2,139       | 2,139     | 120                         | 121       | 136                         | 129       |
| PA-7           | Single Family Detached Housing, Strip Retail Plaza                                      | PA-7                  | Single Family Detached Housing, Single Family Attached Housing, Strip Retail Plaza  | 2,949       | 2,700     | 188                         | 166       | 252                         | 197       |
| PA-8           | Single Family Detached Housing  | PA-8                  | Single Family Detached Housing, Single Family Attached Housing  | 1,555       | 1,350     | 112                         | 94        | 132                         | 98        |
| PA-9           | Elementary School   | PA-9                  | Elementary School   | 681         | 681       | 140                         | 222       | 17                          | 48        |
| PA-10          | Single Family Detached Housing  | PA-10                 | Single Family Detached Housing, Single Family Attached Housing  | 1,777       | 1,560     | 128                         | 109       | 151                         | 108       |
| PA-11          | Single Family Detached Housing  | PA-11                 | Single Family Detached Housing, Single Family Attached Housing  | 1,962       | 1,735     | 141                         | 121       | 167                         | 119       |
| PA-12          | Single Family Detached Housing  | PA-12                 | Single Family Detached Housing, Single Family Attached Housing  | 1,953       | 1,728     | 136                         | 120       | 166                         | 119       |
| PA-13          | Single Family Detached Housing, Multifamily Housing (Low-Rise)                          | PA-13                 | Single Family Detached Housing, Single Family Attached Housing, Multifamily Housing (Low-Rise)                                  | 3,797       | 3,592     | 237                         | 220       | 274                         | 226       |
| PA-14          | Single Family Detached Housing, Multifamily Housing (Low-Rise), General Office Building | PA-14                 | Single Family Detached Housing, Single Family Attached Housing, Multifamily Housing (Low-Rise), Shopping Plaza with Supermarket | 11,829      | 14,265    | 678                         | 609       | 971                         | 1,085     |
| PA-21          | Multifamily Housing (Low-Rise), Shopping Plaza  |                       |   |             |           |                             |           |                             |           |
| PA-15          | Single Family Detached Housing  | PA-15                 | Single Family Detached Housing, Single Family Attached Housing, Multifamily Housing (Low-Rise)                                  | 4,897       | 6,380     | 344                         | 448       | 418                         | 456       |
| PA-16          | Single Family Detached Housing  |                       |   |             |           |                             |           |                             |           |
| PA-18          | Single Family Detached Housing  |                       |   |             |           |                             |           |                             |           |
| PA-19          | Single Family Detached Housing  | PA-16                 | Multifamily Housing (Low-Rise), Strip Retail Plaza, Hotel, Gas Station  | 16,177      | 21,885    | 644                         | 826       | 1,209                       | 1,535     |
| PA-20          | General Office Building   |                       |   |             |           |                             |           |                             |           |
| PA-22          | Shopping Center, Multifamily Housing (Low-Rise)   |                       |   |             |           |                             |           |                             |           |
| PA-23          | Single Family Detached Housing  | PA-23                 | Single Family Detached Housing, Single Family Attached Housing  | 1,988       | 1,762     | 140                         | 123       | 170                         | 122       |
| PA-24          | Single Family Detached Housing  | PA-24                 | Single Family Detached Housing, Single Family Attached Housing  | 1,175       | 995       | 85                          | 68        | 99                          | 66        |
| PA-25          | Single Family Detached Housing  | PA-25                 | Single Family Detached Housing, Single Family Attached Housing  | 2,568       | 2,019     | 179                         | 137       | 216                         | 140       |
| PA-26          | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial          | PA-17                 | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial  | 1,340       | 1,340     | 194                         | 194       | 103                         | 103       |
| PA-27          | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial          | PA-18                 | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial  | 566         | 566       | 80                          | 80        | 50                          | 50        |
| PA-28          | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial          | PA-19                 | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial  | 1,985       | 1,985     | 289                         | 289       | 142                         | 142       |
| PA-29          | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial          | PA-20                 | High-Cube Transload and Short-Term Storage Warehouse, General Light Industrial  | 1,985       | 1,985     | 289                         | 289       | 142                         | 142       |
| Total Vehicles |   |                       |   | 88,699      | 96,712    | 5,101                       | 5,500     | 6,816                       | 6,934     |



APPENDIX B.      QUEUE LENGTH COMPARISON

| Location   | Movement       | 95% Queue Length (ft)                   |   | Recommended Storage Length (ft)<br>MTIS/Update | SHAC Recommendation (ft) |
|--|----------------|---|---|--|--------------------------|
|  |                | Future (2040) MTIS<br>(AM Peak/PM Peak) | Future (2040) Update<br>(AM Peak/PM Peak) |  |                          |
| 1. 56th Avenue & Biloxi Street                               | NB Left-turn   | 120 / 151                               | 137 / 157                                 | 175  | 175                      |
|  | NB Right-turn  | 28 / 27                                 | 30 / 27                                   | Continuous                                     | Continuous               |
|  | EB Through*    | 83 / 598                                | 98 / 597                                  | Continuous                                     | Continuous               |
|  | WB Through     | 138 / 189                               | 156 / 194                                 | Continuous                                     | Continuous               |
|  | WB Left-turn   | 5 / 11                                  | 7 / 11                                    | 50   | 50                       |
| 3. 56th Avenue & Denali Boulevard                            | NB Left-turn** | 331 / 255                               | 271 / 218                                 | 325 / 300                                      | 750                      |
|  | NB Through     | 327 / 256                               | 35 / 18                                   | Continuous                                     | Continuous               |
|  | NB Right-turn  | 89 / 44                                 | 193 / 102                                 | Continuous                                     | Continuous               |
|  | EB Left-turn   | 64 / 29                                 | 63 / 30                                   | 75   | 75                       |
|  | EB Through     | 314 / 312                               | 313 / 308                                 | Continuous                                     | Continuous               |
|  | EB Right-turn  | 20 / 46                                 | 38 / 50                                   | 150  | 775                      |
|  | SB Left-turn   | 46 / 58                                 | 51 / 58                                   | 50   | 50                       |
|  | SB Through     | 16 / 17                                 | 17 / 17                                   | Continuous                                     | Continuous               |
|  | SB Right-turn  | 0 / 8                                   | 0 / 8                                     | 50   | 75                       |
|  | WB Left-turn** | m151 / m193                             | m152 / m200                               | 225  | 450                      |
| 12. 48th Avenue & Denali Boulevard                           | WB Through*    | 168 / 317                               | 158 / 334                                 | Continuous                                     | Continuous               |
|  | NB Left-turn** | #401 / #389                             | #401 / #397                               | 400 / 425                                      | 875                      |
|  | NB Through     | 206 / 126                               | 215 / 126                                 | Continuous                                     | Continuous               |
|  | NB Right-turn  | 410 / #387                              | 410 / #375                                | 425  | 600                      |
|  | EB Left-turn** | m150 / m#357                            | m155 / m#350                              | 300 / 375                                      | 925                      |
|  | EB Through     | m449 / m#542                            | m408 / m#569                              | Continuous                                     | Continuous               |
|  | EB Right-turn  | m32 / m93                               | m38 / m112                                | 675  | 1025                     |
|  | SB Left-turn   | 204 / 242                               | #239 / #376                               | 375 / 400                                      | 375                      |
|  | SB Through     | 187 / 97                                | 193 / 138                                 | Continuous                                     | Continuous               |
|  | SB Right-turn  | #296 / 206                              | #290 / #337                               | 350  | 675                      |
| 13. 48th Avenue & Biloxi Street                              | WB Left-turn** | m#243 / #346                            | m#239 / #342                              | 350  | 700                      |
|  | WB Through     | 428 / 331                               | #510 / #355                               | Continuous                                     | Continuous               |
|  | WB Right-turn  | m38 / 16                                | m45 / 16                                  | 50   | 350                      |
|  | NB Left-turn** | #270 / #253                             | #270 / #225                               | 275  | 875                      |
|  | NB Through     | 0 / 17                                  | 0 / 17                                    | Continuous                                     | Continuous               |
|  | NB Right-turn  | 151 / #520                              | 151 / #299                                | Continuous                                     | Continuous               |
|  | EB Left-turn** | m#152 / m155                            | m139 / m202                               | 175 / 225                                      | 925                      |
|  | EB Through     | m#694 / m163                            | m#704 / m#765                             | Continuous                                     | Continuous               |
|  | EB Right-turn  | m45 / m0                                | m37 / m13                                 | 50   | 1025                     |
|  | SB Left-turn** | 138 / #277                              | 82 / #196                                 | 300  | 375                      |
| 14. 48th Avenue & Addison Street / 25. 48th Avenue & Drive 7 | SB Through     | 16 / 17                                 | 16 / 28                                   | Continuous                                     | Continuous               |
|  | SB Right-turn  | 60 / #267                               | 95 / #358                                 | Continuous                                     | Continuous               |
|  | WB Left-turn** | m#234 / m#161                           | m#230 / m125                              | 250  | 700                      |
|  | WB Through     | m699 / m442                             | #734 / m#752                              | Continuous                                     | Continuous               |
|  | SB Right-turn  | 50 / 280                                | 78 / 220                                  | Continuous                                     | Continuous               |
|  | NB Through*    | 98 / 340                                | 200 / 128                                 | Continuous                                     | Continuous               |
|  | EB Through*    | 18 / 75                                 | 43 / 83                                   | Continuous                                     | Continuous               |
|  | SB Through*    | 90 / 215                                | 148 / 195                                 | Continuous                                     | Continuous               |
|  | SB Right-turn* | 3 / 13                                  | 5 / 13                                    | Continuous                                     | Continuous               |
|  | WB Through*    | 8 / 23                                  | 18 / 23                                   | Continuous                                     | Continuous               |
| 103. Denali Boulevard & Drive 9                              | NB Through*    | 120 / 565                               | 35 / 53                                   | Continuous                                     | Continuous               |
|  | NB Right-turn* | 25 / 10                                 | 95 / 288                                  | Continuous                                     | Continuous               |
|  | EB Through*    | 33 / 205                                | 85 / 118                                  | Continuous                                     | Continuous               |
|  | SB Through*    | 353 / 1433                              | 103 / 48                                  | Continuous                                     | Continuous               |
|  | WB Through*    | 10 / 18                                 | 18 / 13                                   | Continuous                                     | Continuous               |

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

APPENDIX C. LOS/DELAY TABLE

Future (2040) LOS/Delay Summary Table

| Location                              | Approach   | Movement        | Future (2040) MTIS         |   |                     |       | Future (2040) Update       |      |                     |      |
|---------------------------------------|--|-----------------|----------------------------|---|---------------------|-------|----------------------------|------|---------------------|------|
|                                       |  |                 | Level of Service (AM / PM) |   | Delay (s) (AM / PM) |       | Level of Service (AM / PM) |      | Delay (s) (AM / PM) |      |
| #1 - 56th Avenue & Biloxi Street      | Eastbound  | Signalized      | A                          | B | 2.1                 | 12.9  | A                          | B    | 2.8                 | 13   |
|                                       | Westbound  |                 | A                          | A | 3.1                 | 4.1   | A                          | A    | 3.5                 | 4.2  |
|                                       | Northbound   |                 | D                          | D | 52.6                | 54.9  | D                          | E    | 52.3                | 55.2 |
|                                       | Total  |                 | A                          | A | 4.4                 | 10.4  | A                          | A    | 5.1                 | 10.6 |
| #3 - 56th Avenue & Denali Boulevard   | Eastbound  | Signalized      | C                          | B | 20.8                | 17.6  | C                          | B    | 21.1                | 17   |
|                                       | Westbound  |                 | C                          | C | 22.9                | 23.8  | C                          | C    | 21.7                | 23.4 |
|                                       | Northbound   |                 | C                          | D | 32.2                | 37.7  | D                          | D    | 35.4                | 38.8 |
|                                       | Southbound   |                 | C                          | C | 25.3                | 26.0  | C                          | C    | 26.1                | 26.7 |
|                                       |  |                 | Total                      |   | C                   | D     | 24.5                       | 23.4 | C                   | D    |
|                                       | #12 - 48th Avenue & Denali Boulevard                             | Eastbound       | Signalized                 | D | C                   | 19.7  | 41.7                       | B    | D                   | 18.4 |
| Westbound                             |  | D               |                            | E | 32.5                | 24.6  | D                          | C    | 35.3                | 31.8 |
| Northbound                            |  | E               |                            | E | 52.8                | 60.8  | E                          | E    | 55.2                | 64.7 |
| Southbound                            |  | E               |                            | C | 43.8                | 40.7  | D                          | D    | 46.5                | 45.4 |
|                                       |  | Total           |                            | E | D                   | 34.2  | 40.5                       | E    | D                   | 35.4 |
| #13 - 48th Avenue & Biloxi Street     |  | Eastbound       | Signalized                 | D | A                   | 41.6  | 9                          | D    | C                   | 39.9 |
|                                       | Westbound  | B               |                            | B | 36.2                | 17.2  | D                          | C    | 40.5                | 24.6 |
|                                       | Northbound   | E               |                            | F | 51.9                | 239.2 | D                          | E    | 51.9                | 73.8 |
|                                       | Southbound   | D               |                            | F | 23                  | 200.4 | C                          | E    | 22.3                | 70.5 |
|                                       |  | Total           |                            | C | D                   | 39.7  | 41.1                       | C    | E                   | 40.4 |
|                                       | #14 - 48th Avenue & Addison Street / #25 - 48th Avenue & Drive 7 | Southbound      | Right                      | c | f                   | 2     | 85                         | f    | f                   | 11   |
| #102 - Denali Boulevard & 53rd Avenue | Eastbound  | Left/thru/right | a                          | c | 9.7                 | 17.3  | b                          | b    | 12.2                | 15.3 |
|                                       | Westbound  | Left/thru/right | a                          | a | 9.3                 | 7.3   | a                          | a    | 9.6                 | 8.6  |
|                                       | Northbound   | Left/thru/right | b                          | a | 12.4                | 9.1   | c                          | b    | 14.7                | 11.5 |
|                                       | Southbound   | Thru/left       | a                          | b | 9.5                 | 14.7  | b                          | b    | 11.7                | 12.2 |
|                                       |  | Right           | a                          | a | 3.1                 | 4.2   | a                          | a    | 3.2                 | 4.2  |
| #103 - Denali Boulevard & Drive 9     | Eastbound  | Left/thru/right | b                          | c | 14.1                | 15.3  | c                          | c    | 18.9                | 12.4 |
|                                       | Westbound  | Left/thru/right | a                          | b | 9.4                 | 10.1  | a                          | b    | 9.2                 | 10.6 |
|                                       | Northbound   | Left/thru       | a                          | a | 5.4                 | 6.5   | a                          | a    | 5.4                 | 7.1  |
|                                       |  | Thru/Right      | a                          | b | 8.8                 | 12.5  | a                          | b    | 8.8                 | 14.1 |
|                                       |  | Southbound      | Thru/left                  | b | b                   | 13.7  | 13.2                       | c    | c                   | 14.5 |
|                                       | Thruu/Right  |                 | a                          | a | 9.3                 | 8.6   | b                          | b    | 10.1                | 8.7  |

## APPENDIX D. CAPACITY ANALYSIS WORKSHEETS

Timings  
1: Biloxi Street & 56th Avenue

Future Total (2040)  
AM Peak Hour

|                      | →     | ↖     | ←     | ↙     | ↗     |
|----------------------|-------|-------|-------|-------|-------|
| Lane Group           | EBT   | WBL   | WBT   | NBL   | NBR   |
| Lane Configurations  | ↑↑↑   | ↖     | ↑↑↑   | ↖     | ↗     |
| Traffic Volume (vph) | 1455  | 15    | 1580  | 100   | 30    |
| Future Volume (vph)  | 1455  | 15    | 1580  | 100   | 30    |
| Turn Type            | NA    | pm+pt | NA    | Prot  | Perm  |
| Protected Phases     | 4     | 3     | 8     | 2     |       |
| Permitted Phases     |       | 8     |       |       | 2     |
| Detector Phase       | 4     | 3     | 8     | 2     | 2     |
| Switch Phase         |       |       |       |       |       |
| Minimum Initial (s)  | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |
| Minimum Split (s)    | 22.5  | 9.5   | 22.5  | 22.5  | 22.5  |
| Total Split (s)      | 78.0  | 13.0  | 91.0  | 29.0  | 29.0  |
| Total Split (%)      | 65.0% | 10.8% | 75.8% | 24.2% | 24.2% |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| Lost Time Adjust (s) | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lag   | Lead  |       |       |       |
| Lead-Lag Optimize?   | Yes   | Yes   |       |       |       |
| Recall Mode          | C-Max | None  | C-Max | None  | None  |
| Act Effect Green (s) | 94.1  | 98.3  | 98.3  | 12.7  | 12.7  |
| Actuated g/C Ratio   | 0.78  | 0.82  | 0.82  | 0.11  | 0.11  |
| v/c Ratio            | 0.42  | 0.06  | 0.41  | 0.58  | 0.17  |
| Control Delay        | 2.8   | 3.1   | 3.5   | 63.0  | 16.9  |
| Queue Delay          | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay          | 2.8   | 3.1   | 3.5   | 63.0  | 16.9  |
| LOS                  | A     | A     | A     | E     | B     |
| Approach Delay       | 2.8   |       | 3.5   | 52.3  |       |
| Approach LOS         | A     |       | A     | D     |       |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 5.1

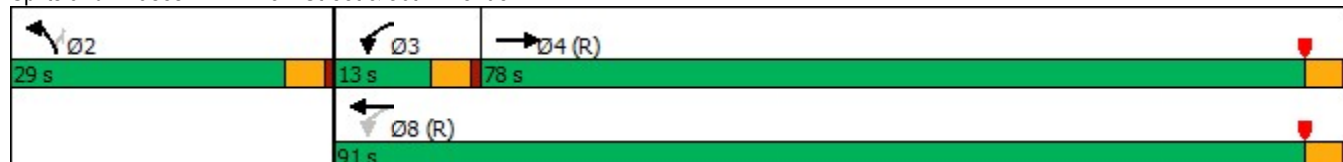
Intersection LOS: A

Intersection Capacity Utilization 43.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Biloxi Street & 56th Avenue








## Queues

## 1: Biloxi Street &amp; 56th Avenue

Future Total (2040)

AM Peak Hour

|                         |  |  |  |  |  |
|-------------------------|---|---|---|---|---|
| Lane Group              | EBT   | WBL   | WBT   | NBL   | NBR   |
| Lane Group Flow (vph)   | 1658  | 16  | 1717  | 109   | 33  |
| v/c Ratio               | 0.42  | 0.06  | 0.41  | 0.58  | 0.17  |
| Control Delay           | 2.8   | 3.1   | 3.5   | 63.0  | 16.9  |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay             | 2.8   | 3.1   | 3.5   | 63.0  | 16.9  |
| Queue Length 50th (ft)  | 58  | 2   | 103   | 82  | 0   |
| Queue Length 95th (ft)  | 98  | 7   | 156   | 137   | 30  |
| Internal Link Dist (ft) | 670   |   | 1090  | 351   |   |
| Turn Bay Length (ft)    |   | 250   |   | 275   | 150   |
| Base Capacity (vph)     | 3963  | 287   | 4165  | 361   | 349   |
| Starvation Cap Reductn  | 0   | 0   | 0   | 0   | 0   |
| Spillback Cap Reductn   | 0   | 0   | 0   | 0   | 0   |
| Storage Cap Reductn     | 0   | 0   | 0   | 0   | 0   |
| Reduced v/c Ratio       | 0.42  | 0.06  | 0.41  | 0.30  | 0.09  |
| Intersection Summary    |   |   |   |   |   |

# HCM 6th Signalized Intersection Summary





























## 1: Biloxi Street & 56th Avenue

Future Total (2040)  
AM Peak Hour

|                              |      |      |      |      |      |       |
|------------------------------|------|------|------|------|------|-------|
|                              | →    | ↘    | ↙    | ←    | ↖    | ↗     |
| Movement                     | EBT  | EBR  | WBL  | WBT  | NBL  | NBR   |
| Lane Configurations          | ↑↑↑↱ |      | ↙    | ↑↑↑  | ↙    | ↗     |
| Traffic Volume (veh/h)       | 1455 | 70   | 15   | 1580 | 100  | 30    |
| Future Volume (veh/h)        | 1455 | 70   | 15   | 1580 | 100  | 30    |
| Initial Q (Qb), veh          | 0    | 0    | 0    | 0    | 0    | 0     |
| Ped-Bike Adj(A_pbT)          |      | 1.00 | 1.00 |      | 1.00 | 1.00  |
| Parking Bus, Adj             | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00  |
| Work Zone On Approach        | No   |      |      | No   | No   |       |
| Adj Sat Flow, veh/h/ln       | 1870 | 1870 | 1870 | 1870 | 1870 | 1870  |
| Adj Flow Rate, veh/h         | 1582 | 76   | 16   | 1717 | 109  | 33    |
| Peak Hour Factor             | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92  |
| Percent Heavy Veh, %         | 2    | 2    | 2    | 2    | 2    | 2     |
| Cap, veh/h                   | 3952 | 190  | 329  | 4322 | 140  | 125   |
| Arrive On Green              | 1.00 | 1.00 | 0.02 | 0.85 | 0.08 | 0.08  |
| Sat Flow, veh/h              | 5160 | 240  | 1781 | 5274 | 1781 | 1585  |
| Grp Volume(v), veh/h         | 1079 | 579  | 16   | 1717 | 109  | 33    |
| Grp Sat Flow(s),veh/h/ln     | 1702 | 1827 | 1781 | 1702 | 1781 | 1585  |
| Q Serve(g_s), s              | 0.0  | 0.0  | 0.2  | 9.3  | 7.2  | 2.4   |
| Cycle Q Clear(g_c), s        | 0.0  | 0.0  | 0.2  | 9.3  | 7.2  | 2.4   |
| Prop In Lane                 |      | 0.13 | 1.00 |      | 1.00 | 1.00  |
| Lane Grp Cap(c), veh/h       | 2695 | 1447 | 329  | 4322 | 140  | 125   |
| V/C Ratio(X)                 | 0.40 | 0.40 | 0.05 | 0.40 | 0.78 | 0.26  |
| Avail Cap(c_a), veh/h        | 2695 | 1447 | 424  | 4322 | 364  | 324   |
| HCM Platoon Ratio            | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00  |
| Upstream Filter(I)           | 0.89 | 0.89 | 0.92 | 0.92 | 1.00 | 1.00  |
| Uniform Delay (d), s/veh     | 0.0  | 0.0  | 1.9  | 2.1  | 54.3 | 52.0  |
| Incr Delay (d2), s/veh       | 0.4  | 0.7  | 0.1  | 0.3  | 9.0  | 1.1   |
| Initial Q Delay(d3),s/veh    | 0.0  | 0.0  | 0.0  | 0.0  | 0.0  | 0.0   |
| %ile BackOfQ(50%),veh/ln     | 0.1  | 0.3  | 0.0  | 1.4  | 3.6  | 1.0   |
| Unsig. Movement Delay, s/veh |      |      |      |      |      |       |
| LnGrp Delay(d),s/veh         | 0.4  | 0.7  | 1.9  | 2.4  | 63.2 | 53.1  |
| LnGrp LOS                    | A    | A    | A    | A    | E    | D     |
| Approach Vol, veh/h          | 1658 |      |      | 1733 | 142  |       |
| Approach Delay, s/veh        | 0.5  |      |      | 2.4  | 60.9 |       |
| Approach LOS                 | A    |      |      | A    | E    |       |
| Timer - Assigned Phs         |      | 2    | 3    | 4    |      | 8     |
| Phs Duration (G+Y+Rc), s     |      | 13.9 | 6.6  | 99.5 |      | 106.1 |
| Change Period (Y+Rc), s      |      | 4.5  | 4.5  | 4.5  |      | 4.5   |
| Max Green Setting (Gmax), s  |      | 24.5 | 8.5  | 73.5 |      | 86.5  |
| Max Q Clear Time (g_c+l1), s |      | 9.2  | 2.2  | 2.0  |      | 11.3  |
| Green Ext Time (p_c), s      |      | 0.3  | 0.0  | 16.8 |      | 19.9  |
| Intersection Summary         |      |      |      |      |      |       |
| HCM 6th Ctrl Delay           |      |      | 3.9  |      |      |       |
| HCM 6th LOS                  |      |      | A    |      |      |       |

# Timings 3: Denali Boulevard & 56th Avenue

Future Total (2040)  
AM Peak Hour

|                      |  |    |  |    |    |    |   |  |  |  |  |
|----------------------|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group           | EBL   | EBT   | EBR   | WBL   | WBT   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations  |  |    |  |   |    |   |  |  |  |  |  |
| Traffic Volume (vph) | 50  | 955   | 445   | 340   | 905   | 565   | 30  | 385   | 25  | 5   | 40  |
| Future Volume (vph)  | 50  | 955   | 445   | 340   | 905   | 565   | 30  | 385   | 25  | 5   | 40  |
| Turn Type            | pm+pt   | NA  | pm+ov   | Prot  | NA  | Prot  | NA  | pm+ov   | Perm  | NA  | pm+ov   |
| Protected Phases     | 7   | 4   | 5   | 3   | 8   | 5   | 2   | 3   |   | 6   | 7   |
| Permitted Phases     | 4   |   | 4   |   |   |   |   | 2   | 6   |   | 6   |
| Detector Phase       | 7   | 4   | 5   | 3   | 8   | 5   | 2   | 3   | 6   | 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)    | 9.5   | 22.5  | 22.5  | 9.5   | 22.5  | 22.5  | 22.5  | 9.5   | 22.5  | 22.5  | 9.5   |
| Total Split (s)      | 10.8  | 37.7  | 41.0  | 25.0  | 51.9  | 41.0  | 57.3  | 25.0  | 16.3  | 16.3  | 10.8  |
| Total Split (%)      | 9.0%  | 31.4%   | 34.2%   | 20.8%   | 43.3%   | 34.2%   | 47.8%   | 20.8%   | 13.6%   | 13.6%   | 9.0%  |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lead  | Lead  | Lead  | Lag   | Lag   | Lead  |   | Lag   | Lag   | Lag   | Lead  |
| Lead-Lag Optimize?   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode          | None  | C-Max   | None  | None  | C-Max   | None  | None  | None  | None  | None  | None  |
| Act Effect Green (s) | 49.3  | 49.3  | 79.6  | 20.5  | 64.4  | 28.5  | 36.7  | 61.7  | 7.9   | 7.9   | 15.6  |
| Actuated g/C Ratio   | 0.41  | 0.41  | 0.66  | 0.17  | 0.54  | 0.24  | 0.31  | 0.51  | 0.07  | 0.07  | 0.13  |
| v/c Ratio            | 0.25  | 0.50  | 0.41  | 0.63  | 0.37  | 0.75  | 0.06  | 0.50  | 0.30  | 0.04  | 0.15  |
| Control Delay        | 29.4  | 29.3  | 2.1   | 39.9  | 15.0  | 48.4  | 24.6  | 17.2  | 61.1  | 51.6  | 1.1   |
| 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          | 29.4  | 29.3  | 2.1   | 39.9  | 15.0  | 48.4  | 24.6  | 17.2  | 61.1  | 51.6  | 1.1   |
| LOS                  | C   | C   | A   | D   | B   | D   | C   | B   | E   | D   | A   |
| Approach Delay       |   | 21.0  |   |   | 21.7  |   | 35.4  |   |   | 26.1  |   |
| Approach LOS         |   | C   |   |   | 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 Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 25.1

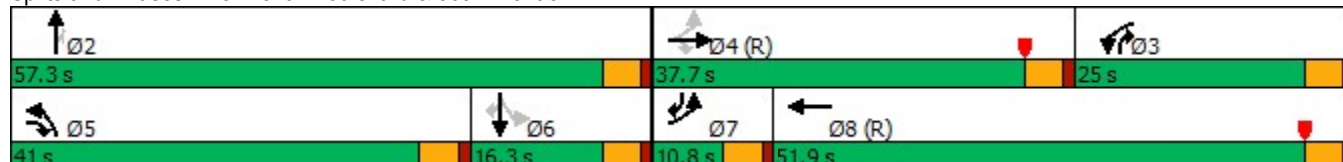
Intersection LOS: C

Intersection Capacity Utilization 62.2%

ICU Level of Service B












Analysis Period (min) 15

Splits and Phases: 3: Denali Boulevard & 56th Avenue



Queues  
3: Denali Boulevard & 56th Avenue

Future Total (2040)  
AM Peak Hour

|                         |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|--|---|---|---|---|
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | NBL   | NBT  | NBR   | SBL   | SBT   | SBR   |
| Lane Group Flow (vph)   | 54  | 1038  | 484   | 370   | 1017  | 614   | 33   | 418   | 27  | 5   | 43  |
| v/c Ratio               | 0.25  | 0.50  | 0.41  | 0.63  | 0.37  | 0.75  | 0.06   | 0.50  | 0.30  | 0.04  | 0.15  |
| Control Delay           | 29.4  | 29.3  | 2.1   | 39.9  | 15.0  | 48.4  | 24.6   | 17.2  | 61.1  | 51.6  | 1.1   |
| 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             | 29.4  | 29.3  | 2.1   | 39.9  | 15.0  | 48.4  | 24.6   | 17.2  | 61.1  | 51.6  | 1.1   |
| Queue Length 50th (ft)  | 27  | 227   | 12  | 119   | 124   | 229   | 17   | 163   | 20  | 4   | 0   |
| Queue Length 95th (ft)  | 63  | 313   | 38  | m152  | 158   | 271   | 35   | 193   | 51  | 17  | 0   |
| Internal Link Dist (ft) |   | 546   |   |   | 823   |   | 622  |   |   | 214   |   |
| Turn Bay Length (ft)    | 150   |   | 350   | 275   |   | 275   |  |   | 100   |   | 100   |
| Base Capacity (vph)     | 220   | 2089  | 1216  | 586   | 2717  | 1044  | 819  | 840   | 134   | 183   | 290   |
| 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       | 0.25  | 0.50  | 0.40  | 0.63  | 0.37  | 0.59  | 0.04   | 0.50  | 0.20  | 0.03  | 0.15  |































Intersection Summary

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

# HCM 6th Signalized Intersection Summary

























## 3: Denali Boulevard & 56th Avenue

Future Total (2040)  
AM Peak Hour

|  |  |    |  |    |    |  |    |  |  |  |    |  |
|--|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement   | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations  |  |    |  |   |    |   |   |  |  |  |   |  |
| Traffic Volume (veh/h)   | 50  | 955   | 445   | 340   | 905   | 30  | 565  | 30  | 385   | 25  | 5   | 40  |
| Future Volume (veh/h)  | 50  | 955   | 445   | 340   | 905   | 30  | 565  | 30  | 385   | 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  | 1038  | 484   | 370   | 984   | 33  | 614  | 33  | 418   | 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   | 235   | 1413  | 764   | 1114  | 2863  | 96  | 709  | 540   | 968   | 103   | 85  | 128   |
| Arrive On Green  | 0.03  | 0.28  | 0.28  | 0.64  | 1.00  | 1.00  | 0.21   | 0.29  | 0.29  | 0.05  | 0.05  | 0.05  |
| Sat Flow, veh/h  | 1781  | 5106  | 1585  | 3456  | 5074  | 170   | 3456   | 1870  | 1585  | 940   | 1870  | 1585  |
| Grp Volume(v), veh/h   | 54  | 1038  | 484   | 370   | 660   | 357   | 614  | 33  | 418   | 27  | 5   | 43  |
| Grp Sat Flow(s),veh/h/ln   | 1781  | 1702  | 1585  | 1728  | 1702  | 1840  | 1728   | 1870  | 1585  | 940   | 1870  | 1585  |
| Q Serve(g_s), s  | 2.8   | 22.1  | 4.4   | 5.8   | 0.0   | 0.0   | 20.6   | 1.5   | 0.0   | 3.4   | 0.3   | 3.1   |
| Cycle Q Clear(g_c), s  | 2.8   | 22.1  | 4.4   | 5.8   | 0.0   | 0.0   | 20.6   | 1.5   | 0.0   | 3.4   | 0.3   | 3.1   |
| Prop In Lane   | 1.00  |   | 1.00  | 1.00  |   | 0.09  | 1.00   |   | 1.00  | 1.00  |   | 1.00  |
| Lane Grp Cap(c), veh/h   | 235   | 1413  | 764   | 1114  | 1921  | 1038  | 709  | 540   | 968   | 103   | 85  | 128   |
| V/C Ratio(X)   | 0.23  | 0.73  | 0.63  | 0.33  | 0.34  | 0.34  | 0.87   | 0.06  | 0.43  | 0.26  | 0.06  | 0.34  |
| Avail Cap(c_a), veh/h  | 267   | 1413  | 764   | 1114  | 1921  | 1038  | 1051   | 823   | 1208  | 152   | 184   | 211   |
| 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)   | 0.92  | 0.92  | 0.92  | 1.00  | 1.00  | 1.00  | 1.00   | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Uniform Delay (d), s/veh   | 34.3  | 39.4  | 11.8  | 15.5  | 0.0   | 0.0   | 46.1   | 30.9  | 12.3  | 56.3  | 54.8  | 52.1  |
| Incr Delay (d2), s/veh   | 0.5   | 3.2   | 3.7   | 0.2   | 0.5   | 0.9   | 5.2  | 0.0   | 0.3   | 1.3   | 0.3   | 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   | 1.2   | 9.6   | 7.1   | 2.1   | 0.1   | 0.3   | 9.3  | 0.7   | 5.8   | 0.8   | 0.2   | 1.3   |
| Unsig. Movement Delay, s/veh                                       |   |   |   |   |   |   |  |   |   |   |   |   |
| LnGrp Delay(d),s/veh   | 34.7  | 42.6  | 15.5  | 15.6  | 0.5   | 0.9   | 51.3   | 31.0  | 12.6  | 57.6  | 55.1  | 53.7  |
| LnGrp LOS  | C   | D   | B   | B   | A   | A   | D  | C   | B   | E   | E   | D   |
| Approach Vol, veh/h  |   | 1576  |   |   | 1387  |   |  | 1065  |   |   | 75  |   |
| Approach Delay, s/veh  |   | 34.0  |   |   | 4.6   |   |  | 35.5  |   |   | 55.2  |   |
| Approach LOS   |   | C   |   |   | A   |   |  | D   |   |   | E   |   |
| Timer - Assigned Phs   |   | 2   | 3   | 4   | 5   | 6   | 7  | 8   |   |   |   |   |
| Phs Duration (G+Y+Rc), s   |   | 39.1  | 43.2  | 37.7  | 29.1  | 10.0  | 8.7  | 72.2  |   |   |   |   |
| Change Period (Y+Rc), s  |   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   |   |   |   |   |
| Max Green Setting (Gmax), s  |   | 52.8  | 20.5  | 33.2  | 36.5  | 11.8  | 6.3  | 47.4  |   |   |   |   |
| Max Q Clear Time (g_c+I1), s                                       |   | 3.5   | 7.8   | 24.1  | 22.6  | 5.4   | 4.8  | 2.0   |   |   |   |   |
| Green Ext Time (p_c), s  |   | 1.8   | 1.1   | 5.7   | 2.0   | 0.1   | 0.0  | 8.6   |   |   |   |   |
| Intersection Summary   |   |   |   |   |   |   |  |   |   |   |   |   |
| HCM 6th Ctrl Delay   |   |   | 24.8  |   |   |   |  |   |   |   |   |   |
| HCM 6th LOS  |   |   | C   |   |   |   |  |   |   |   |   |   |
| Notes  |   |   |   |   |   |   |  |   |   |   |   |   |
| User approved pedestrian interval to be less than phase max green. |   |   |   |   |   |   |  |   |   |   |   |   |

Timings  
12: Denali Boulevard & 48th Avenue

Future Total (2040)  
AM Peak Hour

|                      |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group           | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations  |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 430   | 1430  | 560   | 365   | 1335  | 190   | 660  | 395   | 450   | 255   | 330   | 485   |
| Future Volume (vph)  | 430   | 1430  | 560   | 365   | 1335  | 190   | 660  | 395   | 450   | 255   | 330   | 485   |
| Turn Type            | Prot  | NA  | pm+ov   | Prot  | NA  | pm+ov   | Prot   | NA  | pm+ov   | pm+pt   | NA  | pm+ov   |
| Protected Phases     | 7   | 4   | 5   | 3   | 8   | 1   | 5  | 2   | 3   | 1   | 6   | 7   |
| Permitted Phases     |   |   | 4   |   |   | 8   |  |   | 2   | 6   |   | 6   |
| Detector Phase       | 7   | 4   | 5   | 3   | 8   | 1   | 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   | 5.0   |
| Minimum Split (s)    | 9.5   | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   | 9.5  | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   |
| Total Split (s)      | 27.0  | 46.5  | 31.0  | 20.0  | 39.5  | 24.7  | 31.0   | 28.8  | 20.0  | 24.7  | 22.5  | 27.0  |
| Total Split (%)      | 22.5%   | 38.8%   | 25.8%   | 16.7%   | 32.9%   | 20.6%   | 25.8%  | 24.0%   | 16.7%   | 20.6%   | 18.8%   | 22.5%   |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5  | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0  | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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   | 0.0   |
| Total Lost Time (s)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lead  | Lead  | Lag   | Lag   | Lag   | Lag   | Lag  | Lead  | Lag   | Lag   | Lead  | Lead  |
| Lead-Lag Optimize?   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes  | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode          | None  | C-Max   | None  | None  | C-Max   | None  | None   | None  | None  | None  | None  | None  |
| Act Effect Green (s) | 20.8  | 43.0  | 74.6  | 15.5  | 37.7  | 61.4  | 27.2   | 19.8  | 39.8  | 40.1  | 16.4  | 37.1  |
| Actuated g/C Ratio   | 0.17  | 0.36  | 0.62  | 0.13  | 0.31  | 0.51  | 0.23   | 0.16  | 0.33  | 0.33  | 0.14  | 0.31  |
| v/c Ratio            | 0.79  | 0.85  | 0.61  | 0.90  | 0.91  | 0.24  | 0.92   | 0.73  | 0.83  | 0.67  | 0.74  | 0.90  |
| Control Delay        | 38.5  | 18.5  | 2.7   | 57.3  | 33.9  | 2.8   | 63.9   | 55.2  | 42.4  | 48.4  | 59.7  | 36.5  |
| Queue Delay          | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay          | 38.5  | 18.5  | 2.7   | 57.3  | 33.9  | 2.8   | 63.9   | 55.2  | 42.4  | 48.4  | 59.7  | 36.5  |
| LOS                  | D   | B   | A   | E   | C   | A   | E  | E   | D   | D   | E   | D   |
| Approach Delay       |   | 18.4  |   |   | 35.3  |   |  | 55.2  |   |   | 46.5  |   |
| Approach LOS         |   | B   |   |   | D   |   |  | E   |   |   | D   |   |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 49 (41%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 35.4

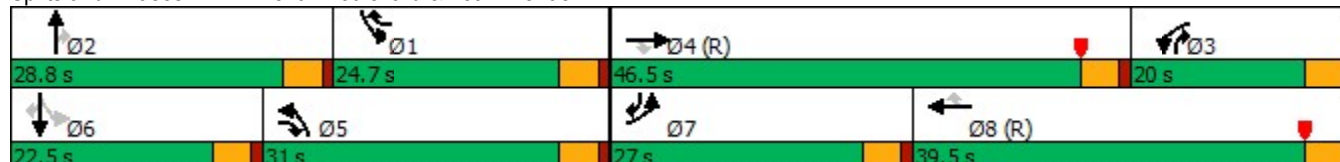
Intersection LOS: D

Intersection Capacity Utilization 85.9%

ICU Level of Service E













Analysis Period (min) 15

Splits and Phases: 12: Denali Boulevard & 48th Avenue



Queues  
12: Denali Boulevard & 48th Avenue

Future Total (2040)  
AM Peak Hour

|                         |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Group Flow (vph)   | 467   | 1554  | 609   | 397   | 1451  | 207   | 717  | 429   | 489   | 277   | 359   | 527   |
| v/c Ratio               | 0.79  | 0.85  | 0.61  | 0.90  | 0.91  | 0.24  | 0.92   | 0.73  | 0.83  | 0.67  | 0.74  | 0.90  |
| Control Delay           | 38.5  | 18.5  | 2.7   | 57.3  | 33.9  | 2.8   | 63.9   | 55.2  | 42.4  | 48.4  | 59.7  | 36.5  |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay             | 38.5  | 18.5  | 2.7   | 57.3  | 33.9  | 2.8   | 63.9   | 55.2  | 42.4  | 48.4  | 59.7  | 36.5  |
| Queue Length 50th (ft)  | 145   | 364   | 20  | 153   | 385   | 10  | 281  | 168   | 289   | 148   | 141   | 146   |
| Queue Length 95th (ft)  | m155  | m408  | m38   | m#239   | #510  | m45   | #401   | 215   | 410   | #239  | 193   | #290  |
| Internal Link Dist (ft) |   | 640   |   |   | 1760  |   |  | 542   |   |   | 586   |   |
| Turn Bay Length (ft)    | 250   |   | 275   | 300   |   | 150   | 400  |   | 250   | 300   |   | 225   |
| Base Capacity (vph)     | 643   | 1820  | 1005  | 443   | 1596  | 856   | 777  | 716   | 588   | 411   | 530   | 604   |
| Starvation Cap Reductn  | 0   | 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   | 0   |
| Storage Cap Reductn     | 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0   | 0   | 0   | 0   | 0   |
| Reduced v/c Ratio       | 0.73  | 0.85  | 0.61  | 0.90  | 0.91  | 0.24  | 0.92   | 0.60  | 0.83  | 0.67  | 0.68  | 0.87  |

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.

# HCM 6th Signalized Intersection Summary

## 12: Denali Boulevard & 48th Avenue

Future Total (2040)  
AM Peak Hour

|                              |  |  |  |  |  |  |   |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations          |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)       | 430   | 1430  | 560   | 365   | 1335  | 190   | 660   | 395   | 450   | 255   | 330   | 485   |
| Future Volume (veh/h)        | 430   | 1430  | 560   | 365   | 1335  | 190   | 660   | 395   | 450   | 255   | 330   | 485   |
| 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         | 467   | 1554  | 0   | 397   | 1451  | 207   | 717   | 429   | 0   | 277   | 359   | 527   |
| 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                   | 543   | 1787  |   | 447   | 1645  | 863   | 763   | 526   |   | 486   | 533   | 487   |
| Arrive On Green              | 0.05  | 0.12  | 0.00  | 0.04  | 0.11  | 0.11  | 0.22  | 0.15  | 0.00  | 0.22  | 0.15  | 0.15  |
| Sat Flow, veh/h              | 3456  | 5106  | 1585  | 3456  | 5106  | 1585  | 3456  | 3554  | 1585  | 1781  | 3554  | 1585  |
| Grp Volume(v), veh/h         | 467   | 1554  | 0   | 397   | 1451  | 207   | 717   | 429   | 0   | 277   | 359   | 527   |
| Grp Sat Flow(s),veh/h/ln     | 1728  | 1702  | 1585  | 1728  | 1702  | 1585  | 1728  | 1777  | 1585  | 1781  | 1777  | 1585  |
| Q Serve(g_s), s              | 16.1  | 35.9  | 0.0   | 13.7  | 33.6  | 4.2   | 24.5  | 14.0  | 0.0   | 10.0  | 11.5  | 18.0  |
| Cycle Q Clear(g_c), s        | 16.1  | 35.9  | 0.0   | 13.7  | 33.6  | 4.2   | 24.5  | 14.0  | 0.0   | 10.0  | 11.5  | 18.0  |
| Prop In Lane                 | 1.00  |   | 1.00  | 1.00  |   | 1.00  | 1.00  |   | 1.00  | 1.00  |   | 1.00  |
| Lane Grp Cap(c), veh/h       | 543   | 1787  |   | 447   | 1645  | 863   | 763   | 526   |   | 486   | 533   | 487   |
| V/C Ratio(X)                 | 0.86  | 0.87  |   | 0.89  | 0.88  | 0.24  | 0.94  | 0.81  |   | 0.57  | 0.67  | 1.08  |
| Avail Cap(c_a), veh/h        | 648   | 1787  |   | 447   | 1645  | 863   | 763   | 720   |   | 486   | 533   | 487   |
| HCM Platoon Ratio            | 0.33  | 0.33  | 0.33  | 0.33  | 0.33  | 0.33  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Upstream Filter(I)           | 1.00  | 1.00  | 0.00  | 0.73  | 0.73  | 0.73  | 1.00  | 1.00  | 0.00  | 1.00  | 1.00  | 1.00  |
| Uniform Delay (d), s/veh     | 55.6  | 50.4  | 0.0   | 56.6  | 51.4  | 6.8   | 46.0  | 49.5  | 0.0   | 38.3  | 48.2  | 17.9  |
| Incr Delay (d2), s/veh       | 9.9   | 6.1   | 0.0   | 14.9  | 5.4   | 0.5   | 19.4  | 5.2   | 0.0   | 1.6   | 3.3   | 64.9  |
| 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     | 8.2   | 17.4  | 0.0   | 7.3   | 16.2  | 2.0   | 12.5  | 6.6   | 0.0   | 7.2   | 5.3   | 15.2  |
| Unsig. Movement Delay, s/veh |   |   |   |   |   |   |   |   |   |   |   |   |
| LnGrp Delay(d),s/veh         | 65.5  | 56.5  | 0.0   | 71.5  | 56.8  | 7.3   | 65.4  | 54.7  | 0.0   | 39.9  | 51.5  | 82.8  |
| LnGrp LOS                    | E   | E   |   | E   | E   | A   | E   | D   |   | D   | D   | F   |
| Approach Vol, veh/h          | 2021  |   |   | 2055  |   |   | 1146  |   |   | 1163  |   |   |
| Approach Delay, s/veh        | 58.5  |   |   | 54.7  |   |   | 61.4  |   |   | 63.0  |   |   |
| Approach LOS                 | E   |   |   | D   |   |   | E   |   |   | E   |   |   |
| Timer - Assigned Phs         | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |   |   |   |   |
| Phs Duration (G+Y+Rc), s     | 31.2  | 22.3  | 20.0  | 46.5  | 31.0  | 22.5  | 23.4  | 43.2  |   |   |   |   |
| Change Period (Y+Rc), s      | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |   |   |   |   |
| Max Green Setting (Gmax), s  | 20.2  | 24.3  | 15.5  | 42.0  | 26.5  | 18.0  | 22.5  | 35.0  |   |   |   |   |
| Max Q Clear Time (g_c+I1), s | 12.0  | 16.0  | 15.7  | 37.9  | 26.5  | 20.0  | 18.1  | 35.6  |   |   |   |   |
| Green Ext Time (p_c), s      | 0.5   | 1.7   | 0.0   | 3.2   | 0.0   | 0.0   | 0.8   | 0.0   |   |   |   |   |

### Intersection Summary

























|                    |      |
|--------------------|------|
| HCM 6th Ctrl Delay | 58.6 |
| HCM 6th LOS        | E    |

### Notes

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Timings  
13: Biloxi Street & 48th Avenue

Future Total (2040)  
AM Peak Hour

|                      |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group           | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBR   | SBL   | SBT   | SBR   | Ø2  |
| Lane Configurations  |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 275   | 1965  | 410   | 440   | 2015  | 95  | 400  | 275   | 175   | 5   | 180   |   |
| Future Volume (vph)  | 275   | 1965  | 410   | 440   | 2015  | 95  | 400  | 275   | 175   | 5   | 180   |   |
| Turn Type            | Prot  | NA  | pm+ov   | Prot  | NA  | Perm  | Prot   | pm+ov   | pm+pt   | NA  | pm+ov   |   |
| Protected Phases     | 7   | 4   | 5   | 3   | 8   |   | 5  | 3   | 1   | 6   | 7   | 2   |
| Permitted Phases     |   |   | 4   |   |   | 8   |  | 2   | 6   |   | 6   |   |
| Detector Phase       | 7   | 4   | 5   | 3   | 8   | 8   | 5  | 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   | 5.0   |
| Minimum Split (s)    | 9.5   | 22.5  | 9.5   | 9.5   | 22.5  | 22.5  | 9.5  | 9.5   | 9.5   | 22.5  | 9.5   | 22.5  |
| Total Split (s)      | 18.5  | 54.5  | 21.0  | 22.0  | 58.0  | 58.0  | 21.0   | 22.0  | 11.2  | 22.5  | 18.5  | 32.3  |
| Total Split (%)      | 15.4%   | 45.4%   | 17.5%   | 18.3%   | 48.3%   | 48.3%   | 17.5%  | 18.3%   | 9.3%  | 18.8%   | 15.4%   | 27%   |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5  | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0  | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   | 4.5   | 4.5   | 4.5   |   |
| Lead/Lag             | Lag   | Lag   | Lag   | Lead  | Lead  | Lead  | Lag  | Lead  | Lag   | Lead  | Lag   | Lead  |
| Lead-Lag Optimize?   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes  | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode          | None  | C-Max   | None  | None  | C-Max   | C-Max   | None   | None  | None  | Max   | None  | Max   |
| Act Effect Green (s) | 14.0  | 50.0  | 66.5  | 17.5  | 53.5  | 53.5  | 16.5   | 45.3  | 24.7  | 18.0  | 36.5  |   |
| Actuated g/C Ratio   | 0.12  | 0.42  | 0.55  | 0.15  | 0.45  | 0.45  | 0.14   | 0.38  | 0.21  | 0.15  | 0.30  |   |
| v/c Ratio            | 0.75  | 1.01  | 0.41  | 0.96  | 0.97  | 0.13  | 0.92   | 0.46  | 0.32  | 0.02  | 0.34  |   |
| Control Delay        | 52.5  | 46.1  | 1.5   | 77.7  | 34.2  | 1.3   | 77.3   | 14.9  | 31.9  | 43.8  | 12.5  |   |
| 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          | 52.5  | 46.1  | 1.5   | 77.7  | 34.2  | 1.3   | 77.3   | 14.9  | 31.9  | 43.8  | 12.5  |   |
| LOS                  | D   | D   | A   | E   | C   | A   | E  | B   | C   | D   | B   |   |
| Approach Delay       |   | 39.9  |   |   | 40.5  |   |  |   |   | 22.3  |   |   |
| Approach LOS         |   | D   |   |   | D   |   |  |   |   | C   |   |   |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 108 (90%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 40.4

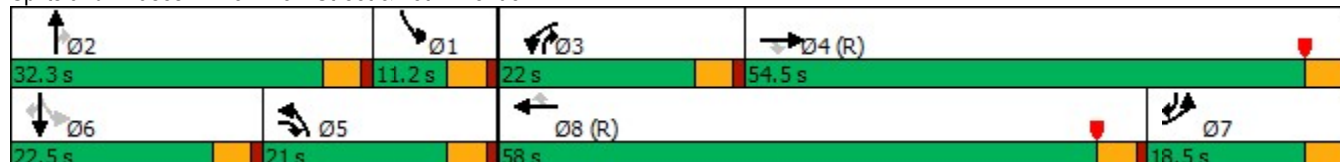
Intersection LOS: D

Intersection Capacity Utilization 79.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 13: Biloxi Street & 48th Avenue














## Queues

## 13: Biloxi Street &amp; 48th Avenue

Future Total (2040)

AM Peak Hour

|                         |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|--|---|---|---|---|
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBR   | SBL   | SBT   | SBR   |
| Lane Group Flow (vph)   | 299   | 2136  | 446   | 478   | 2190  | 103   | 435  | 299   | 190   | 5   | 196   |
| v/c Ratio               | 0.75  | 1.01  | 0.41  | 0.96  | 0.97  | 0.13  | 0.92   | 0.46  | 0.32  | 0.02  | 0.34  |
| Control Delay           | 52.5  | 46.1  | 1.5   | 77.7  | 34.2  | 1.3   | 77.3   | 14.9  | 31.9  | 43.8  | 12.5  |
| 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             | 52.5  | 46.1  | 1.5   | 77.7  | 34.2  | 1.3   | 77.3   | 14.9  | 31.9  | 43.8  | 12.5  |
| Queue Length 50th (ft)  | 113   | ~580  | 14  | 184   | 626   | 0   | 173  | 88  | 54  | 3   | 34  |
| Queue Length 95th (ft)  | m139  | m#704   | m37   | m#230   | #734  | m2  | #270   | 151   | 82  | 16  | 95  |
| Internal Link Dist (ft) |   | 420   |   |   | 580   |   |  |   |   | 543   |   |
| Turn Bay Length (ft)    | 275   |   | 400   | 275   |   | 150   | 250  | 300   | 275   |   |   |
| Base Capacity (vph)     | 400   | 2118  | 1076  | 500   | 2267  | 781   | 472  | 656   | 602   | 279   | 576   |
| 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       | 0.75  | 1.01  | 0.41  | 0.96  | 0.97  | 0.13  | 0.92   | 0.46  | 0.32  | 0.02  | 0.34  |

## 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.

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

# HCM 6th Signalized Intersection Summary

## 13: Biloxi Street & 48th Avenue

Future Total (2040)  
AM Peak Hour

|                              |  |  |  |  |  |  |   |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations          |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)       | 275   | 1965  | 410   | 440   | 2015  | 95  | 400   | 0   | 275   | 175   | 5   | 180   |
| Future Volume (veh/h)        | 275   | 1965  | 410   | 440   | 2015  | 95  | 400   | 0   | 275   | 175   | 5   | 180   |
| 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         | 299   | 2136  | 0   | 478   | 2190  | 103   | 435   | 0   | 0   | 190   | 5   | 0   |
| 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                   | 403   | 2128  |   | 504   | 2276  | 707   | 475   | 433   |   | 725   | 281   |   |
| Arrive On Green              | 0.23  | 0.83  | 0.00  | 0.29  | 0.89  | 0.89  | 0.14  | 0.00  | 0.00  | 0.06  | 0.15  | 0.00  |
| Sat Flow, veh/h              | 3456  | 5106  | 1585  | 3456  | 5106  | 1585  | 3456  | 1870  | 1585  | 3456  | 1870  | 1585  |
| Grp Volume(v), veh/h         | 299   | 2136  | 0   | 478   | 2190  | 103   | 435   | 0   | 0   | 190   | 5   | 0   |
| Grp Sat Flow(s),veh/h/ln     | 1728  | 1702  | 1585  | 1728  | 1702  | 1585  | 1728  | 1870  | 1585  | 1728  | 1870  | 1585  |
| Q Serve(g_s), s              | 9.6   | 50.0  | 0.0   | 16.3  | 39.2  | 1.0   | 14.9  | 0.0   | 0.0   | 0.0   | 0.3   | 0.0   |
| Cycle Q Clear(g_c), s        | 9.6   | 50.0  | 0.0   | 16.3  | 39.2  | 1.0   | 14.9  | 0.0   | 0.0   | 0.0   | 0.3   | 0.0   |
| Prop In Lane                 | 1.00  |   | 1.00  | 1.00  |   | 1.00  | 1.00  |   | 1.00  | 1.00  |   | 1.00  |
| Lane Grp Cap(c), veh/h       | 403   | 2128  |   | 504   | 2276  | 707   | 475   | 433   |   | 725   | 281   |   |
| V/C Ratio(X)                 | 0.74  | 1.00  |   | 0.95  | 0.96  | 0.15  | 0.92  | 0.00  |   | 0.26  | 0.02  |   |
| Avail Cap(c_a), veh/h        | 403   | 2128  |   | 504   | 2276  | 707   | 475   | 433   |   | 725   | 281   |   |
| HCM Platoon Ratio            | 2.00  | 2.00  | 2.00  | 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  | 0.00  | 1.00  | 1.00  | 1.00  | 1.00  | 0.00  | 0.00  | 1.00  | 1.00  | 0.00  |
| Uniform Delay (d), s/veh     | 44.3  | 10.0  | 0.0   | 42.1  | 5.7   | 3.7   | 51.1  | 0.0   | 0.0   | 40.7  | 43.5  | 0.0   |
| Incr Delay (d2), s/veh       | 7.2   | 20.5  | 0.0   | 27.6  | 11.8  | 0.4   | 22.4  | 0.0   | 0.0   | 0.2   | 0.1   | 0.0   |
| 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     | 4.1   | 7.8   | 0.0   | 7.8   | 4.9   | 0.4   | 7.9   | 0.0   | 0.0   | 2.4   | 0.1   | 0.0   |
| Unsig. Movement Delay, s/veh |   |   |   |   |   |   |   |   |   |   |   |   |
| LnGrp Delay(d),s/veh         | 51.5  | 30.5  | 0.0   | 69.7  | 17.6  | 4.1   | 73.5  | 0.0   | 0.0   | 40.8  | 43.6  | 0.0   |
| LnGrp LOS                    | D   | F   |   | E   | B   | A   | E   | A   |   | D   | D   |   |
| Approach Vol, veh/h          | 2435  |   | 2771  |   |   | 435   |   |   | 195   |   |   |   |
| Approach Delay, s/veh        | 33.0  |   | 26.0  |   |   | 73.5  |   |   | 40.9  |   |   |   |
| Approach LOS                 | C   |   | C   |   |   | E   |   |   | D   |   |   |   |
| Timer - Assigned Phs         | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |   |   |   |   |
| Phs Duration (G+Y+Rc), s     | 11.2  | 32.3  | 22.0  | 54.5  | 21.0  | 22.5  | 18.5  | 58.0  |   |   |   |   |
| Change Period (Y+Rc), s      | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |   |   |   |   |
| Max Green Setting (Gmax), s  | 6.7   | 27.8  | 17.5  | 50.0  | 16.5  | 18.0  | 14.0  | 53.5  |   |   |   |   |
| Max Q Clear Time (g_c+I1), s | 2.0   | 0.0   | 18.3  | 52.0  | 16.9  | 2.3   | 11.6  | 41.2  |   |   |   |   |
| Green Ext Time (p_c), s      | 0.2   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.3   | 10.6  |   |   |   |   |
| Intersection Summary         |   |   |   |   |   |   |   |   |   |   |   |   |
| HCM 6th Ctrl Delay           | 33.0  |   |   |   |   |   |   |   |   |   |   |   |
| HCM 6th LOS                  | C   |   |   |   |   |   |   |   |   |   |   |   |

| Intersection             |      |      |      |      |      |      |
|--------------------------|------|------|------|------|------|------|
| Int Delay, s/veh         | 10.9 |      |      |      |      |      |
| Movement                 | EBL  | EBT  | WBT  | WBR  | SBL  | SBR  |
| Lane Configurations      |      | ↑↑↑  | ↑↑↑  | ↑    |      | ↑    |
| Traffic Vol, veh/h       | 0    | 2405 | 2360 | 95   | 0    | 180  |
| Future Vol, veh/h        | 0    | 2405 | 2360 | 95   | 0    | 180  |
| Conflicting Peds, #/hr   | 0    | 0    | 0    | 0    | 0    | 0    |
| Sign Control             | Free | Free | Free | Free | Stop | Stop |
| RT Channelized           | -    | None | -    | None | -    | None |
| Storage Length           | -    | -    | -    | 300  | -    | 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                | 0    | 2614 | 2565 | 103  | 0    | 196  |

| Major/Minor          | Major1 | Major2 | Minor2     |
|----------------------|--------|--------|------------|
| Conflicting Flow All | -      | 0      | - 0 - 1283 |
| Stage 1              | -      | -      | - - -      |
| Stage 2              | -      | -      | - - -      |
| Critical Hdwy        | -      | -      | - - 7.14   |
| Critical Hdwy Stg 1  | -      | -      | - - -      |
| Critical Hdwy Stg 2  | -      | -      | - - -      |
| Follow-up Hdwy       | -      | -      | - - 3.92   |
| Pot Cap-1 Maneuver   | 0      | -      | - 0 ~ 134  |
| Stage 1              | 0      | -      | - 0 -      |
| Stage 2              | 0      | -      | - 0 -      |
| Platoon blocked, %   | -      | -      | -          |
| Mov Cap-1 Maneuver   | -      | -      | - - ~ 134  |
| Mov Cap-2 Maneuver   | -      | -      | - - -      |
| Stage 1              | -      | -      | - - -      |
| Stage 2              | -      | -      | - - -      |

| Approach             | EB | WB | SB       |
|----------------------|----|----|----------|
| HCM Control Delay, s | 0  | 0  | \$ 303.8 |
| HCM LOS              |    |    | F        |

| Minor Lane/Major Mvmt | EBT | WBT | WBR | SBLn1    |
|-----------------------|-----|-----|-----|----------|
| Capacity (veh/h)      | -   | -   | -   | 134      |
| HCM Lane V/C Ratio    | -   | -   | -   | 1.46     |
| HCM Control Delay (s) | -   | -   | -   | \$ 303.8 |
| HCM Lane LOS          | -   | -   | -   | F        |
| HCM 95th %tile Q(veh) | -   | -   | -   | 13.2     |

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

Timings  
1: Biloxi Street & 56th Avenue

Future Total (2040)  
PM Peak Hour

|                      | →     | ↖     | ←     | ↗     | ↘     |
|----------------------|-------|-------|-------|-------|-------|
| Lane Group           | EBT   | WBL   | WBT   | NBL   | NBR   |
| Lane Configurations  | ↑↑↑   | ↖     | ↑↑↑   | ↖     | ↖     |
| Traffic Volume (vph) | 1780  | 25    | 1725  | 120   | 25    |
| Future Volume (vph)  | 1780  | 25    | 1725  | 120   | 25    |
| Turn Type            | NA    | pm+pt | NA    | Prot  | Perm  |
| Protected Phases     | 4     | 3     | 8     | 2     |       |
| Permitted Phases     |       | 8     |       |       | 2     |
| Detector Phase       | 4     | 3     | 8     | 2     | 2     |
| Switch Phase         |       |       |       |       |       |
| Minimum Initial (s)  | 5.0   | 5.0   | 5.0   | 5.0   | 5.0   |
| Minimum Split (s)    | 22.5  | 9.5   | 22.5  | 22.5  | 22.5  |
| Total Split (s)      | 81.0  | 12.0  | 93.0  | 27.0  | 27.0  |
| Total Split (%)      | 67.5% | 10.0% | 77.5% | 22.5% | 22.5% |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| Lost Time Adjust (s) | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Lost Time (s)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lag   | Lead  |       |       |       |
| Lead-Lag Optimize?   | Yes   | Yes   |       |       |       |
| Recall Mode          | C-Max | None  | C-Max | None  | None  |
| Act Effect Green (s) | 90.5  | 96.9  | 96.9  | 14.1  | 14.1  |
| Actuated g/C Ratio   | 0.75  | 0.81  | 0.81  | 0.12  | 0.12  |
| v/c Ratio            | 0.55  | 0.15  | 0.46  | 0.63  | 0.13  |
| Control Delay        | 12.7  | 4.8   | 4.2   | 63.2  | 16.8  |
| Queue Delay          | 0.3   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay          | 13.0  | 4.8   | 4.2   | 63.2  | 16.8  |
| LOS                  | B     | A     | A     | E     | B     |
| Approach Delay       | 13.0  |       | 4.2   | 55.2  |       |
| Approach LOS         | B     |       | A     | E     |       |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 4:EBT and 8:WBTL, Start of Yellow

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 10.6

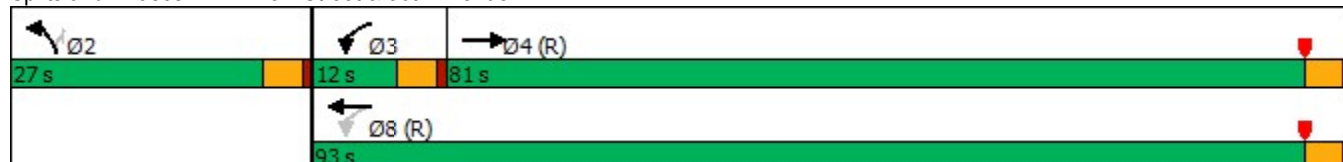
Intersection LOS: B

Intersection Capacity Utilization 52.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Biloxi Street & 56th Avenue








## Queues

## 1: Biloxi Street &amp; 56th Avenue

Future Total (2040)







PM Peak Hour

|                         |  |  |  |  |  |
|-------------------------|---|---|---|---|---|
| Lane Group              | EBT   | WBL   | WBT   | NBL   | NBR   |
| Lane Group Flow (vph)   | 2103  | 27  | 1875  | 130   | 27  |
| v/c Ratio               | 0.55  | 0.15  | 0.46  | 0.63  | 0.13  |
| Control Delay           | 12.7  | 4.8   | 4.2   | 63.2  | 16.8  |
| Queue Delay             | 0.3   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay             | 13.0  | 4.8   | 4.2   | 63.2  | 16.8  |
| Queue Length 50th (ft)  | 534   | 3   | 129   | 97  | 0   |
| Queue Length 95th (ft)  | 597   | 11  | 194   | 157   | 27  |
| Internal Link Dist (ft) | 670   |   | 1090  | 351   |   |
| Turn Bay Length (ft)    |   | 250   |   | 275   | 150   |
| Base Capacity (vph)     | 3795  | 197   | 4106  | 331   | 318   |
| Starvation Cap Reductn  | 884   | 0   | 0   | 0   | 0   |
| Spillback Cap Reductn   | 0   | 0   | 0   | 0   | 0   |
| Storage Cap Reductn     | 0   | 0   | 0   | 0   | 0   |
| Reduced v/c Ratio       | 0.72  | 0.14  | 0.46  | 0.39  | 0.08  |
| Intersection Summary    |   |   |   |   |   |

# HCM 6th Signalized Intersection Summary






























## 1: Biloxi Street & 56th Avenue

Future Total (2040)  
PM Peak Hour

|                              |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|
| Movement                     | EBT   | EBR   | WBL   | WBT   | NBL   | NBR   |
| Lane Configurations          | ↑↑↑↱  |   | ↱   | ↑↑↑   | ↱   | ↱   |
| Traffic Volume (veh/h)       | 1780  | 155   | 25  | 1725  | 120   | 25  |
| Future Volume (veh/h)        | 1780  | 155   | 25  | 1725  | 120   | 25  |
| Initial Q (Qb), veh          | 0   | 0   | 0   | 0   | 0   | 0   |
| Ped-Bike Adj(A_pbT)          |   | 1.00  | 1.00  |   | 1.00  | 1.00  |
| Parking Bus, Adj             | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Work Zone On Approach        | No  |   |   | No  | No  |   |
| Adj Sat Flow, veh/h/ln       | 1870  | 1870  | 1870  | 1870  | 1870  | 1870  |
| Adj Flow Rate, veh/h         | 1935  | 168   | 27  | 1875  | 130   | 27  |
| Peak Hour Factor             | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  |
| Percent Heavy Veh, %         | 2   | 2   | 2   | 2   | 2   | 2   |
| Cap, veh/h                   | 3697  | 319   | 254   | 4262  | 161   | 143   |
| Arrive On Green              | 1.00  | 1.00  | 0.02  | 0.83  | 0.09  | 0.09  |
| Sat Flow, veh/h              | 4955  | 413   | 1781  | 5274  | 1781  | 1585  |
| Grp Volume(v), veh/h         | 1373  | 730   | 27  | 1875  | 130   | 27  |
| Grp Sat Flow(s),veh/h/ln     | 1702  | 1796  | 1781  | 1702  | 1781  | 1585  |
| Q Serve(g_s), s              | 0.0   | 0.0   | 0.3   | 11.5  | 8.6   | 1.9   |
| Cycle Q Clear(g_c), s        | 0.0   | 0.0   | 0.3   | 11.5  | 8.6   | 1.9   |
| Prop In Lane                 |   | 0.23  | 1.00  |   | 1.00  | 1.00  |
| Lane Grp Cap(c), veh/h       | 2629  | 1387  | 254   | 4262  | 161   | 143   |
| V/C Ratio(X)                 | 0.52  | 0.53  | 0.11  | 0.44  | 0.81  | 0.19  |
| Avail Cap(c_a), veh/h        | 2629  | 1387  | 322   | 4262  | 334   | 297   |
| HCM Platoon Ratio            | 1.33  | 1.33  | 1.00  | 1.00  | 1.00  | 1.00  |
| Upstream Filter(I)           | 0.78  | 0.78  | 0.90  | 0.90  | 1.00  | 1.00  |
| Uniform Delay (d), s/veh     | 0.0   | 0.0   | 2.1   | 2.6   | 53.6  | 50.5  |
| Incr Delay (d2), s/veh       | 0.6   | 1.1   | 0.2   | 0.3   | 9.2   | 0.6   |
| Initial Q Delay(d3),s/veh    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| %ile BackOfQ(50%),veh/ln     | 0.2   | 0.4   | 0.1   | 2.0   | 4.3   | 0.8   |
| Unsig. Movement Delay, s/veh |   |   |   |   |   |   |
| LnGrp Delay(d),s/veh         | 0.6   | 1.1   | 2.3   | 2.9   | 62.7  | 51.1  |
| LnGrp LOS                    | A   | A   | A   | A   | E   | D   |
| Approach Vol, veh/h          | 2103  |   |   | 1902  | 157   |   |
| Approach Delay, s/veh        | 0.8   |   |   | 2.9   | 60.7  |   |
| Approach LOS                 | A   |   |   | A   | E   |   |
| Timer - Assigned Phs         | 2   |   | 3   | 4   | 8   |   |
| Phs Duration (G+Y+Rc), s     | 15.3  |   | 7.5   | 97.2  | 104.7   |   |
| Change Period (Y+Rc), s      | 4.5   |   | 4.5   | 4.5   | 4.5   |   |
| Max Green Setting (Gmax), s  | 22.5  |   | 7.5   | 76.5  | 88.5  |   |
| Max Q Clear Time (g_c+l1), s | 10.6  |   | 2.3   | 2.0   | 13.5  |   |
| Green Ext Time (p_c), s      | 0.3   |   | 0.0   | 27.9  | 23.8  |   |
| Intersection Summary         |   |   |   |   |   |   |
| HCM 6th Ctrl Delay           |   |   | 4.0   |   |   |   |
| HCM 6th LOS                  |   |   | A   |   |   |   |

# Timings 3: Denali Boulevard & 56th Avenue

Future Total (2040)  
PM Peak Hour

|                      |  |    |  |    |    |   |   |  |  |  |  |
|----------------------|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group           | EBL   | EBT   | EBR   | WBL   | WBT   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations  |  |    |  |    |    |   |  |  |  |  |  |
| Traffic Volume (vph) | 20  | 1020  | 595   | 345   | 1145  | 425  | 10  | 205   | 30  | 5   | 50  |
| Future Volume (vph)  | 20  | 1020  | 595   | 345   | 1145  | 425  | 10  | 205   | 30  | 5   | 50  |
| Turn Type            | pm+pt   | NA  | pm+ov   | Prot  | NA  | Prot   | NA  | pm+ov   | Perm  | NA  | pm+ov   |
| Protected Phases     | 7   | 4   | 5   | 3   | 8   | 5  | 2   | 3   |   | 6   | 7   |
| Permitted Phases     | 4   |   | 4   |   |   |  |   | 2   | 6   |   | 6   |
| Detector Phase       | 7   | 4   | 5   | 3   | 8   | 5  | 2   | 3   | 6   | 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)    | 9.5   | 22.5  | 22.5  | 9.5   | 22.5  | 22.5   | 22.5  | 9.5   | 22.5  | 22.5  | 9.5   |
| Total Split (s)      | 9.6   | 40.3  | 33.0  | 24.2  | 54.9  | 33.0   | 55.5  | 24.2  | 22.5  | 22.5  | 9.6   |
| Total Split (%)      | 8.0%  | 33.6%   | 27.5%   | 20.2%   | 45.8%   | 27.5%  | 46.3%   | 20.2%   | 18.8%   | 18.8%   | 8.0%  |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5  | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0  | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lead  | Lead  | Lead  | Lag   | Lag   | Lead   |   | Lag   | Lag   | Lag   | Lead  |
| Lead-Lag Optimize?   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes  |   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode          | None  | C-Max   | None  | None  | C-Max   | None   | None  | None  | None  | None  | None  |
| Act Effect Green (s) | 55.3  | 55.3  | 80.0  | 19.7  | 70.5  | 22.9   | 31.5  | 55.7  | 8.4   | 8.4   | 15.1  |
| Actuated g/C Ratio   | 0.46  | 0.46  | 0.67  | 0.16  | 0.59  | 0.19   | 0.26  | 0.46  | 0.07  | 0.07  | 0.13  |
| v/c Ratio            | 0.11  | 0.47  | 0.53  | 0.67  | 0.42  | 0.70   | 0.02  | 0.29  | 0.34  | 0.04  | 0.19  |
| Control Delay        | 24.1  | 25.1  | 2.9   | 51.4  | 15.0  | 51.1   | 26.3  | 14.0  | 61.7  | 50.8  | 3.1   |
| 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          | 24.1  | 25.1  | 2.9   | 51.4  | 15.0  | 51.1   | 26.3  | 14.0  | 61.7  | 50.8  | 3.1   |
| LOS                  | C   | C   | A   | D   | B   | D  | C   | B   | E   | D   | A   |
| Approach Delay       |   | 17.0  |   |   | 23.4  |  | 38.8  |   |   | 26.7  |   |
| 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 Yellow

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70

Intersection Signal Delay: 23.3

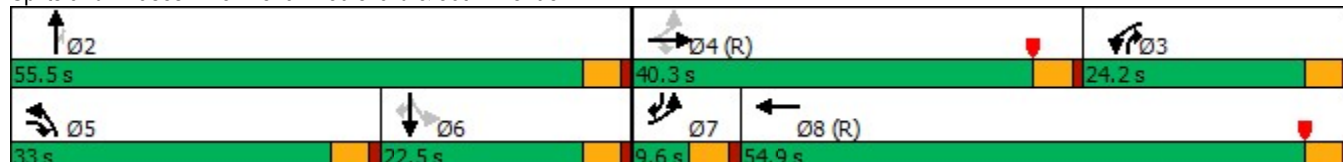
Intersection LOS: C

Intersection Capacity Utilization 62.1%

ICU Level of Service B












Analysis Period (min) 15

Splits and Phases: 3: Denali Boulevard & 56th Avenue



Queues  
3: Denali Boulevard & 56th Avenue

Future Total (2040)  
PM Peak Hour

|                         |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|--|---|---|---|---|
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | NBL   | NBT  | NBR   | SBL   | SBT   | SBR   |
| Lane Group Flow (vph)   | 22  | 1109  | 647   | 375   | 1256  | 462   | 11   | 223   | 33  | 5   | 54  |
| v/c Ratio               | 0.11  | 0.47  | 0.53  | 0.67  | 0.42  | 0.70  | 0.02   | 0.29  | 0.34  | 0.04  | 0.19  |
| Control Delay           | 24.1  | 25.1  | 2.9   | 51.4  | 15.0  | 51.1  | 26.3   | 14.0  | 61.7  | 50.8  | 3.1   |
| 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             | 24.1  | 25.1  | 2.9   | 51.4  | 15.0  | 51.1  | 26.3   | 14.0  | 61.7  | 50.8  | 3.1   |
| Queue Length 50th (ft)  | 10  | 227   | 21  | 151   | 151   | 173   | 6  | 71  | 25  | 4   | 0   |
| Queue Length 95th (ft)  | 30  | 308   | 50  | m200  | 334   | 218   | 18   | 102   | 58  | 17  | 8   |
| Internal Link Dist (ft) |   | 546   |   |   | 823   |   | 622  |   |   | 214   |   |
| Turn Bay Length (ft)    | 150   |   | 350   | 275   |   | 275   |  |   | 100   |   | 100   |
| Base Capacity (vph)     | 193   | 2341  | 1244  | 563   | 2984  | 815   | 791  | 764   | 209   | 279   | 281   |
| Starvation Cap Reductn  | 0   | 0   | 16  | 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       | 0.11  | 0.47  | 0.53  | 0.67  | 0.42  | 0.57  | 0.01   | 0.29  | 0.16  | 0.02  | 0.19  |






























Intersection Summary

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

# HCM 6th Signalized Intersection Summary

























## 3: Denali Boulevard & 56th Avenue

Future Total (2040)  
PM Peak Hour

|                              |  |    |  |    |    |  |    |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations          |  |    |  |   |    |   |   |  |  |  |  |  |
| Traffic Volume (veh/h)       | 20  | 1020  | 595   | 345   | 1145  | 10  | 425  | 10  | 205   | 30  | 5   | 50  |
| Future Volume (veh/h)        | 20  | 1020  | 595   | 345   | 1145  | 10  | 425  | 10  | 205   | 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  | 1109  | 647   | 375   | 1245  | 11  | 462  | 11  | 223   | 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                   | 113   | 1523  | 723   | 1186  | 3236  | 29  | 545  | 460   | 934   | 118   | 95  | 115   |
| Arrive On Green              | 0.02  | 0.30  | 0.30  | 0.11  | 0.20  | 0.20  | 0.16   | 0.25  | 0.25  | 0.05  | 0.05  | 0.05  |
| Sat Flow, veh/h              | 1781  | 5106  | 1585  | 3456  | 5220  | 46  | 3456   | 1870  | 1585  | 1146  | 1870  | 1585  |
| Grp Volume(v), veh/h         | 22  | 1109  | 647   | 375   | 812   | 444   | 462  | 11  | 223   | 33  | 5   | 54  |
| Grp Sat Flow(s),veh/h/ln     | 1781  | 1702  | 1585  | 1728  | 1702  | 1862  | 1728   | 1870  | 1585  | 1146  | 1870  | 1585  |
| Q Serve(g_s), s              | 1.1   | 23.4  | 19.9  | 12.0  | 24.7  | 24.7  | 15.6   | 0.5   | 0.0   | 3.4   | 0.3   | 3.9   |
| Cycle Q Clear(g_c), s        | 1.1   | 23.4  | 19.9  | 12.0  | 24.7  | 24.7  | 15.6   | 0.5   | 0.0   | 3.4   | 0.3   | 3.9   |
| Prop In Lane                 | 1.00  |   | 1.00  | 1.00  |   | 0.02  | 1.00   |   | 1.00  | 1.00  |   | 1.00  |
| Lane Grp Cap(c), veh/h       | 113   | 1523  | 723   | 1186  | 2110  | 1154  | 545  | 460   | 934   | 118   | 95  | 115   |
| V/C Ratio(X)                 | 0.19  | 0.73  | 0.90  | 0.32  | 0.38  | 0.38  | 0.85   | 0.02  | 0.24  | 0.28  | 0.05  | 0.47  |
| Avail Cap(c_a), veh/h        | 150   | 1523  | 723   | 1186  | 2110  | 1154  | 821  | 795   | 1218  | 232   | 281   | 272   |
| HCM Platoon Ratio            | 1.00  | 1.00  | 1.00  | 0.33  | 0.33  | 0.33  | 1.00   | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Upstream Filter(I)           | 0.86  | 0.86  | 0.86  | 1.00  | 1.00  | 1.00  | 1.00   | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Uniform Delay (d), s/veh     | 34.8  | 37.7  | 18.2  | 40.3  | 28.0  | 28.0  | 49.1   | 34.3  | 11.8  | 55.7  | 54.2  | 53.4  |
| Incr Delay (d2), s/veh       | 0.7   | 2.7   | 14.1  | 0.2   | 0.5   | 1.0   | 5.4  | 0.0   | 0.1   | 1.3   | 0.2   | 3.0   |
| 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     | 0.5   | 10.0  | 8.4   | 5.6   | 11.4  | 12.7  | 7.1  | 0.2   | 2.8   | 1.0   | 0.2   | 1.7   |
| Unsig. Movement Delay, s/veh |   |   |   |   |   |   |  |   |   |   |   |   |
| LnGrp Delay(d),s/veh         | 35.6  | 40.4  | 32.3  | 40.4  | 28.5  | 28.9  | 54.5   | 34.3  | 11.9  | 56.9  | 54.4  | 56.4  |
| LnGrp LOS                    | D   | D   | C   | D   | C   | C   | D  | C   | B   | E   | D   | E   |
| Approach Vol, veh/h          | 1778  |   |   |   |   | 1631  |  | 696   |   | 92  |   |   |
| Approach Delay, s/veh        | 37.4  |   |   |   |   | 31.4  |  | 40.6  |   | 56.5  |   |   |
| Approach LOS                 | D   |   |   |   |   | C   |  | D   |   | E   |   |   |
| Timer - Assigned Phs         | 2   |   | 3   | 4   | 5   | 6   | 7  | 8   |   |   |   |   |
| Phs Duration (G+Y+Rc), s     | 34.0  |   | 45.7  | 40.3  | 23.4  | 10.6  | 7.1  | 78.9  |   |   |   |   |
| Change Period (Y+Rc), s      | 4.5   |   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   |   |   |   |   |
| Max Green Setting (Gmax), s  | 51.0  |   | 19.7  | 35.8  | 28.5  | 18.0  | 5.1  | 50.4  |   |   |   |   |
| Max Q Clear Time (g_c+I1), s | 2.5   |   | 14.0  | 25.4  | 17.6  | 5.9   | 3.1  | 26.7  |   |   |   |   |
| Green Ext Time (p_c), s      | 0.8   |   | 0.7   | 7.0   | 1.3   | 0.2   | 0.0  | 9.5   |   |   |   |   |
| Intersection Summary         |   |   |   |   |   |   |  |   |   |   |   |   |
| HCM 6th Ctrl Delay           |   |   | 36.0  |   |   |   |  |   |   |   |   |   |
| HCM 6th LOS                  |   |   | D   |   |   |   |  |   |   |   |   |   |
| Notes                        |   |   |   |   |   |   |  |   |   |   |   |   |

Timings  
12: Denali Boulevard & 48th Avenue

Future Total (2040)  
PM Peak Hour

|                      |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group           | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations  |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 725   | 1665  | 780   | 520   | 1160  | 255   | 630  | 205   | 455   | 285   | 230   | 500   |
| Future Volume (vph)  | 725   | 1665  | 780   | 520   | 1160  | 255   | 630  | 205   | 455   | 285   | 230   | 500   |
| Turn Type            | Prot  | NA  | pm+ov   | Prot  | NA  | pm+ov   | Prot   | NA  | pm+ov   | pm+pt   | NA  | pm+ov   |
| Protected Phases     | 7   | 4   | 5   | 3   | 8   | 1   | 5  | 2   | 3   | 1   | 6   | 7   |
| Permitted Phases     |   |   | 4   |   |   | 8   |  |   | 2   | 6   |   | 6   |
| Detector Phase       | 7   | 4   | 5   | 3   | 8   | 1   | 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   | 5.0   |
| Minimum Split (s)    | 9.5   | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   | 9.5  | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   |
| Total Split (s)      | 31.0  | 44.9  | 29.0  | 24.2  | 38.1  | 26.4  | 29.0   | 24.5  | 24.2  | 26.4  | 21.9  | 31.0  |
| Total Split (%)      | 25.8%   | 37.4%   | 24.2%   | 20.2%   | 31.8%   | 22.0%   | 24.2%  | 20.4%   | 20.2%   | 22.0%   | 18.3%   | 25.8%   |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5  | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0  | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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   | 0.0   |
| Total Lost Time (s)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lag   | Lag   | Lead  | Lead  | Lead  | Lag   | Lead   | Lead  | Lead  | Lag   | Lag   | Lag   |
| Lead-Lag Optimize?   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes  | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode          | None  | C-Max   | None  | None  | C-Max   | None  | None   | None  | None  | None  | None  | None  |
| Act Effect Green (s) | 26.5  | 40.6  | 69.6  | 21.6  | 35.8  | 67.1  | 24.5   | 12.9  | 34.5  | 26.9  | 15.2  | 41.7  |
| Actuated g/C Ratio   | 0.22  | 0.34  | 0.58  | 0.18  | 0.30  | 0.56  | 0.20   | 0.11  | 0.29  | 0.22  | 0.13  | 0.35  |
| v/c Ratio            | 1.04  | 1.05  | 0.90  | 0.91  | 0.83  | 0.30  | 0.98   | 0.59  | 0.95  | 0.78  | 0.56  | 0.89  |
| Control Delay        | 70.7  | 63.1  | 16.0  | 52.2  | 29.1  | 2.5   | 76.9   | 57.2  | 51.2  | 58.8  | 53.7  | 34.0  |
| Queue Delay          | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay          | 70.7  | 63.1  | 16.0  | 52.2  | 29.1  | 2.5   | 76.9   | 57.2  | 51.2  | 58.8  | 53.7  | 34.0  |
| LOS                  | E   | E   | B   | D   | C   | A   | E  | E   | D   | E   | D   | C   |
| Approach Delay       |   | 53.3  |   |   | 31.8  |   |  | 64.7  |   |   | 45.4  |   |
| Approach LOS         |   | D   |   |   | C   |   |  | E   |   |   | D   |   |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 16 (13%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 48.6

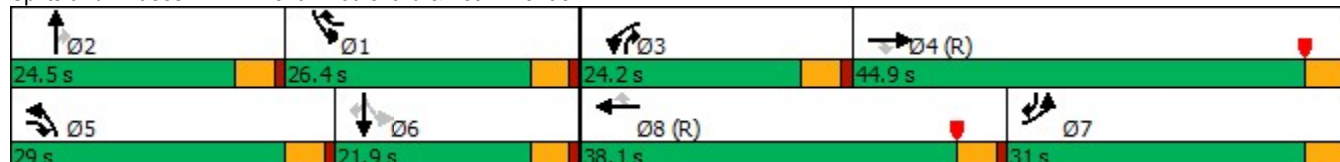
Intersection LOS: D

Intersection Capacity Utilization 87.4%

ICU Level of Service E













Analysis Period (min) 15

Splits and Phases: 12: Denali Boulevard & 48th Avenue



Queues  
12: Denali Boulevard & 48th Avenue

Future Total (2040)  
PM Peak Hour

|                         |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Group Flow (vph)   | 788   | 1810  | 848   | 565   | 1261  | 277   | 685  | 223   | 495   | 310   | 250   | 543   |
| v/c Ratio               | 1.04  | 1.05  | 0.90  | 0.91  | 0.83  | 0.30  | 0.98   | 0.59  | 0.95  | 0.78  | 0.56  | 0.89  |
| Control Delay           | 70.7  | 63.1  | 16.0  | 52.2  | 29.1  | 2.5   | 76.9   | 57.2  | 51.2  | 58.8  | 53.7  | 34.0  |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay             | 70.7  | 63.1  | 16.0  | 52.2  | 29.1  | 2.5   | 76.9   | 57.2  | 51.2  | 58.8  | 53.7  | 34.0  |
| Queue Length 50th (ft)  | ~335  | ~556  | 157   | ~232  | 351   | 6   | 274  | 87  | 182   | 222   | 95  | 167   |
| Queue Length 95th (ft)  | m#350   | m#569   | m112  | #342  | #355  | 16  | #397   | 126   | #375  | #376  | 138   | #337  |
| Internal Link Dist (ft) |   | 640   |   |   | 1760  |   |  | 542   |   |   | 586   |   |
| Turn Bay Length (ft)    | 250   |   | 275   | 300   |   | 150   | 400  |   | 250   | 300   |   | 225   |
| Base Capacity (vph)     | 758   | 1720  | 942   | 618   | 1515  | 923   | 700  | 589   | 522   | 396   | 513   | 612   |
| Starvation Cap Reductn  | 0   | 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   | 0   |
| Storage Cap Reductn     | 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0   | 0   | 0   | 0   | 0   |
| Reduced v/c Ratio       | 1.04  | 1.05  | 0.90  | 0.91  | 0.83  | 0.30  | 0.98   | 0.38  | 0.95  | 0.78  | 0.49  | 0.89  |

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.

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

# HCM 6th Signalized Intersection Summary 12: Denali Boulevard & 48th Avenue

Future Total (2040)  
PM Peak Hour

|                              |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations          |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)       | 725   | 1665  | 780   | 520   | 1160  | 255   | 630  | 205   | 455   | 285   | 230   | 500   |
| Future Volume (veh/h)        | 725   | 1665  | 780   | 520   | 1160  | 255   | 630  | 205   | 455   | 285   | 230   | 500   |
| 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         | 788   | 1810  | 0   | 565   | 1261  | 141   | 685  | 223   | 0   | 310   | 250   | 271   |
| 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                   | 927   | 1961  |   | 567   | 1430  | 787   | 706  | 304   |   | 445   | 347   | 580   |
| Arrive On Green              | 0.54  | 0.77  | 0.00  | 0.05  | 0.09  | 0.09  | 0.20   | 0.09  | 0.00  | 0.22  | 0.10  | 0.10  |
| Sat Flow, veh/h              | 3456  | 5106  | 1585  | 3456  | 5106  | 1585  | 3456   | 3554  | 1585  | 1781  | 3554  | 1585  |
| Grp Volume(v), veh/h         | 788   | 1810  | 0   | 565   | 1261  | 141   | 685  | 223   | 0   | 310   | 250   | 271   |
| Grp Sat Flow(s),veh/h/ln     | 1728  | 1702  | 1585  | 1728  | 1702  | 1585  | 1728   | 1777  | 1585  | 1781  | 1777  | 1585  |
| Q Serve(g_s), s              | 23.3  | 33.9  | 0.0   | 19.6  | 29.3  | 0.0   | 23.6   | 7.3   | 0.0   | 14.9  | 8.2   | 6.0   |
| Cycle Q Clear(g_c), s        | 23.3  | 33.9  | 0.0   | 19.6  | 29.3  | 0.0   | 23.6   | 7.3   | 0.0   | 14.9  | 8.2   | 6.0   |
| Prop In Lane                 | 1.00  |   | 1.00  | 1.00  |   | 1.00  | 1.00   |   | 1.00  | 1.00  |   | 1.00  |
| Lane Grp Cap(c), veh/h       | 927   | 1961  |   | 567   | 1430  | 787   | 706  | 304   |   | 445   | 347   | 580   |
| V/C Ratio(X)                 | 0.85  | 0.92  |   | 1.00  | 0.88  | 0.18  | 0.97   | 0.73  |   | 0.70  | 0.72  | 0.47  |
| Avail Cap(c_a), veh/h        | 927   | 1961  |   | 567   | 1430  | 787   | 706  | 592   |   | 445   | 515   | 655   |
| HCM Platoon Ratio            | 2.00  | 2.00  | 2.00  | 0.33  | 0.33  | 0.33  | 1.00   | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Upstream Filter(I)           | 1.00  | 1.00  | 0.00  | 0.77  | 0.77  | 0.77  | 1.00   | 1.00  | 0.00  | 1.00  | 1.00  | 1.00  |
| Uniform Delay (d), s/veh     | 25.8  | 12.5  | 0.0   | 56.7  | 52.5  | 21.6  | 47.4   | 53.5  | 0.0   | 41.3  | 52.5  | 11.5  |
| Incr Delay (d2), s/veh       | 7.6   | 8.8   | 0.0   | 32.1  | 6.5   | 0.4   | 26.7   | 3.4   | 0.0   | 4.7   | 2.8   | 0.6   |
| 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     | 8.0   | 6.2   | 0.0   | 11.7  | 14.3  | 2.9   | 12.7   | 3.4   | 0.0   | 8.9   | 3.8   | 2.6   |
| Unsig. Movement Delay, s/veh |   |   |   |   |   |   |  |   |   |   |   |   |
| LnGrp Delay(d),s/veh         | 33.4  | 21.3  | 0.0   | 88.8  | 59.0  | 22.0  | 74.1   | 56.9  | 0.0   | 46.0  | 55.4  | 12.1  |
| LnGrp LOS                    | C   | C   |   | F   | E   | C   | E  | E   |   | D   | E   | B   |
| Approach Vol, veh/h          | 2598  |   |   | 1967  |   |   | 908  |   |   | 831   |   |   |
| Approach Delay, s/veh        | 25.0  |   |   | 64.9  |   |   | 69.9   |   |   | 37.8  |   |   |
| Approach LOS                 | C   |   |   | E   |   |   | E  |   |   | D   |   |   |
| Timer - Assigned Phs         | 1   | 2   | 3   | 4   | 5   | 6   | 7  | 8   |   |   |   |   |
| Phs Duration (G+Y+Rc), s     | 30.4  | 14.8  | 24.2  | 50.6  | 29.0  | 16.2  | 36.7   | 38.1  |   |   |   |   |
| Change Period (Y+Rc), s      | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   |   |   |   |   |
| Max Green Setting (Gmax), s  | 21.9  | 20.0  | 19.7  | 40.4  | 24.5  | 17.4  | 26.5   | 33.6  |   |   |   |   |
| Max Q Clear Time (g_c+I1), s | 16.9  | 9.3   | 21.6  | 35.9  | 25.6  | 10.2  | 25.3   | 31.3  |   |   |   |   |
| Green Ext Time (p_c), s      | 0.4   | 0.9   | 0.0   | 3.8   | 0.0   | 1.5   | 0.5  | 1.8   |   |   |   |   |

## Intersection Summary

HCM 6th Ctrl Delay 45.6

HCM 6th LOS D

























## Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, EBR] is excluded from calculations of the approach delay and intersection delay.

Timings  
13: Biloxi Street & 48th Avenue

Future Total (2040)  
PM Peak Hour

|                      |  |  |  |  |  |  |   |  |  |  |  |  |
|----------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group           | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL   | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations  |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (vph) | 520   | 2525  | 450   | 250   | 2035  | 185   | 355   | 5   | 370   | 315   | 10  | 390   |
| Future Volume (vph)  | 520   | 2525  | 450   | 250   | 2035  | 185   | 355   | 5   | 370   | 315   | 10  | 390   |
| Turn Type            | Prot  | NA  | pm+ov   | Prot  | NA  | pm+ov   | Prot  | NA  | pm+ov   | Prot  | NA  | pm+ov   |
| Protected Phases     | 7   | 4   | 5   | 3   | 8   | 1   | 5   | 2   | 3   | 1   | 6   | 7   |
| Permitted Phases     |   |   | 4   |   |   | 8   |   |   | 2   |   |   | 6   |
| Detector Phase       | 7   | 4   | 5   | 3   | 8   | 1   | 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   | 5.0   |
| Minimum Split (s)    | 9.5   | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   | 9.5   | 22.5  | 9.5   |
| Total Split (s)      | 33.0  | 59.0  | 21.0  | 28.0  | 54.0  | 20.0  | 21.0  | 13.0  | 28.0  | 20.0  | 12.0  | 33.0  |
| Total Split (%)      | 27.5%   | 49.2%   | 17.5%   | 23.3%   | 45.0%   | 16.7%   | 17.5%   | 10.8%   | 23.3%   | 16.7%   | 10.0%   | 27.5%   |
| Yellow Time (s)      | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   | 3.5   |
| All-Red Time (s)     | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   | 1.0   |
| 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   | 0.0   |
| Total Lost Time (s)  | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   |
| Lead/Lag             | Lag   | Lead  | Lead  | Lag   | Lead  | Lead  | Lead  | Lag   | Lag   | Lead  | Lag   | Lag   |
| Lead-Lag Optimize?   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |
| Recall Mode          | None  | C-Max   | None  | None  | C-Max   | None  | None  | None  | None  | None  | None  | None  |
| Act Effect Green (s) | 27.8  | 65.2  | 84.9  | 22.8  | 60.2  | 79.7  | 16.1  | 6.3   | 24.5  | 15.9  | 6.3   | 29.3  |
| Actuated g/C Ratio   | 0.23  | 0.54  | 0.71  | 0.19  | 0.50  | 0.66  | 0.13  | 0.05  | 0.20  | 0.13  | 0.05  | 0.24  |
| v/c Ratio            | 0.71  | 0.99  | 0.40  | 0.42  | 0.87  | 0.18  | 0.84  | 0.05  | 1.01  | 0.75  | 0.11  | 0.99  |
| Control Delay        | 43.0  | 17.6  | 0.3   | 41.5  | 24.4  | 3.7   | 67.6  | 54.2  | 80.0  | 61.5  | 56.3  | 78.1  |
| Queue Delay          | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay          | 43.0  | 17.6  | 0.3   | 41.5  | 24.4  | 3.7   | 67.6  | 54.2  | 80.0  | 61.5  | 56.3  | 78.1  |
| LOS                  | D   | B   | A   | D   | C   | A   | E   | D   | E   | E   | E   | E   |
| Approach Delay       |   | 19.2  |   |   | 24.6  |   |   | 73.8  |   |   | 70.5  |   |
| Approach LOS         |   | B   |   |   | C   |   |   | E   |   |   | E   |   |

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 35 (29%), Referenced to phase 4:EBT and 8:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 31.3

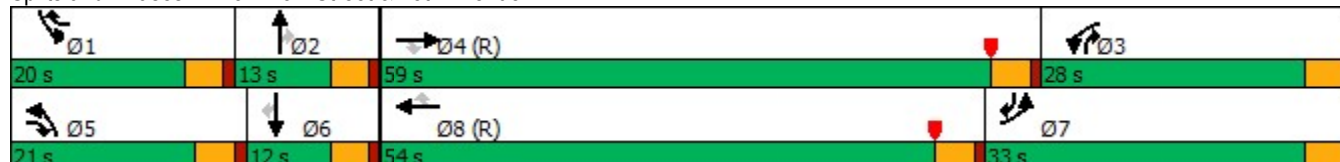
Intersection LOS: C

Intersection Capacity Utilization 91.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 13: Biloxi Street & 48th Avenue















## Queues

## 13: Biloxi Street &amp; 48th Avenue

Future Total (2040)

PM Peak Hour

|                         |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Lane Group              | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Group Flow (vph)   | 565   | 2745  | 489   | 272   | 2212  | 201   | 386  | 5   | 402   | 342   | 11  | 424   |
| v/c Ratio               | 0.71  | 0.99  | 0.40  | 0.42  | 0.87  | 0.18  | 0.84   | 0.05  | 1.01  | 0.75  | 0.11  | 0.99  |
| Control Delay           | 43.0  | 17.6  | 0.3   | 41.5  | 24.4  | 3.7   | 67.6   | 54.2  | 80.0  | 61.5  | 56.3  | 78.1  |
| Queue Delay             | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   | 0.0  | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Total Delay             | 43.0  | 17.6  | 0.3   | 41.5  | 24.4  | 3.7   | 67.6   | 54.2  | 80.0  | 61.5  | 56.3  | 78.1  |
| Queue Length 50th (ft)  | 226   | 436   | 0   | 105   | 408   | 11  | 151  | 4   | ~273  | 132   | 8   | ~303  |
| Queue Length 95th (ft)  | m202  | m#765   | m13   | m125  | m#752   | m22   | #225   | 17  | #299  | #196  | 28  | #358  |
| Internal Link Dist (ft) |   | 420   |   |   | 580   |   |  | 548   |   |   | 543   |   |
| Turn Bay Length (ft)    | 275   |   | 400   | 275   |   | 150   | 250  |   | 300   | 275   |   |   |
| Base Capacity (vph)     | 815   | 2761  | 1215  | 672   | 2550  | 1080  | 472  | 131   | 407   | 460   | 116   | 436   |
| Starvation Cap Reductn  | 0   | 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   | 0   |
| Storage Cap Reductn     | 0   | 0   | 0   | 0   | 0   | 0   | 0  | 0   | 0   | 0   | 0   | 0   |
| Reduced v/c Ratio       | 0.69  | 0.99  | 0.40  | 0.40  | 0.87  | 0.19  | 0.82   | 0.04  | 0.99  | 0.74  | 0.09  | 0.97  |

## 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.

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

# HCM 6th Signalized Intersection Summary

## 13: Biloxi Street & 48th Avenue

Future Total (2040)  
PM Peak Hour

|                              |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------|---|---|---|---|---|---|--|---|---|---|---|---|
| Movement                     | EBL   | EBT   | EBR   | WBL   | WBT   | WBR   | NBL  | NBT   | NBR   | SBL   | SBT   | SBR   |
| Lane Configurations          |  |  |  |  |  |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)       | 520   | 2525  | 450   | 250   | 2035  | 185   | 355  | 5   | 370   | 315   | 10  | 390   |
| Future Volume (veh/h)        | 520   | 2525  | 450   | 250   | 2035  | 185   | 355  | 5   | 370   | 315   | 10  | 390   |
| 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         | 565   | 2745  | 0   | 272   | 2212  | 103   | 386  | 5   | 0   | 342   | 11  | 0   |
| 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                   | 925   | 2319  |   | 781   | 2106  | 837   | 443  | 101   |   | 400   | 78  |   |
| Arrive On Green              | 0.54  | 0.91  | 0.00  | 0.07  | 0.14  | 0.14  | 0.13   | 0.05  | 0.00  | 0.12  | 0.04  | 0.00  |
| Sat Flow, veh/h              | 3456  | 5106  | 1585  | 3456  | 5106  | 1585  | 3456   | 1870  | 1585  | 3456  | 1870  | 1585  |
| Grp Volume(v), veh/h         | 565   | 2745  | 0   | 272   | 2212  | 103   | 386  | 5   | 0   | 342   | 11  | 0   |
| Grp Sat Flow(s),veh/h/ln     | 1728  | 1702  | 1585  | 1728  | 1702  | 1585  | 1728   | 1870  | 1585  | 1728  | 1870  | 1585  |
| Q Serve(g_s), s              | 13.5  | 54.5  | 0.0   | 9.0   | 49.5  | 1.1   | 13.2   | 0.3   | 0.0   | 11.7  | 0.7   | 0.0   |
| Cycle Q Clear(g_c), s        | 13.5  | 54.5  | 0.0   | 9.0   | 49.5  | 1.1   | 13.2   | 0.3   | 0.0   | 11.7  | 0.7   | 0.0   |
| Prop In Lane                 | 1.00  |   | 1.00  | 1.00  |   | 1.00  | 1.00   |   | 1.00  | 1.00  |   | 1.00  |
| Lane Grp Cap(c), veh/h       | 925   | 2319  |   | 781   | 2106  | 837   | 443  | 101   |   | 400   | 78  |   |
| V/C Ratio(X)                 | 0.61  | 1.18  |   | 0.35  | 1.05  | 0.12  | 0.87   | 0.05  |   | 0.85  | 0.14  |   |
| Avail Cap(c_a), veh/h        | 925   | 2319  |   | 781   | 2106  | 837   | 475  | 132   |   | 446   | 117   |   |
| HCM Platoon Ratio            | 2.00  | 2.00  | 2.00  | 0.33  | 0.33  | 0.33  | 1.00   | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  |
| Upstream Filter(I)           | 1.00  | 1.00  | 0.00  | 1.00  | 1.00  | 1.00  | 1.00   | 1.00  | 0.00  | 1.00  | 1.00  | 0.00  |
| Uniform Delay (d), s/veh     | 23.6  | 5.5   | 0.0   | 47.1  | 51.8  | 9.9   | 51.3   | 53.8  | 0.0   | 52.1  | 55.4  | 0.0   |
| Incr Delay (d2), s/veh       | 1.2   | 87.4  | 0.0   | 0.3   | 34.3  | 0.3   | 15.4   | 0.2   | 0.0   | 13.8  | 0.8   | 0.0   |
| 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     | 4.5   | 20.9  | 0.0   | 4.1   | 29.3  | 1.3   | 6.6  | 0.1   | 0.0   | 5.8   | 0.3   | 0.0   |
| Unsig. Movement Delay, s/veh |   |   |   |   |   |   |  |   |   |   |   |   |
| LnGrp Delay(d),s/veh         | 24.7  | 92.9  | 0.0   | 47.4  | 86.2  | 10.2  | 66.8   | 54.0  | 0.0   | 65.9  | 56.2  | 0.0   |
| LnGrp LOS                    | C   | F   |   | D   | F   | B   | E  | D   |   | E   | E   |   |
| Approach Vol, veh/h          | 3310  |   |   | 2587  |   |   | 391  |   |   | 353   |   |   |
| Approach Delay, s/veh        | 81.3  |   |   | 79.1  |   |   | 66.6   |   |   | 65.6  |   |   |
| Approach LOS                 | F   |   |   | E   |   |   | E  |   |   | E   |   |   |
| Timer - Assigned Phs         | 1   | 2   | 3   | 4   | 5   | 6   | 7  | 8   |   |   |   |   |
| Phs Duration (G+Y+Rc), s     | 18.4  | 11.0  | 31.6  | 59.0  | 19.9  | 9.5   | 36.6   | 54.0  |   |   |   |   |
| Change Period (Y+Rc), s      | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5   | 4.5  | 4.5   |   |   |   |   |
| Max Green Setting (Gmax), s  | 15.5  | 8.5   | 23.5  | 54.5  | 16.5  | 7.5   | 28.5   | 49.5  |   |   |   |   |
| Max Q Clear Time (g_c+I1), s | 13.7  | 2.3   | 11.0  | 56.5  | 15.2  | 2.7   | 15.5   | 51.5  |   |   |   |   |
| Green Ext Time (p_c), s      | 0.2   | 0.0   | 0.7   | 0.0   | 0.2   | 0.0   | 1.8  | 0.0   |   |   |   |   |

### Intersection Summary

HCM 6th Ctrl Delay 78.7

HCM 6th LOS E

### Notes

User approved pedestrian interval to be less than phase max green.

Unsignalized Delay for [NBR, EBR, SBR] is excluded from calculations of the approach delay and intersection delay.

| Intersection               |        |                        |      |                            |      |                                |
|----------------------------|--------|------------------------|------|----------------------------|------|--------------------------------|
| Int Delay, s/veh           | 31.8   |                        |      |                            |      |                                |
| Movement                   | EBL    | EBT                    | WBT  | WBR                        | SBL  | SBR                            |
| Lane Configurations        |        | ↑↑↑↑                   | ↑↑↑↑ | ↗                          |      | ↗                              |
| Traffic Vol, veh/h         | 0      | 3250                   | 2205 | 175                        | 0    | 310                            |
| Future Vol, veh/h          | 0      | 3250                   | 2205 | 175                        | 0    | 310                            |
| Conflicting Peds, #/hr     | 0      | 0                      | 0    | 0                          | 0    | 0                              |
| Sign Control               | Free   | Free                   | Free | Free                       | Stop | Stop                           |
| RT Channelized             | -      | None                   | -    | None                       | -    | None                           |
| Storage Length             | -      | -                      | -    | 300                        | -    | 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                  | 0      | 3533                   | 2397 | 190                        | 0    | 337                            |
|                            |        |                        |      |                            |      |                                |
| Major/Minor                | Major1 | Major2                 |      | Minor2                     |      |                                |
| Conflicting Flow All       | -      | 0                      | -    | 0                          | -    | 1199                           |
| Stage 1                    | -      | -                      | -    | -                          | -    | -                              |
| Stage 2                    | -      | -                      | -    | -                          | -    | -                              |
| Critical Hdwy              | -      | -                      | -    | -                          | -    | 7.14                           |
| Critical Hdwy Stg 1        | -      | -                      | -    | -                          | -    | -                              |
| Critical Hdwy Stg 2        | -      | -                      | -    | -                          | -    | -                              |
| Follow-up Hdwy             | -      | -                      | -    | -                          | -    | 3.92                           |
| Pot Cap-1 Maneuver         | 0      | -                      | -    | -                          | 0    | ~ 153                          |
| Stage 1                    | 0      | -                      | -    | -                          | 0    | -                              |
| Stage 2                    | 0      | -                      | -    | -                          | 0    | -                              |
| Platoon blocked, %         |        | -                      | -    | -                          |      |                                |
| Mov Cap-1 Maneuver         | -      | -                      | -    | -                          | -    | ~ 153                          |
| Mov Cap-2 Maneuver         | -      | -                      | -    | -                          | -    | -                              |
| Stage 1                    | -      | -                      | -    | -                          | -    | -                              |
| Stage 2                    | -      | -                      | -    | -                          | -    | -                              |
|                            |        |                        |      |                            |      |                                |
|                            |        |                        |      |                            |      |                                |
| Approach                   | EB     | WB                     |      | SB                         |      |                                |
| HCM Control Delay, s       | 0      | 0                      |      | \$ 609.7                   |      |                                |
| HCM LOS                    |        |                        |      | F                          |      |                                |
|                            |        |                        |      |                            |      |                                |
|                            |        |                        |      |                            |      |                                |
| Minor Lane/Major Mvmt      | EBT    | WBT                    | WBR  | SBLn1                      |      |                                |
| Capacity (veh/h)           | -      | -                      | -    | 153                        |      |                                |
| HCM Lane V/C Ratio         | -      | -                      | -    | 2.202                      |      |                                |
| HCM Control Delay (s)      | -      | -                      | -    | \$ 609.7                   |      |                                |
| HCM Lane LOS               | -      | -                      | -    | F                          |      |                                |
| HCM 95th %tile Q(veh)      | -      | -                      | -    | 27.6                       |      |                                |
| Notes                      |        |                        |      |                            |      |                                |
| ~: Volume exceeds capacity |        | \$: Delay exceeds 300s |      | +: Computation Not Defined |      | *: All major volume in platoon |