

TRANSPORT COLORADO

Revised Traffic Impact Analysis



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I. INTRODUCTION

TransPort Colorado is planning to develop a master-planned business environment of approximately 5,378 acres in the city of Aurora, Colorado. The project is known as TransPort Colorado and will be developed with industrial, data center, warehousing, and commercial land uses with several parcels having a rail-service component. The project will have access to national highway and rail transportation corridors, and to national and international air infrastructure. **Figure I** provides a vicinity map of the project location.

The project is located adjacent to the Colorado Air and Space Port (Space Port), formerly known as Front Range Airport, and it is also within close proximity of Denver International Airport (DEN). The project will have access to I-70, a major east-west interstate highway system, via existing and planned interchanges. I-25 is located approximately 23 miles to the west of the project site and is the primary interstate access route between New Mexico and Montana. Complementing these two vital interstate highway links is the alignment of the Union Pacific Railroad (UPRR) tracks along the north side of United States (US) 36. One of TransPort Colorado's economic benefits will be its rail access for rail-served properties and transload facilities.

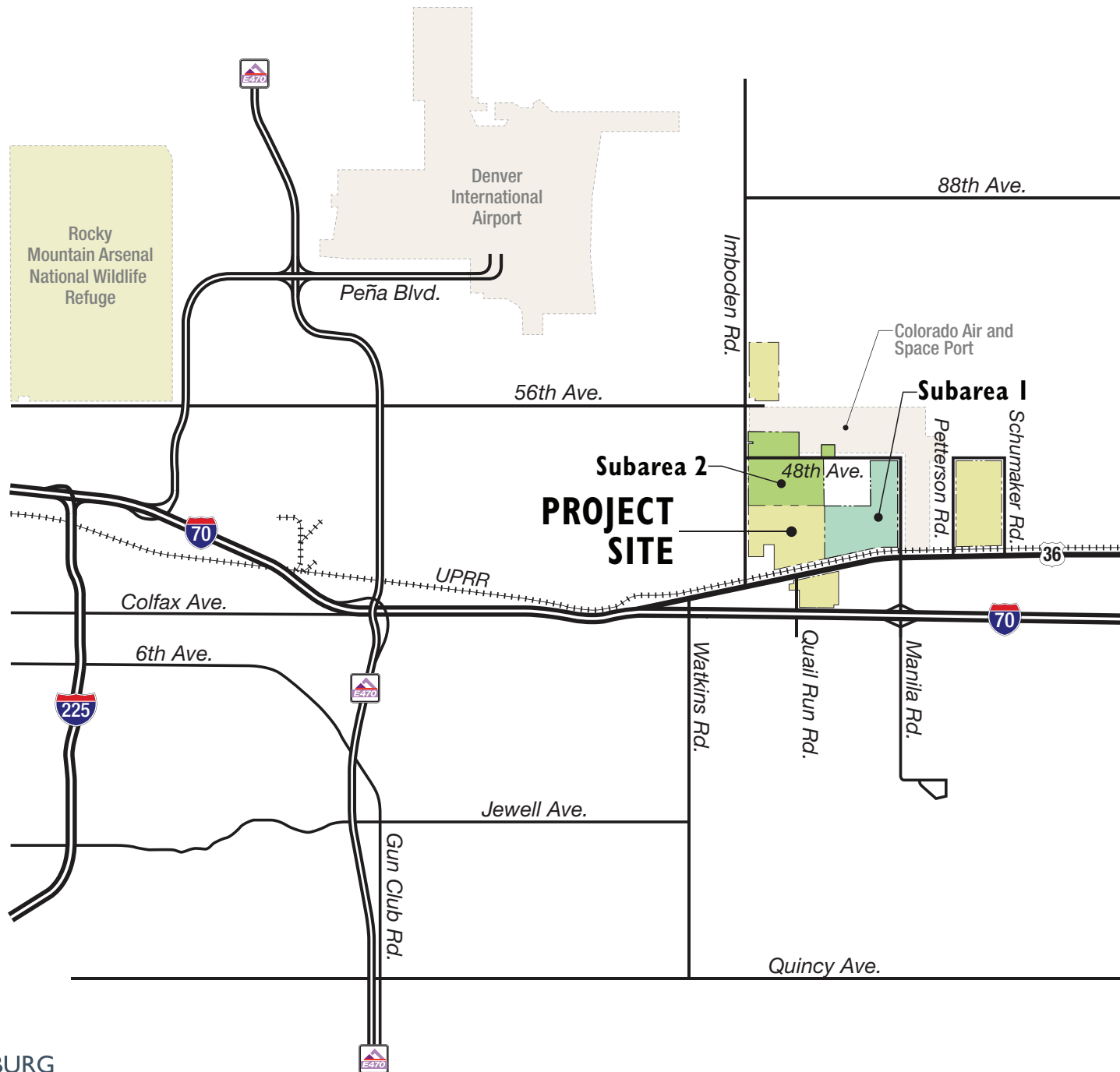
The majority of the project is bounded by US 36, the UPRR, and I-70 along its south edge, by 48th Avenue to the north, by Imboden Road on the west, and by Manila Road to the east. Two additional properties are included in the development, the largest of which is located east of the Space Port north-south runaway. This parcel consists of approximately 1,100 acres and is bounded by US 36 on the south, 48th Avenue to the north, and between Petterson and Schumaker Roads. The second parcel is about 300 acres and is adjacent to Imboden Road between 56th and 64th Avenues.

This Traffic Impact Analysis (TIA) provides an assessment of the traffic impacts related to the development of TransPort Colorado. Specific elements of this report are based on correspondence with the City of Aurora in 2018, and this revised TIA includes modifications related to the City's review of the original report. It is coupled with the following subarea evaluations requested by TransPort Colorado:

- Evaluation of existing operational conditions
- Trip generation estimates for the proposed land uses
- Analysis of project impacts
- Consistency with the *Northeast Aurora Transportation Study Refresh (NEATS Refresh)*
- Discussion of large truck influences primarily regarding potential roundabouts
- Discussion on pedestrian trail construction adjacent Bear Gulch
- Recommendations for public improvements

These analyses are structured in several sections. Project impacts focus first on the build-out of all of TransPort Colorado, followed by an assessment of project impacts for the Year 2040, then for two subarea development scenarios. The report is structured in this manner to understand:

- The holistic impacts of TransPort Colorado for its entire build-out; the Build-Out scenario references the *NEATS Refresh* recommended roadway network with the understanding that ultimate build-out of TransPort Colorado will be beyond the *NEATS Refresh* planning horizon
- What improvements may be needed for a 20-year planning horizon (Year 2040)
- The impacts of two subareas to understand these subarea improvement requirements since these two land areas are where development is first expected to occur



II. EXISTING CONDITIONS

II.A. Land Use

The area that immediately surrounds the site is largely undeveloped with the exception of the Space Port to the north, the Prairie View housing development along the west side of Imboden Road, and the Galambs Mobile Home community along the south side of US 36. Residential and commercial uses exist in the Towns of Watkins and Bennett, while the Prosper residential and commercial site is developing approximately 3 miles to the west along the south side of I-70.

II.B. Roadway System

The TransPort Colorado site will occupy over 8 square miles of land to the east of the Denver metropolitan area. Several existing roadways are spaced along 1-mile land sections, although most of these roads currently have very little traffic and are somewhat discontinuous. One interstate highway and one United States highway border the project site or are near its southern boundary. **Figure 2** provides a representation of the surrounding roadway network, its laneage, and its speed limit characteristics. Following are more detailed descriptions of the primary roadways adjacent and near the project site.

Interstate 70 (I-70)

I-70 is a major interstate route that bisects the State of Colorado at its approximate north/south midpoint. Not only is this route the primary east/west corridor for interstate travel in Colorado, but this route provides access to numerous states outside Colorado, from Utah to Maryland. I-70 has four travel lanes for vehicle movements and is posted with a speed limit of 75 miles per hour (MPH).

There are two interchanges with I-70 near the project site. The Manila Road interchange is near the midpoint of TransPort Colorado and is proposed to be one of the primary interstate access routes for the TransPort Colorado land uses. Four miles to the west of the Manila Road interchange is the Watkins Road interchange. This interchange can provide access for TransPort Colorado during the earlier stages of development.





United States 36 (US 36)

The southern boundary of the project lies along approximately 4 miles of UPRR trackage that is directly adjacent to the north side of US 36. The UPRR and US 36 parallel each other along the entire length of TransPort Colorado's southern boundary. The centerline-to-centerline distance between these two facilities is approximately 100 feet. US 36 is two lanes wide, and it has a posted speed limit of 55 MPH. Several section line roadways intersect US 36, and each intersecting roadway is controlled by stop signs at US 36. The Colorado Department of Transportation (CDOT) classifies US 36 as a Rural Highway (R-B) in this area.

Imboden, Quail Run, Cavanaugh, Manila, Petterson, and Schumaker Roads

Each of these roadways exists at 1-mile intervals adjacent, within, or near TransPort Colorado, with each having a north/south orientation. Only Imboden and Petterson Roads are continuous for any significant distance adjacent to TransPort Colorado, however. Both of these roadways extend from US 36 to the north past the TransPort Colorado boundary. Quail Run Road extends from US 36 to the south of I-70 and is grade-separated via an underpass with I-70.

LEGEND

-  = Number of Through Lanes
-  = Paved Roadway
-  = Gravel Roadway
-  = Posted Speed Limit



Cavanaugh Road is a dead-end street that extends from US 36 southward but does not cross I-70. Manila Road parallels part of the Space Port boundary and continues toward the south, past US 36 and I-70 into Arapahoe County.

Schumaker Road is a dead-end street that extends from US 36 southward but does not cross I-70. It does not exist immediately north of US 36 but is adjacent to the east boundary of TransPort Colorado, extending northward from 38th Avenue, midway through the property, and beyond the TransPort Colorado boundary to the north. Only Imboden and Manila Roads provide access to the main entryway for the Space Port, and they have posted speeds of 45 MPH.

Quail Run, Cavanaugh, Petterson, and Schumaker Roads have roadway sections that are not paved. At-grade crossings of the UPRR exist only at Imboden, Manila, and Petterson Roads.

48th and 56th Avenues

48th and 56th Avenues have an east/west orientation and are separated by a 1-mile distance. 48th Avenue is paved between Imboden and Manila Roads. Most of 48th Avenue in the vicinity of the project is two lanes wide; however, to the west of Imboden Road, it is an unimproved one-lane roadway that provides access only to a private residence.

56th Avenue is a two-lane roadway that extends westward from Imboden Road towards the City and County of Denver, while to the east of Imboden Road, it exists for only an approximate 1-mile distance along the northern boundary of the Space Port. 56th Avenue is two lanes wide and its alignment to the east of Imboden Road is gravel.

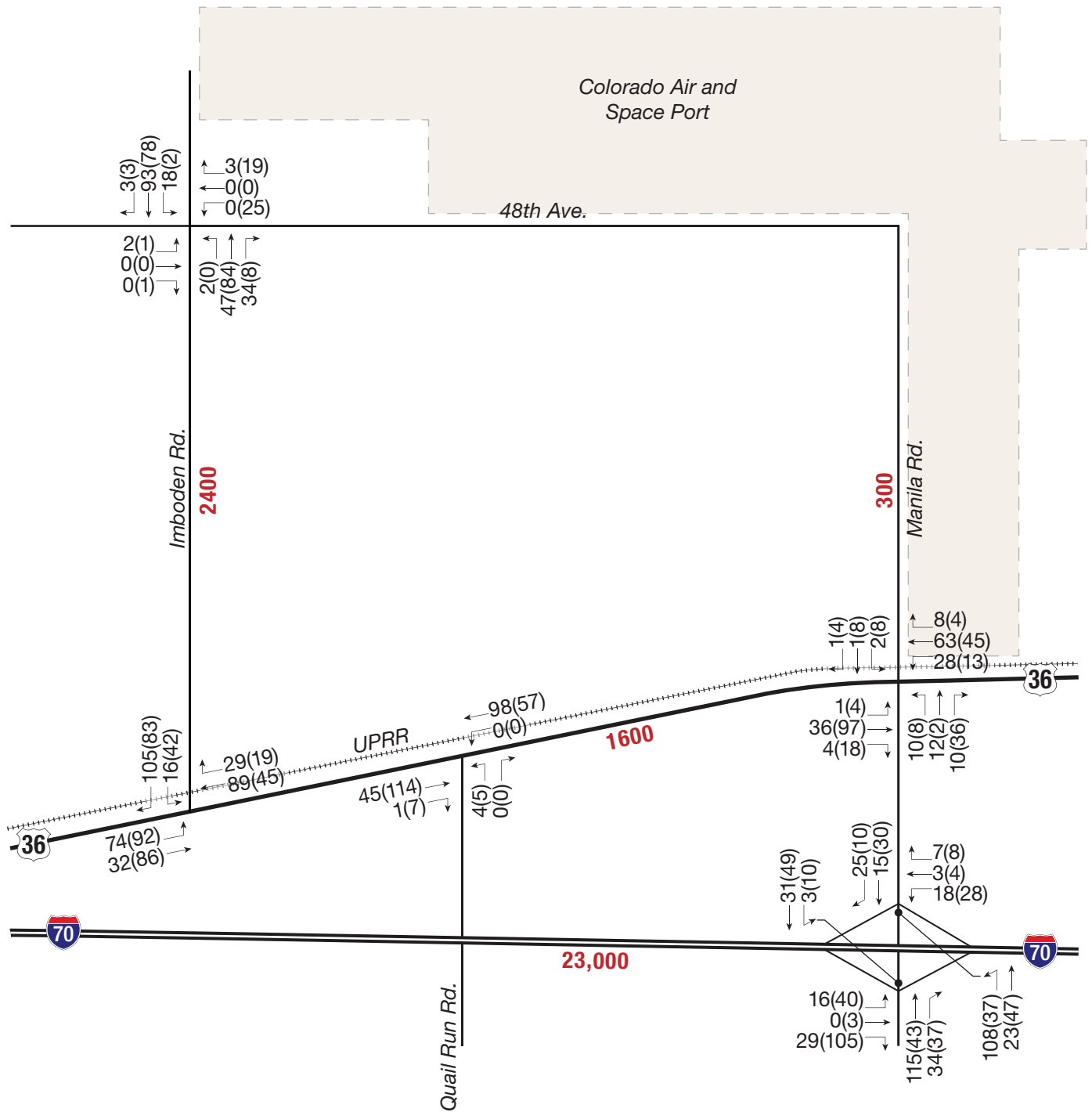
II.C. Rail Facility

The UPRR parallels the southern boundary of TransPort Colorado. The UPRR trackage extends from the Denver metropolitan area to the east into Kansas and points beyond. There is only one track within the railroad right-of-way, and approximately three trains use this track each day.

II.D. Traffic Volumes

Existing traffic volumes were recorded at six intersections adjacent to TransPort Colorado in September 2018, including the two interchange ramp terminals with I-70 at Manila Road. These movements were recorded during the AM and PM peak hours, the typical time periods when vehicle activity is greatest. As shown on **Figure 3**, vehicle movements along the adjacent roadways and at the interchange ramp terminals are relatively low when compared to traffic volume levels in other parts of the Denver metropolitan area. All left, through, and right turn movements are less than 125 vehicles per hour (vph), with only a few movements greater than 100 vph.

Daily traffic volumes were also recorded. These measurements include the level of vehicle activity on a roadway for a 24-hour period. Referring to **Figure 3**, it can be seen that daily traffic volume levels along Imboden Road are about 2,400 vehicles per day (vpd), while along Manila Road, the level is only about 300 vpd. US 36 traffic volumes are about 1,600 vpd, and traffic volume along I-70 is 23,000 vpd adjacent to the site. Daily traffic volumes along I-70 and US 36 were acquired from CDOT's Online Transportation Information System (OTIS). **Appendix A** includes the recorded traffic volume data.



LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes

II.E. Traffic Control

Control of vehicle movements at intersections surrounding TransPort Colorado is carried out via stop signs. All stop signs are used on the “minor” street intersection or ramp terminal approaches where vehicle right-of-way assignment is necessary.

II.F. Traffic Operations

Traffic operations within the study area were evaluated according to techniques documented in the *Highway Capacity Manual*, 6th Edition (Transportation Research Board, 2016) using the existing traffic volumes, intersection geometry, and traffic control. Level of Service (LOS) is a qualitative measure of traffic operational conditions based on roadway capacity and vehicle delay. LOS is described by a letter designation ranging from A to F, with LOS A representing almost free-flow travel, while LOS F represents congested conditions.

For stop-controlled intersections, LOS is calculated for each vehicle movement that must yield the right-of-way to an oncoming or crossing vehicle. In urbanized areas, LOS D is typically considered to be acceptable for peak hour traffic operations and is the standard set in the City of Aurora Traffic Impact Study guidelines.

Figure 4 shows the existing traffic control, intersection geometry, and results of the LOS analyses. **Appendix B** includes the LOS criteria, and **Appendix C** includes the analysis worksheets. All intersections currently operate within acceptable parameters, at LOS B or better, during peak hours.

III. BACKGROUND CONDITIONS

III.A. Roadway Network Plan

The *Northeast Area Transportation Study Refresh (NEATS Refresh)* was recently updated for the City of Aurora (project completion in October 2018). This publication summarized the build-out transportation recommendations for the *NEATS Refresh* planning area for the roadway, transit and trail systems. The boundary for this study effort was approximately between Picadilly Road on the west, Schumaker Road on the east, Jewell Avenue and I-70 on the south, and 72nd Avenue on the north.

Besides an assessment of roadway improvement needs, future transit hubs were identified at two locations and a trail element was identified within the TransPort Colorado study area. These improvements are graphically depicted on **Figure 5** and they can be summarized as:

Freeway Access

- New interchanges constructed at the Quail Run and Schumaker Road alignments along I-70

Minor Arterials

- Quail Run Road south of 48th Avenue
- Schumaker Road

Potential UPRR Grade-Separated Crossings

- Quail Run Road
- Manila Road
- Schumaker Road

Trail Amenity

- Bear Gulch Trail

Major Arterials

- Imboden Road/Quail Run Road alignment
- Manila Road
- 48th Avenue
- 56th Avenue

Collector Streets

- Imboden Road north of US 36

Transit Hubs

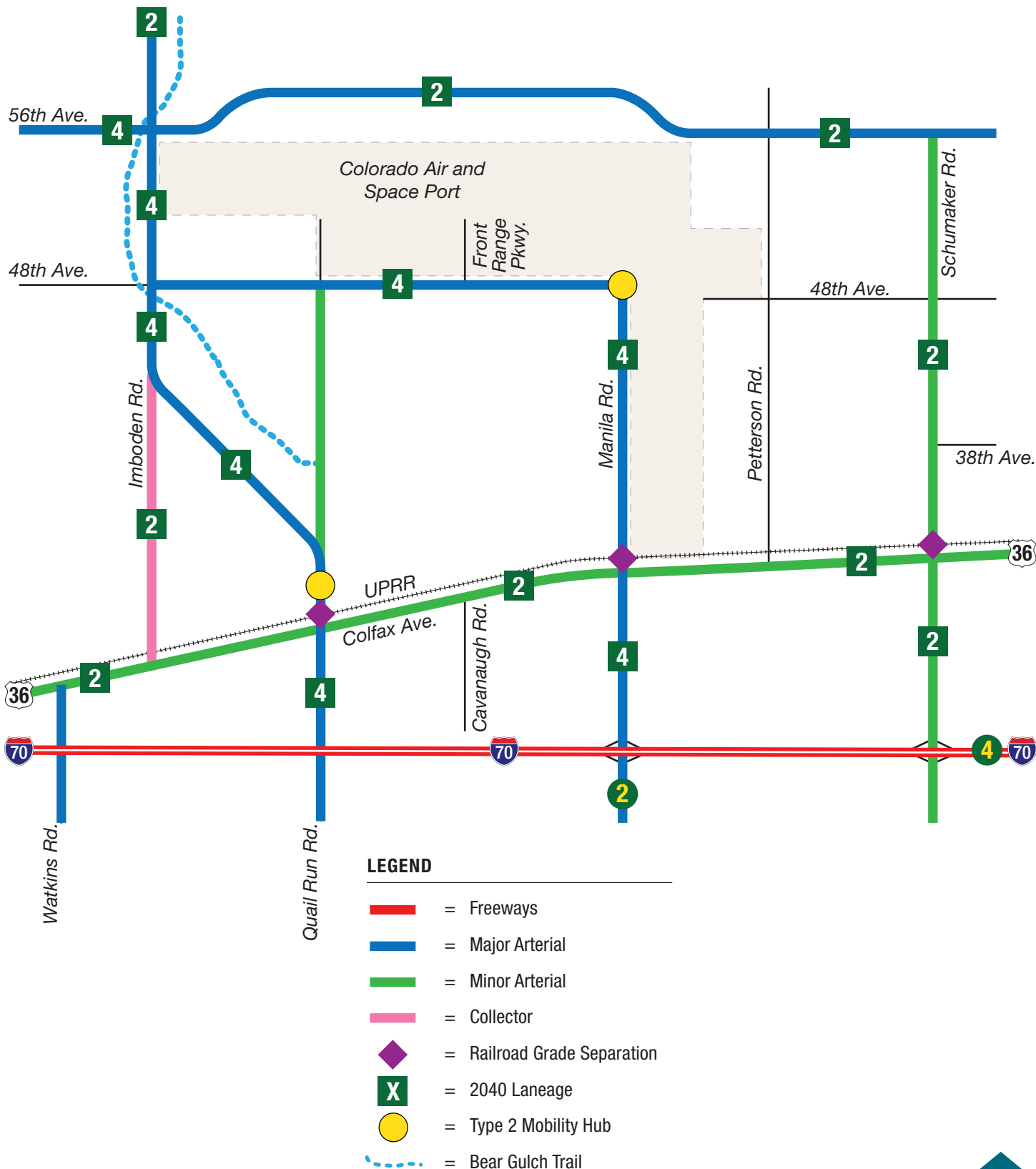
- Imboden Road/Quail Run Road alignment at US 36
- 48th Avenue/Manila Road intersection

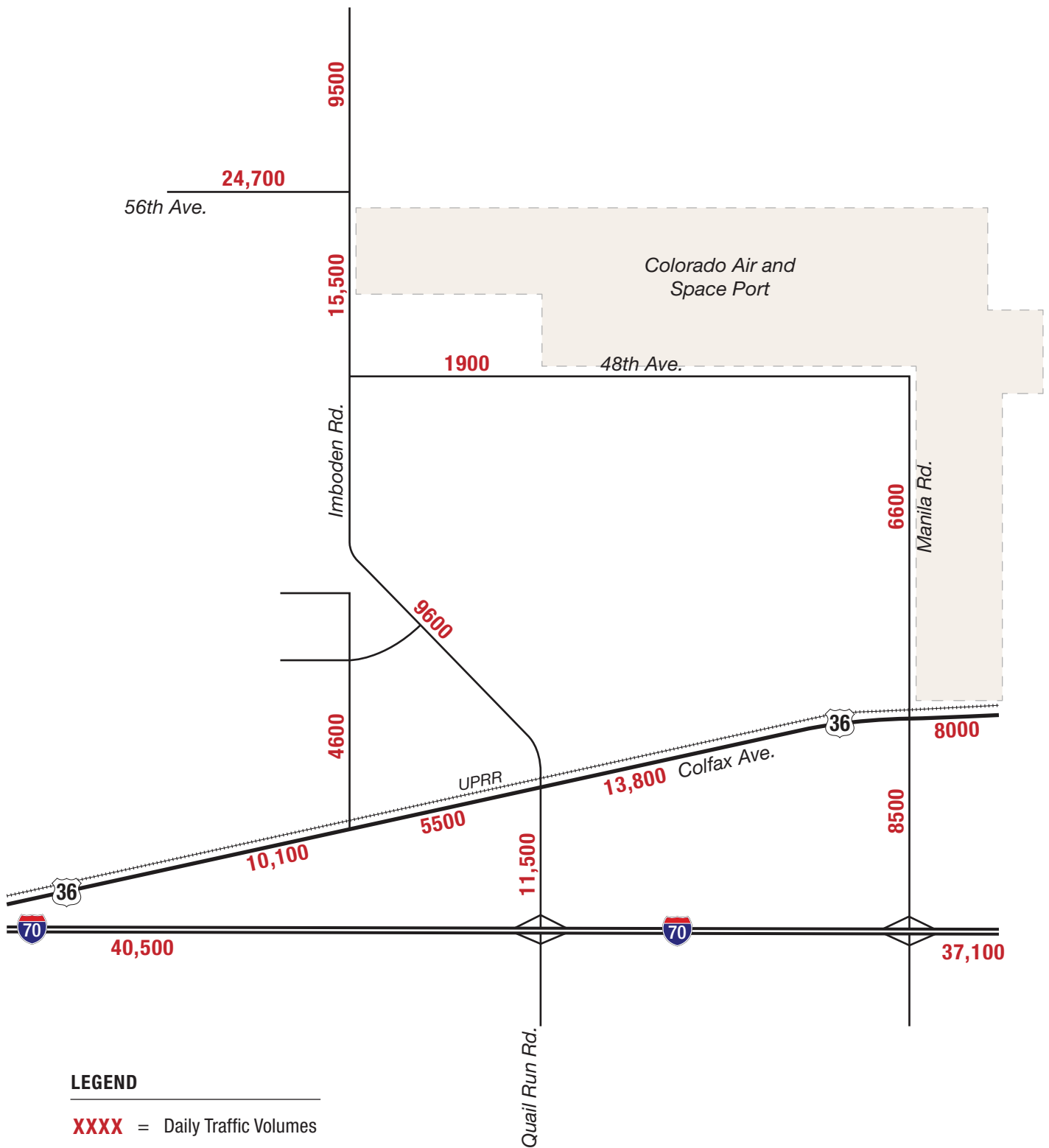
It should be noted that the current development plans for TransPort Colorado were not entirely known when *NEATS Refresh* was prepared.

III.B. Background Traffic Volumes

Background traffic volume projections started with information contained in *NEATS Refresh*. But to truly understand a Background traffic volume scenario, i.e., one without any TransPort Colorado development, the *NEATS Refresh* travel demand model was adjusted to reflect zero land use in the Traffic Analysis Zones that encompass the TransPort Colorado study area. As such, the traffic volumes represented on **Figure 6** contain projected background traffic volumes for the build-out of the *NEATS Refresh* area without the development of TransPort Colorado. **Appendix D** provides a representation of the *NEATS Refresh* raw travel demand model information with TransPort Colorado land uses.

The *NEATS Refresh* travel demand model is considered a more accurate model for this area of Aurora since it has been modified with additional land use information given current and planned development proposals. The Denver Regional Council of Governments (DRCOG) model is not considered as accurate for these reasons. As such, the traffic volume projections of **Figure 6** contain higher traffic volume levels than what the DRCOG model predicts for the surrounding roadway network. It is understood, however, that future analysis of TransPort Colorado that involves CDOT approvals will need to use the DRCOG model for background traffic projections.





IV. TRANSPORT COLORADO BUILD-OUT CONDITIONS

This section summarizes the daily traffic volume projections and TransPort Colorado Build-Out roadway network requirements which is projected to be beyond the Year 2040. **Section V summarizes development information, daily traffic volume projections, and improvement recommendations for Year 2040.**

The information in this section uses Build-Out daily traffic volume projections to reflect the roadway typical section needs so that future improvements can be planned accordingly. As noted previously, Subareas 1 and 2 are described and evaluated in subsequent sections and they evaluate roadway improvement needs at a more finite level for those land areas. The TransPort Colorado Build-Out analyses concentrate on a more holistic understanding of the hierarchy of the roadway network and anticipated roadway laneage.

IV.A. TransPort Colorado Land Uses

TransPort Colorado is planned for several land uses that require a relatively large number of acres for material storage and industrial uses, while other uses rely on large buildings that may not have a large employee component. Heavy industrial, data center, and warehouse uses are located directly adjacent to the Space Port. These uses are coupled with a commercial component that is situated between I-70 and US 36, and between Quail Run and Cavanaugh Roads, with over 500 acres of mixed-use retail, service, hotel and residential uses.

In summary, the land use division of project acreage once undevelopable land such as right-of-way requirements, power line easements, drainage areas, open space, etc., is removed can be summarized as:

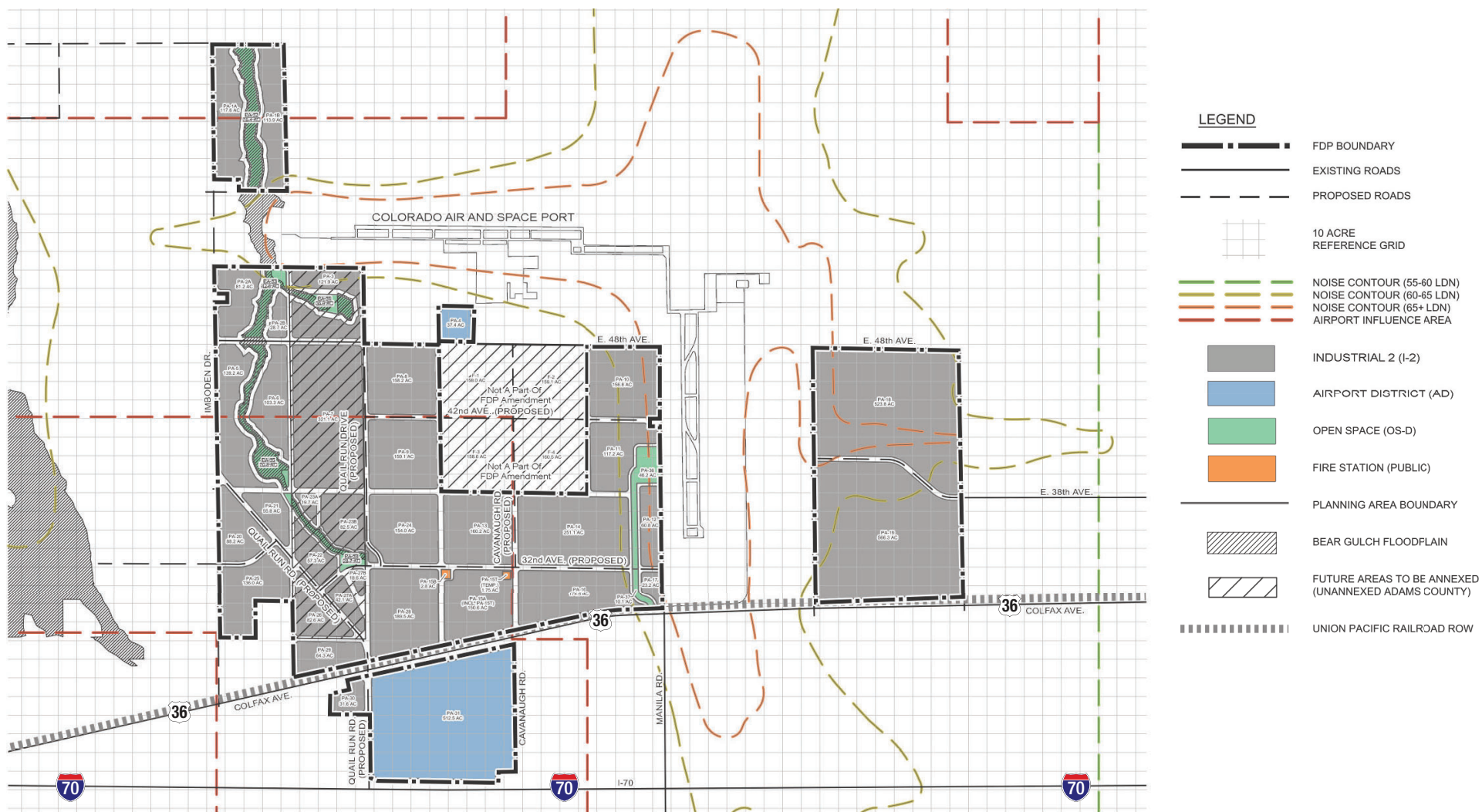
▪ Industrial =	2,484 acres ±
▪ Data Center =	562 acres ±
▪ Warehousing =	1,385 acres ±
▪ Mixed-Use Commercial =	<u>532 acres ±</u>
TOTAL =	4,963 acres ±

Figure 7 represents the proposed site plan for TransPort Colorado. As shown on **Figure 7**, several of the industrial uses form a somewhat inverted “L” shape around non-affiliated parcels directly south of the Space Port. Some of these industrial parcels will be served by rail for bulk inbound deliveries of goods and materials. It is understood that deliveries of these bulk materials, sometimes after processing into other goods for sale, will be delivered to the Denver metropolitan area and beyond by over-the-road vehicles. Subareas 4 and 6 are also slated for industrial uses but will not be served by rail.

The data center and warehousing land areas are identified as Mixed Commercial, their current zoning. They straddle Bear Gulch and are adjacent to Imboden Road and/or 48th Avenue. These uses are expected to include large buildings for the purposes of product storage (warehousing) and for the processing of electronic data (data center). Both uses are not projected to have the same number of employees as is typically expected for a land use with the same size building, but they are projected to have a square foot (sf) to employee ratio that is less.

Subarea 5 is located in the southern portion of TransPort Colorado between I-70 and US 36, and it is planned that these parcels will have a variety of retail services that can support not only patrons of TransPort Colorado but those of the surrounding communities and for travelers along I-70.

Restaurants, gas stations, banks, tire shops, along with hotels and office components, will serve this burgeoning area of the City of Aurora as it develops over time.



IV.B. TransPort Colorado Build-Out Trip Generation Estimates

Table I includes the trip generation estimates for the Build-Out of the TransPort Colorado development. These estimates are based on reasonable floor-area-ratios for the individual land uses and on trip generation categories discussed with City of Aurora staff during the preparation of this study. While **Table I** summarizes the trip generation potential for the four land use categories, **Appendix E** includes a more detailed breakdown of trip generation information for each individual TransPort Colorado land parcel.

Trip generation estimates for the Build-Out of TransPort Colorado are based on average weekday data contained in *Trip Generation*, 10th Edition, by the Institute of Transportation Engineers (ITE), 2017. Trip generation data is based on the potential for over 38 million square feet of development to occur.

Through correspondence with the City of Aurora, the Light Industrial land use category was used for the trip generation estimates for all industrial sites since certain parcels that may be classified as Heavy Industrial lack sufficient trip generation data.

Additionally, due to the currently unknown mix of office, hotel, and retail uses in planning areas designated for mixed-use development (Subarea 5), land uses that could change over time, the trip generation potential for the mixed-use land areas are based on the ITE Shopping Center category for the purposes of this report. The Shopping Center trip generation category includes a higher retail focus which may result in trip estimates that may be conservative. As such, the trip generation data contained in **Table I** likely reflects a worst-case scenario of the trip generation potential of TransPort Colorado.

Table I. TransPort Colorado Build-Out Trip Generation Estimates

Trip Generation Category	Acres (±)	Building Square Footage (ksf) ¹	Daily Vehicle-Trips	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Industrial ²	2,484	16,024	61,205	3,039	414	3,453	324	2,173	2,497
Data Center	562	10,440	4,361	5,765	1,475	7,240	1,665	5,183	6,848
Warehousing	1,385	4,405	17,450	287	235	522	130	304	434
Mixed-Use	532	6,954	118,655	2,343	1,437	3,780	6,481	7,021	13,502
Subtotal =			201,671	11,434	3,561	14,995	8,600	14,680	23,281
Mixed Use Internal Capture Reductions ³			-42,715	-680	-680	-1,360	-2,430	-2,430	-4,860
Mixed Use Pass-By Reductions ⁴			-5,933	-95	-95	-190	-338	-338	-676
NET EXTERNAL TRIP GENERATION =			153,059	10,659	2,786	13,445	5,832	11,912	17,745

¹ Building square footage amounts represent the maximum allowable development.

² Per the City of Aurora, the Light Industrial trip generation category was used for all industrial parcels.

³ Internal Capture reductions were estimated based on mixed-use sites in Planning Areas 30 and 31 at a rate of 36 percent, the average rate reported for mixed-use sites in NCHRP Report 684.

⁴ Pass-by trip reductions are at a rate of 5 percent.

Trip Generation Estimates Discussion

Internal Capture – Internal capture was estimated within the planning areas designated for mixed-use development at a rate of 36 percent, the average percentage reported by the National Cooperative Highway Research Program *Report 684*. This internal capture rate resulted in the reduction of almost 43,000 daily trips.

Due to both the large size and relative isolation of the TransPort Colorado development, it is estimated that there will be additional interactions that take place between the industrial/warehousing/data center uses and the mixed-use parcels that would result in trips to the adjacent roadway network but not to the regional transportation network (i.e., outside the basic TransPort Colorado boundary). An additional 9 percent of traffic to/from Subarea 5 is projected to interact with the industrial/warehousing/data center planning areas. This percentage is consistent with the interactions seen between the TAZ in the *NEATS Refresh* model that represents Subarea 5 and the other two TAZs that encompass TransPort. This results in 10,679 inbound and outbound trips (total = 21,358 trips) between Subarea 5 and the industrial/warehousing/data center planning areas never leaving the roadway network encompassed by the TransPort Colorado development. As a result of this interaction, while the net new trips to the roadway network is about 153,000, only about 132,000 impact the roadway network beyond the TransPort Colorado site.

Pass-By Trips – Not all vehicle-trips generated by the 38 million square feet of development will be new. Some trips will have a direct relationship with motorists that are traveling along I-70, ones that will take advantage of the land use mix in Subarea 5. While ITE pass-by percentages can be upwards of 50 percent for some uses, a reduction of only 5 percent was used for Subarea 5 due to the lack of solidified plans for the mixed-use sites that have direct frontage along I-70. As noted in **Table I**, there are projected to be nearly 6,000 pass-by trips that will use the development that are not new to the external roadway network but that will divert their trip to/from Subarea 5.

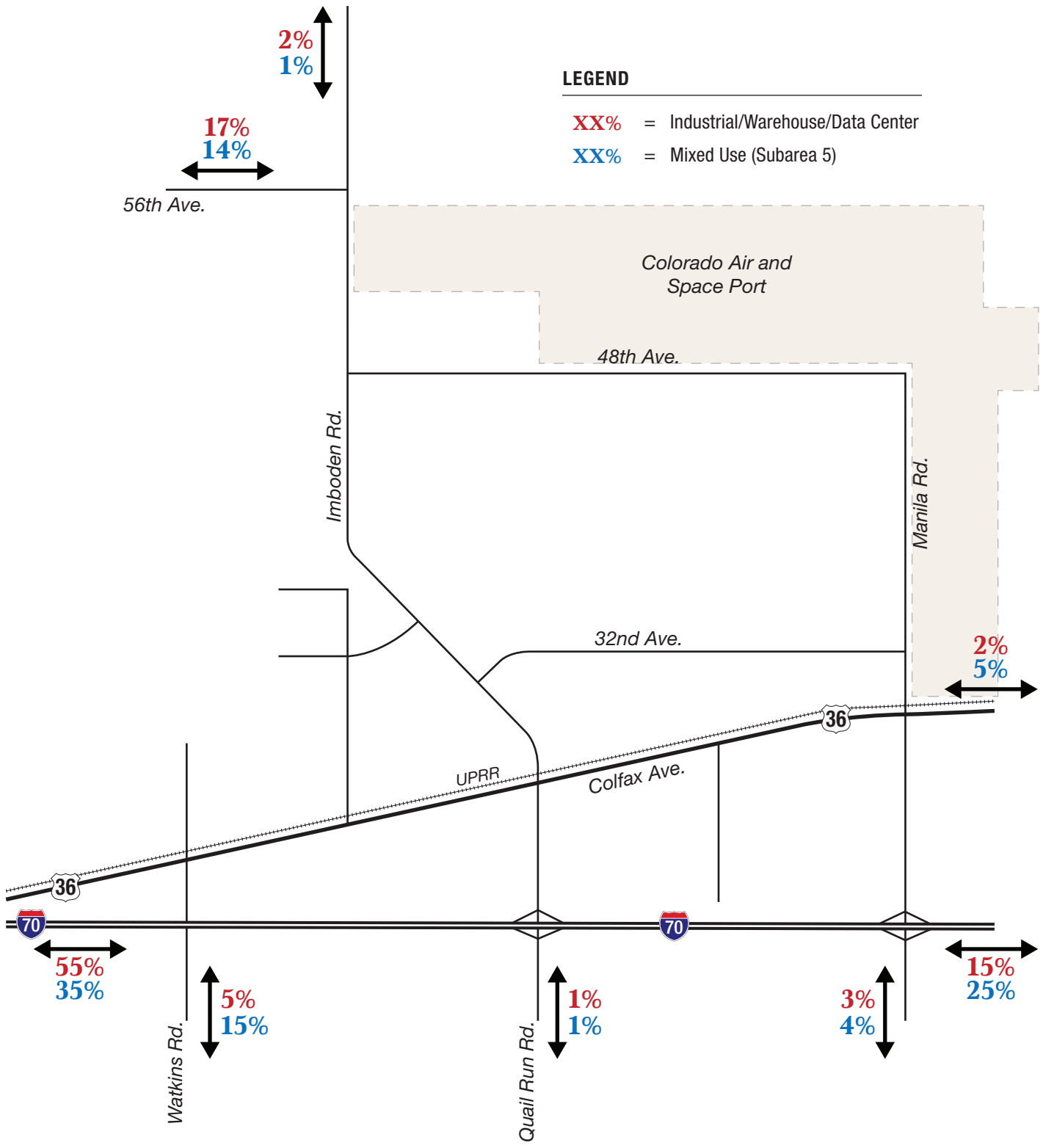
IV.C. Trip Assignment

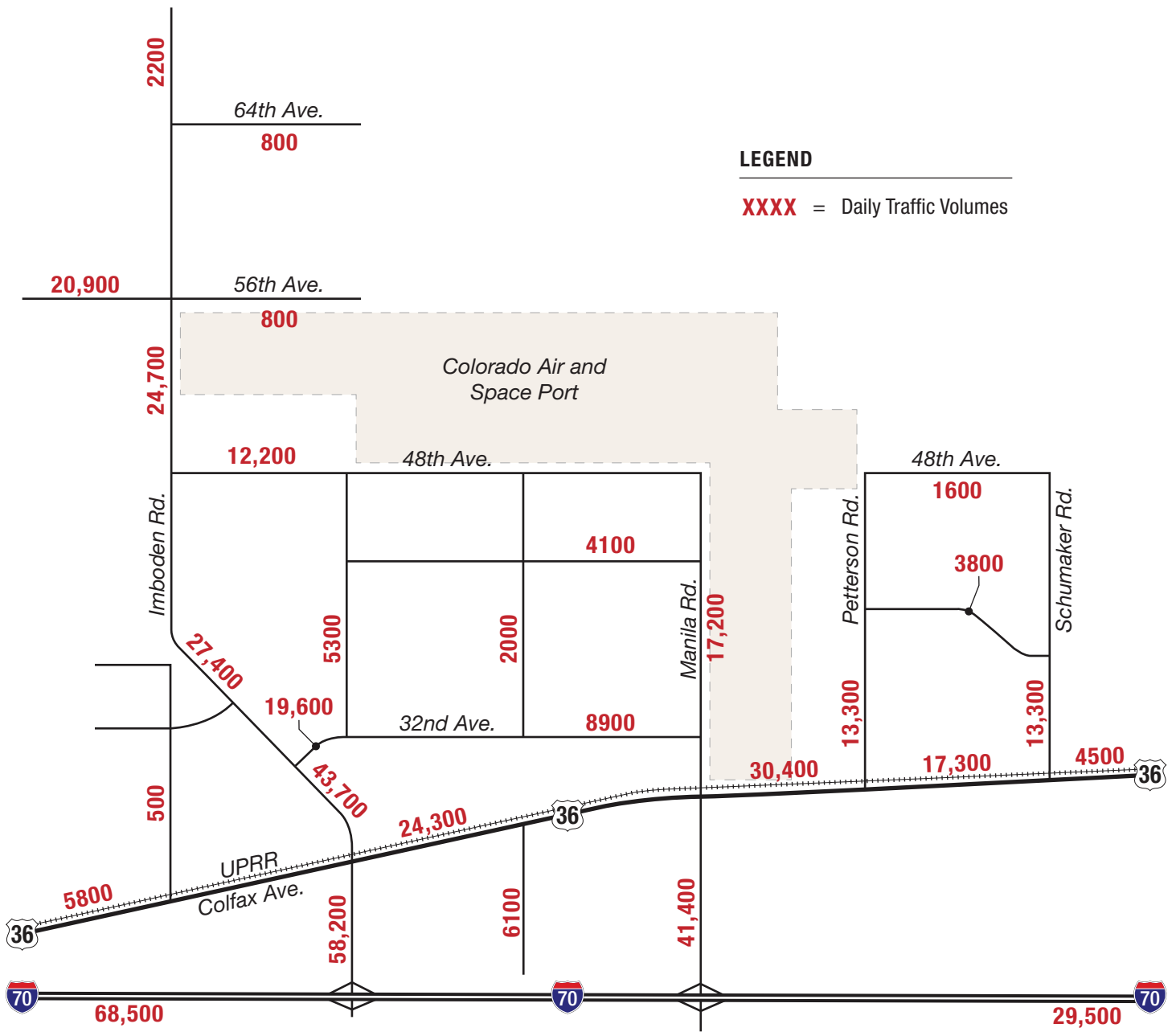
Estimates of vehicle routing to/from TransPort Colorado were developed based on information contained in the travel demand model for *NEATS Refresh* as well as on engineering judgment. The industrial, data center and warehousing land uses are projected to have a strong orientation to/from the west along I-70 since the population density of the Denver metropolitan area is in this direction.

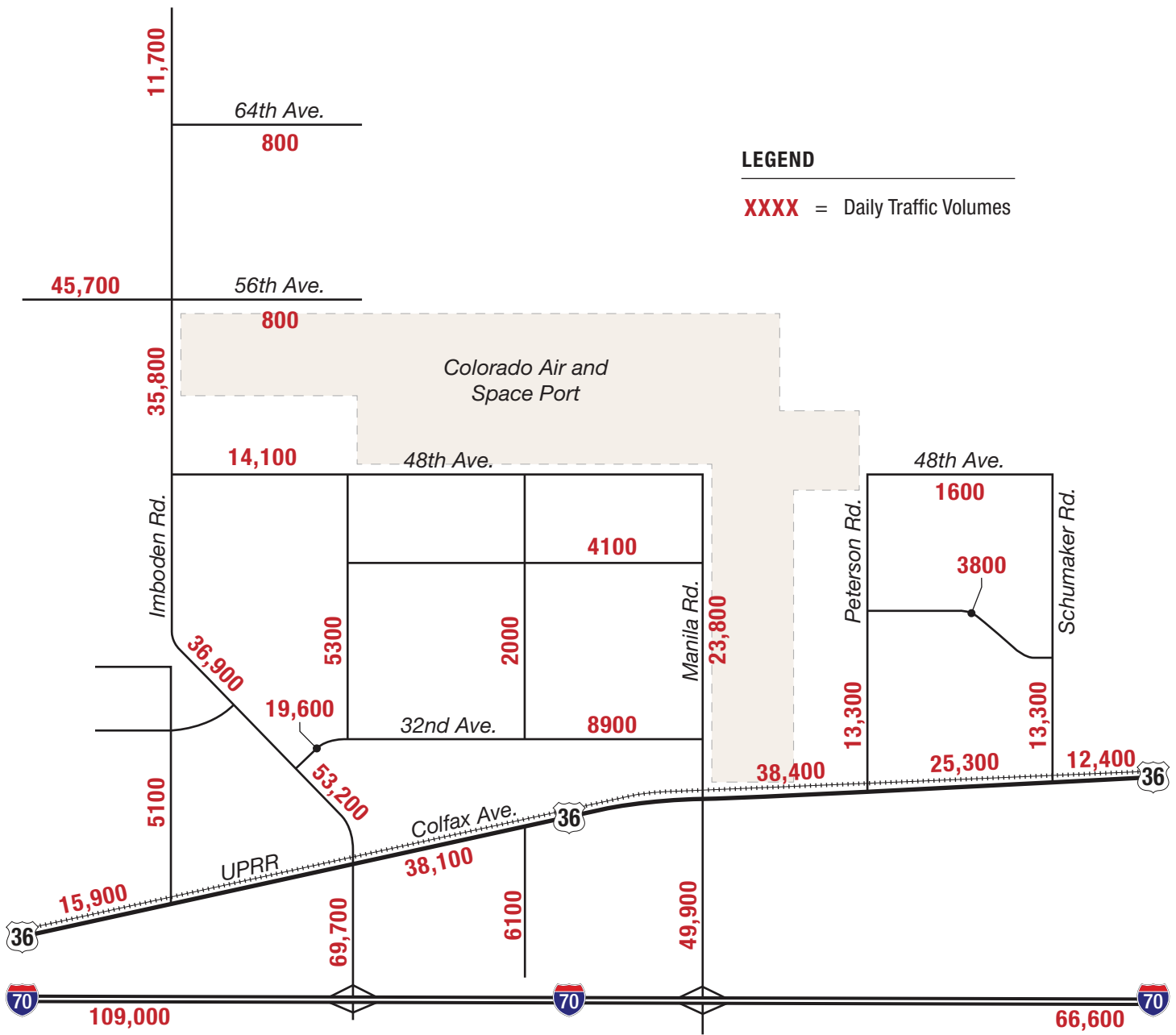
The mixed-use properties in Subarea 5 are expected to have a somewhat different trip assignment since these land uses will serve not only TransPort Colorado and motorists along I-70, but the Towns of Watkins and Bennett and nearby developments that are currently being planned or are under construction. A higher distribution of vehicle-trips is oriented to/from the east as a result since Denver metropolitan area residents have other mixed-use options to the west.

Figure 8 provides a summary of the trip distribution estimates, while **Figure 9** illustrates the projected site generated daily traffic volumes for the TransPort Colorado Build-Out scenario. **Figure 10** is the combination of Background traffic projections (**Figure 6**) and the TransPort Colorado site generated traffic volumes.

As indicated on these figures, at Build-Out of the site, TransPort Colorado will contribute a significant amount of the projected total traffic volumes on the surrounding roadway network by the time it is completed. At Build-Out, traffic volumes along the major roadway segments, particularly near I-70, will exceed 44,000 vpd along Manila Road and will be about 67,000 vpd on Quail Run Road. Traffic volumes will gradually decrease toward the north along Imboden Road and eastward along US 36. Given the industrial and data center/warehousing characteristics of the site, several internal roadways are projected to be under 10,000 vpd.







IV.D. Recommended Roadway Laneage

The TransPort Colorado Build-Out roadway laneage assessed in this report is based on the average daily traffic volume projections. This analysis considers the Build-Out of TransPort Colorado in which all planning areas develop to their maximum potential.

Laneage recommendations are shown on **Figure 11**. Several laneage requirements are more robust than outlined in *NEATS Refresh* as a result of the higher trip generation potential of the TransPort Colorado site than what was included in the *NEATS Refresh* travel demand model. These laneage revisions include an eight-lane cross-section for Quail Run Road between I-70 and US 36 (6 through lanes with continuous acceleration/deceleration lanes), a six-lane cross-section for Imboden Road from 56th Avenue along its realignment to Quail Run Road at US 36, and a four-lane cross-section along US 36 from TransPort Colorado's eastern boundary at Schumaker Road to the west toward Watkins.

Manila Road between US 36 and I-70 can be planned as a 4-lane roadway. While projected traffic volumes imply that this segment of Manila Road may require six lanes by Build-Out of TransPort Colorado, it does not consider the influence that a new interchange on I-70 at the Schumaker Road alignment will have, one that will allow more direct access for Subarea 6 vehicle movements that will provide congestion relief along Manila Road.

IV.E. Large Truck Influence at Roundabouts

There is the potential that roundabouts can be considered for varying intersections within or adjacent to the TransPort Colorado development area. Given the level of industrial and warehousing land uses, a higher percentage of large (semi) trucks are anticipated to use the TransPort Colorado roadway network. Large trucks can benefit by the installation of roundabouts due to a lessening of start/stop movements and the freer flow of vehicles through a roundabout. As such, roundabouts are viable options in the proper locations.

To succeed, roundabouts will need to be designed correctly for the influence of large vehicles. They may need to be larger than roundabouts at other locations and they potentially will include truck aprons. Analyses of approach geometry, the inside and outside roundabout diameters, circulating movements through the roundabouts, and fastest-path evaluations are all important design issues that will need to be considered if roundabouts are a desired intersection traffic control option.







IV.F. Bear Gulch Trail Connectivity

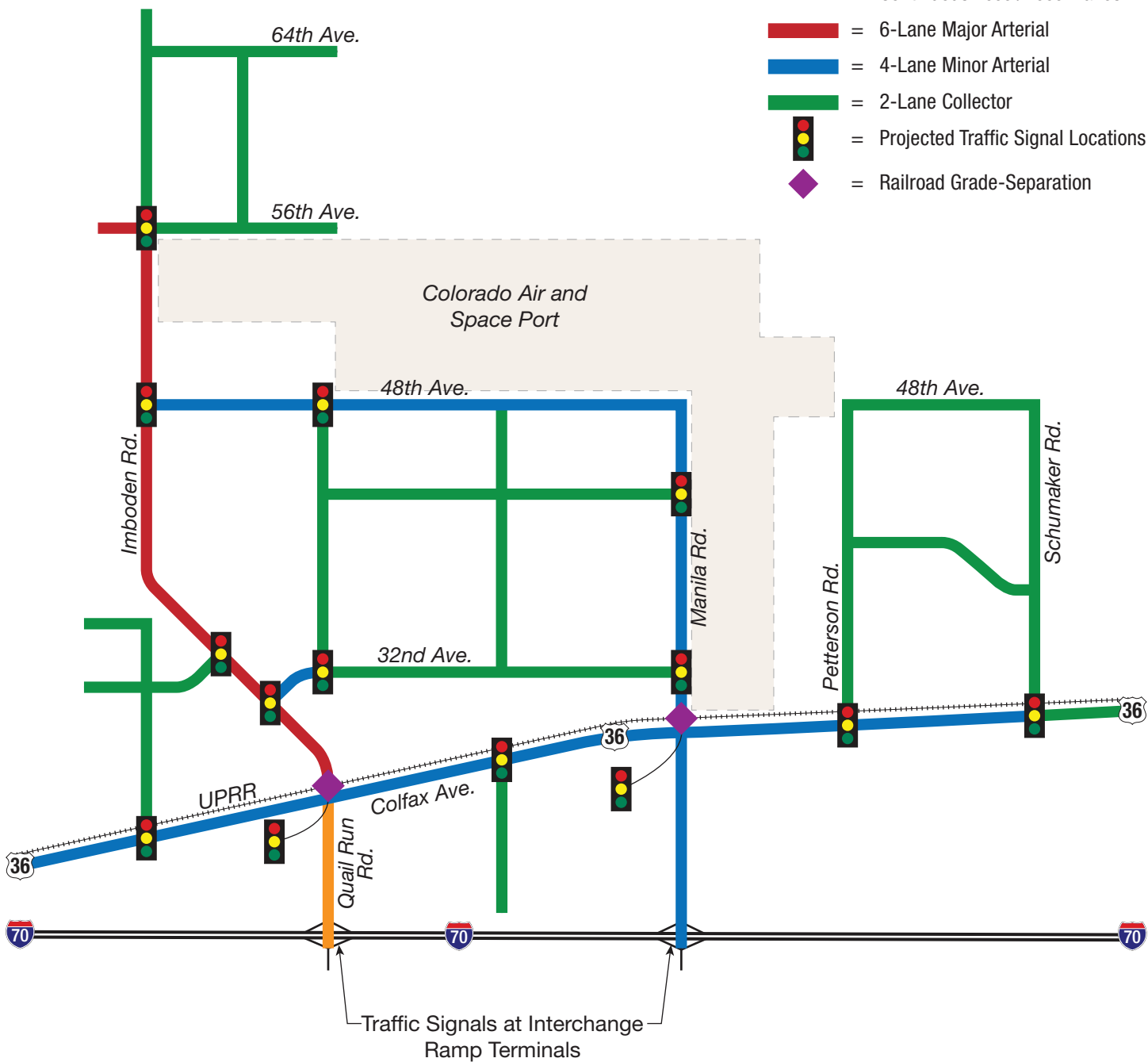
Bear Gulch extends through the western portion of TransPort Colorado between Imboden and Quail Run Roads. TransPort Colorado will construct the Bear Gulch Trail through its land area with input from the City of Aurora and will rely on information contained in *NEATS Refresh* as a starting point. Coordination with City staff will occur at the proper time to formalize the trail alignment and its connectivity outside the TransPort Colorado land area boundary.

IV.G. CDOT Coordination

It will be necessary for TransPort Colorado to coordinate with CDOT related to construction of roadway improvements along US 36 and at I-70 interchanges. The new Quail Run Road interchange and modifications to the existing Manila Road interchange will need to be approved through CDOT's I601 process. Improvements along US 36 will require CDOT approval, and any new access will require a State Highway Access Permit.

LEGEND

-  = 6-Lane Major Arterial with Continuous Accel/Decel Lanes
-  = 6-Lane Major Arterial
-  = 4-Lane Minor Arterial
-  = 2-Lane Collector
-  = Projected Traffic Signal Locations
-  = Railroad Grade-Separation



V. YEAR 2040 CONDITIONS

This section provides information on the level of potential development by the Year 2040, the associated traffic volumes, and roadway infrastructure requirements. As noted previously, the Build-Out of TransPort Colorado is projected to be beyond the Year 2040, but since most planning horizons are based on a future 20-year scenario, an assessment for the Year 2040 has now been included.

V.A. Year 2040 Background Traffic

Daily traffic volume projections represented on **Figure 12** for the Year 2040 have been developed based on the *NEATS Refresh* Year 2040 daily traffic volumes with zero development in the TransPort Colorado land areas.

V.B. Year 2040 Land Uses

TransPort Colorado has prepared an economic analysis that provides the best estimates of the levels of development for the Year 2040 timeframe. It is not anticipated that each land use type will develop linearly from zero development to Year 2040 to Build-Out, however. For example, the construction of mixed-use commercial property will lag behind other land uses given its location within TransPort Colorado, the roadway/interchange connections to serve it, and the existence of other land uses to support it. Considering these factors, the development absorption estimates for the 2040 TransPort Colorado land uses are:

▪ Industrial =	1,316 acres ±
▪ Data Center =	412 acres ±
▪ Warehousing =	264 acres ±
▪ Mixed-Use Commercial =	<u>26 acres ±</u>
TOTAL =	2,018 acres ±

This level of development represents about 41 percent of the total TransPort Colorado size.

V.C. Year 2040 Trip Generation Estimates & Assignment

Trip generation estimates of traffic volumes have been developed using the same parameters and trip characteristics as note in **Section IV. Table 2** on page 23 and **Figure 13** represent the trip generation estimates and assignment of vehicle trips, respectively.

V.D. Year 2040 Total Daily Traffic Volumes

The site generated traffic volumes of **Figure 13** were added to the estimated Year 2040 Background traffic volumes, which were developed similarly to how the background traffic volumes were estimated for the Build-Out timeframe. **Figure 14** is the combination of the site generated and background traffic volumes for the Year 2040.

Table 2. Year 2040 Trip Generation Estimates

Trip Generation Category	Acres (±)	Building Square Footage (ksf)	Daily Vehicle-Trips	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Industrial ¹	1,316	8,232	31,904	1,837	251	2,088	202	1,351	1,553
Data Center	412	2,070	3,681	2,088	624	2,712	738	1,996	2,735
Warehousing	264	2,070	2,050	120	98	218	53	124	177
Mixed-Use	26	341	15,252	294	180	474	696	754	1,449
Subtotal =			52,886	4,339	1,153	5,492	1,689	4,225	5,914
Mixed Use Internal Capture Reductions ²			-5,220	-85	-85	-170	-261	-261	-522
Mixed Use Pass-By Reductions ³			-720	-12	-12	-24	-36	-36	-72
NET EXTERNAL TRIP GENERATION =			46,946	4,242	1,056	5,298	1,392	3,928	5,320

¹ Per the City of Aurora, the Light Industrial trip generation category was used for all industrial parcels.

² Internal Capture reductions were estimated based on mixed-use sites in Planning Areas 30 and 31 at a rate of 36 percent, the average rate reported for mixed-use sites in NCHRP Report 684.

³ Pass-by was reductions are at a rate of 5 percent for mixed-use.

V.E. Year 2040 Recommended Roadway Laneage

Figure 15 provides a graphical representation of the recommended roadway laneage that is projected to be needed by the Year 2040 based on the land use density predictions and on the daily traffic volume estimates of **Figure 14**.

Given the incremental development of TransPort Colorado toward the Build-Out scenario, it can be seen on **Figure 15** that roadway laneage and other infrastructure requirements are a proportional share of what is predicted for the Build-Out timeframe. For example, the Imboden Road/Quail Run Road typical section does not need to be six lanes although it is predicted that the connection to I-70 via a new interchange will be constructed consistent with the recommendations of *NEATS Refresh*.

LEGEND

XXXX = Daily Traffic Volumes

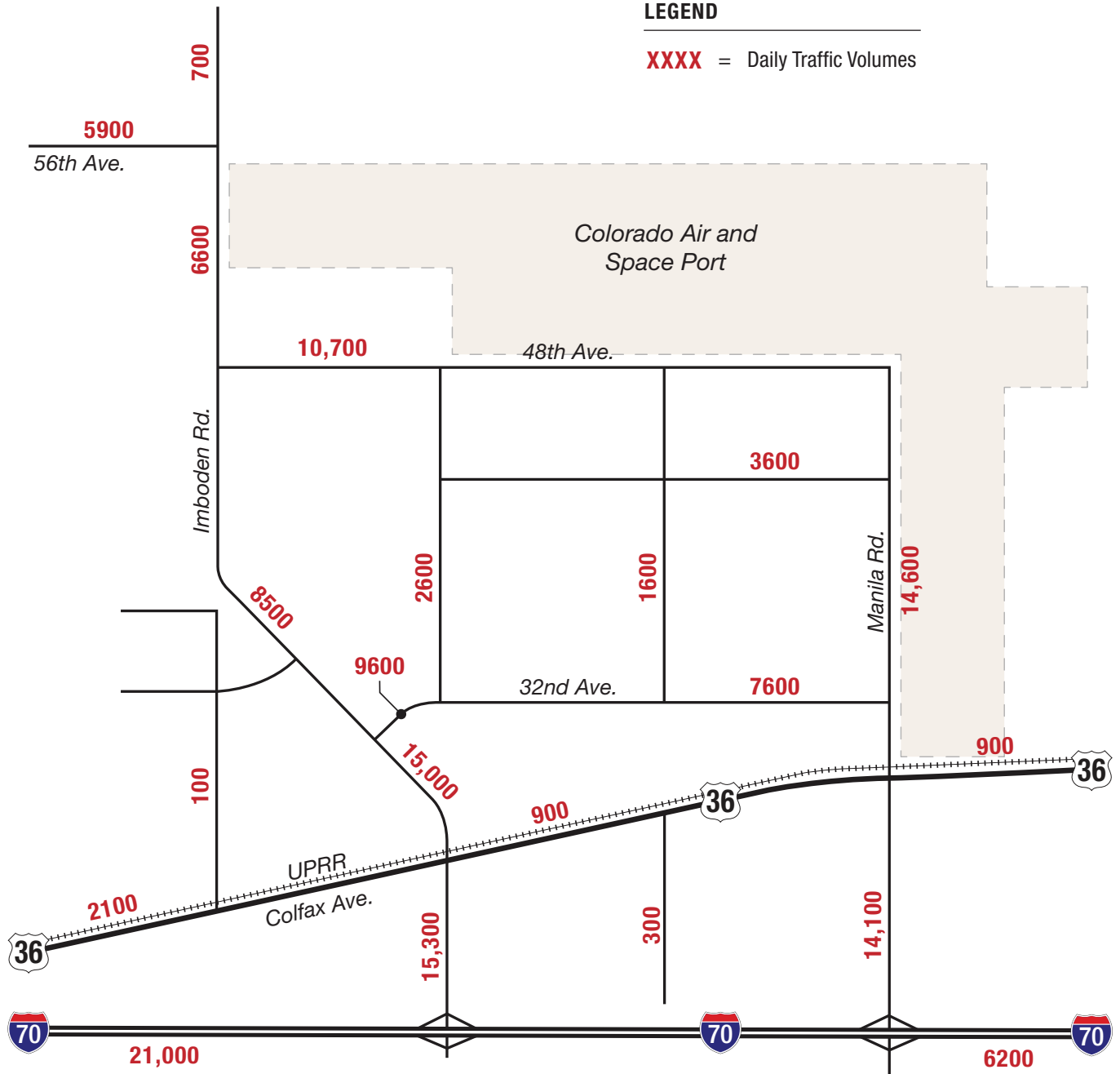
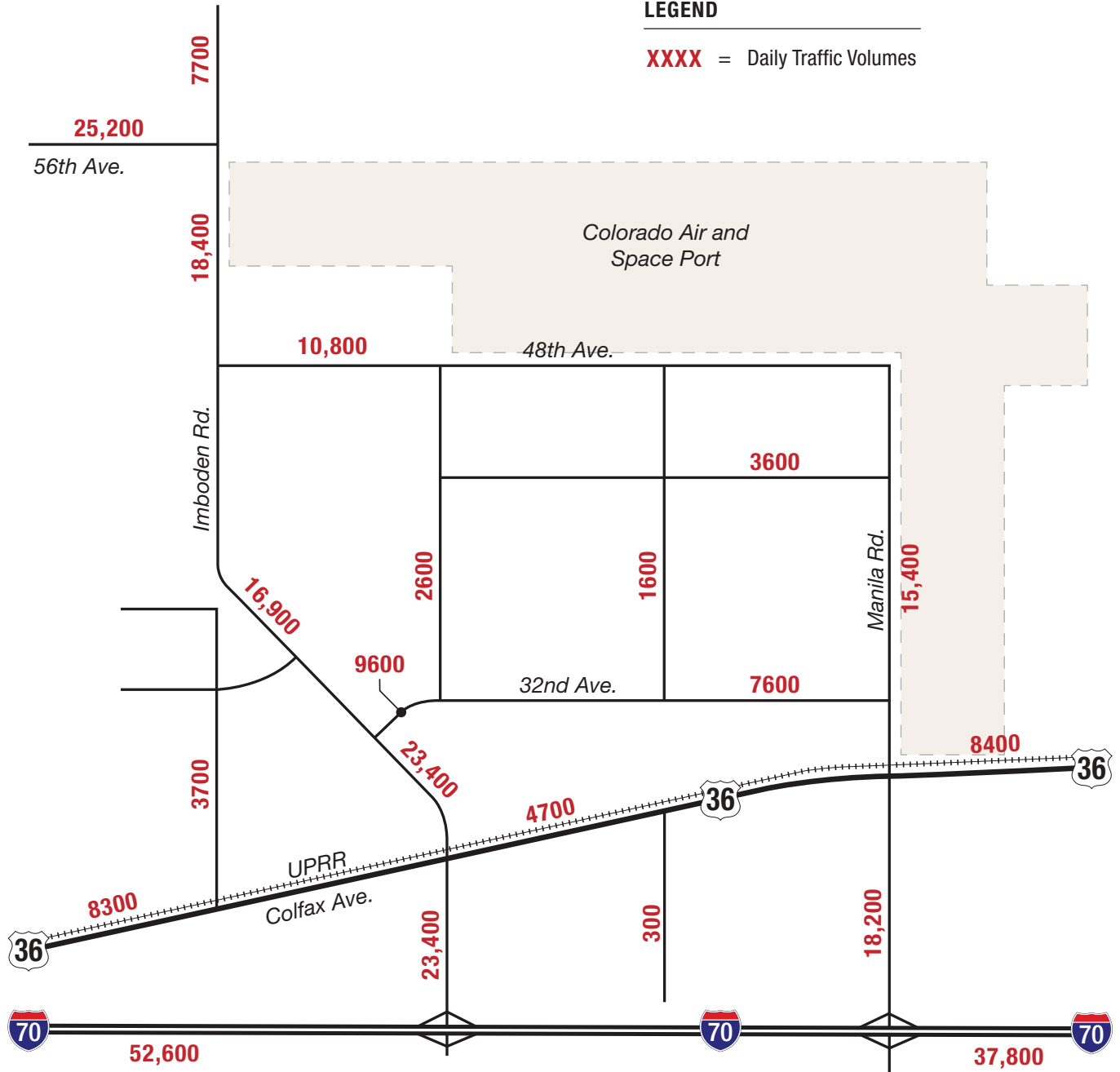


FIGURE 13
Year 2040 TransPort Colorado
Site Generated Daily Traffic Volumes

LEGEND

XXXX = Daily Traffic Volumes



NORTH

FIGURE 14

Year 2040 TransPort Colorado
Total Daily Traffic Volumes

TransPort Colorado 18-335 11/20/19



VI. SUBAREA I

As noted in the Introduction, two subareas of TransPort Colorado have been evaluated for trip generation estimates and roadway requirements. Although it is unknown exactly where the initial land sales will occur, Subareas 1 and 2 are the likely locations. As such, they are included in this report to assist in the development review process with the City. Subareas 1 and 2 have been evaluated as if they are developed separately from one another; therefore, the information contained in this section and the following section (**Section VII, Subarea 2**) contain similar information on the projected development types, along with trip generation projections, traffic operational data, and roadway network and traffic control recommendations.

Background traffic estimates for these subarea scenarios assume a 1.7 percent annual growth rate as determined from data available on CDOT's OTIS at count station 101690, which is located along SH 36 to the east of Imboden Road. Given the relatively low existing traffic levels, these background scenarios do not differ significantly from existing conditions both in volume and in operational results. **Figure 16** and **Figure 21** (in **Section VII**) for Background traffic volume provide estimates for Subareas 1 & 2. These Background estimates include the same traffic volume levels, and they represent a Year 2040 development scenario. Of note, when considering the separate development of these subareas, the construction of the Quail Run Road interchange at I-70 is not required and is, therefore, not represented on these figures.

VI.A. Subarea I Land Uses

Figure 17 is a representation of the land area boundary and parcel locations for Subarea I. The land area abuts Manila Road on the east, 48th Avenue on the north, US 36 and the UPRR on the south, and on the west, other TransPort Colorado parcels or land areas that are not a part of TransPort Colorado.

Subarea I is projected to take approximately 20 years to develop (approximately Year 2040), and it includes a total of 1,154 acres, but once non-developable land is removed, the summary of acreage is:

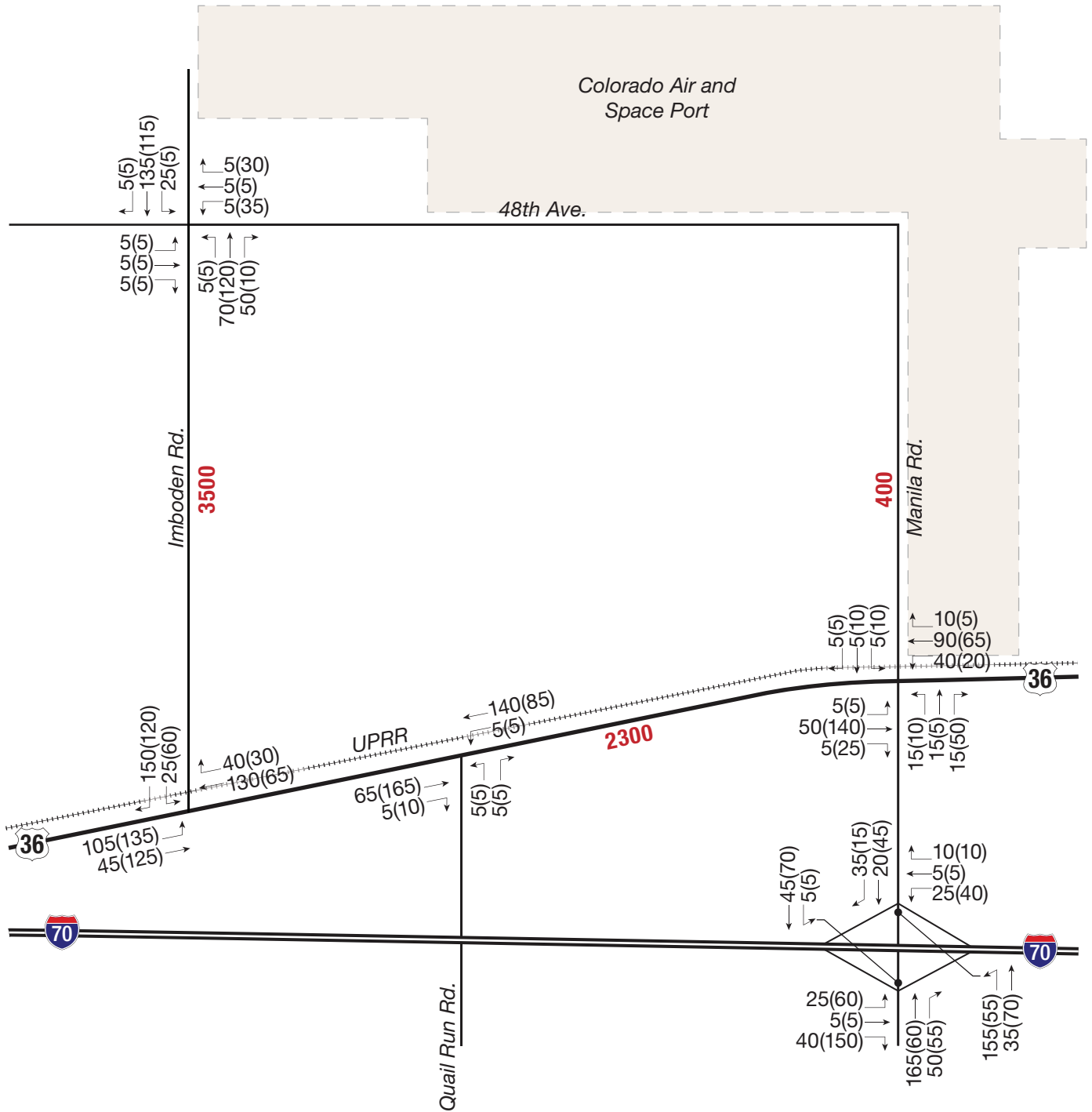
Table 3. Subarea I Land Area

Parcel 10 = 151.1 acres	Parcel 14 = 246.5 acres
Parcel 11 = 116.0 acres	Parcel 15 = 150.0 acres
Parcel 12 = 63.2 acres	Parcel 16 = 171.4 acres
Parcel 13 = 154.2 acres	Parcel 17 = 21.9 acres
TOTAL =	1,074.3 Acres

VI.B. Subarea I Trip Generation Estimates & Assignment

Subarea I includes only industrial land use types. Through discussions with City of Aurora staff, the trip generation for these land uses, regardless of how dense or what the individual uses on each parcel are, have been estimated using the Light Industrial trip generation category in *Trip Generation*, 10th Edition. As such, these estimates may be conservative. Regardless, **Table 4** on Page 30 summarizes the estimates of vehicle trips for Subarea I. Vehicle-trips are projected to exceed 25,000 vpd and 1,200 vph during the AM and PM peak hours.

The assignment of the estimated vehicle-trips of **Table 4** were applied to the projected roadway network using the trip distribution assumptions noted in **Section IV.C. Figure 18** and **Figure 19** provide representations of the site generated and total traffic volume projections for Subarea I.



LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes

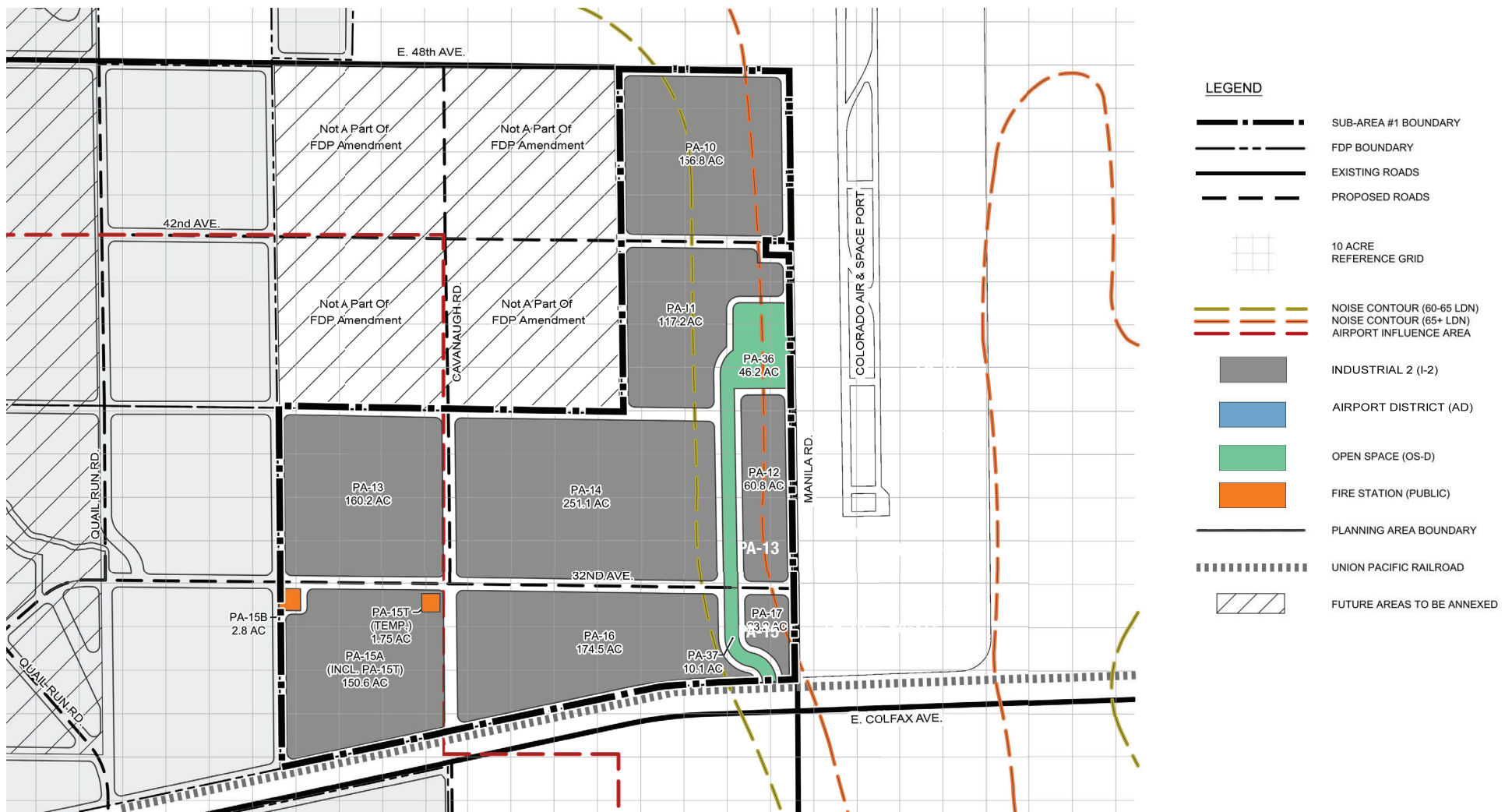


FIGURE 17
Subarea I
Land Uses

Table 4. Subarea I Trip Generation Estimates

Planning Area	Land Use	ITE Code	Square Footage (KSF)	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
PA-10	Industrial	110	987.3	3,800	214	29	243	23	156	179
PA-11	Industrial	110	757.9	2,931	176	24	200	19	130	149
PA-12	Industrial	110	412.9	1,623	112	15	127	13	85	98
PA-13	Industrial	110	1,007.5	3,877	216	30	246	24	158	182
PA-14	Industrial	110	1,610.6	6,162	307	42	349	33	218	251
PA-15	Industrial	110	980.1	3,773	212	29	241	23	155	178
PA-16	Industrial	110	608.3	2,363	149	21	170	16	112	128
	Transload Facility	Custom	101.3	162	14	2	16	2	14	16
	Subtotal		709.7	2,525	163	23	186	18	126	144
PA-17	Industrial	110	143.1	600	51	7	58	6	41	47
Net External Trip Generation				25,291	1,451	199	1,650	159	1,069	1,228

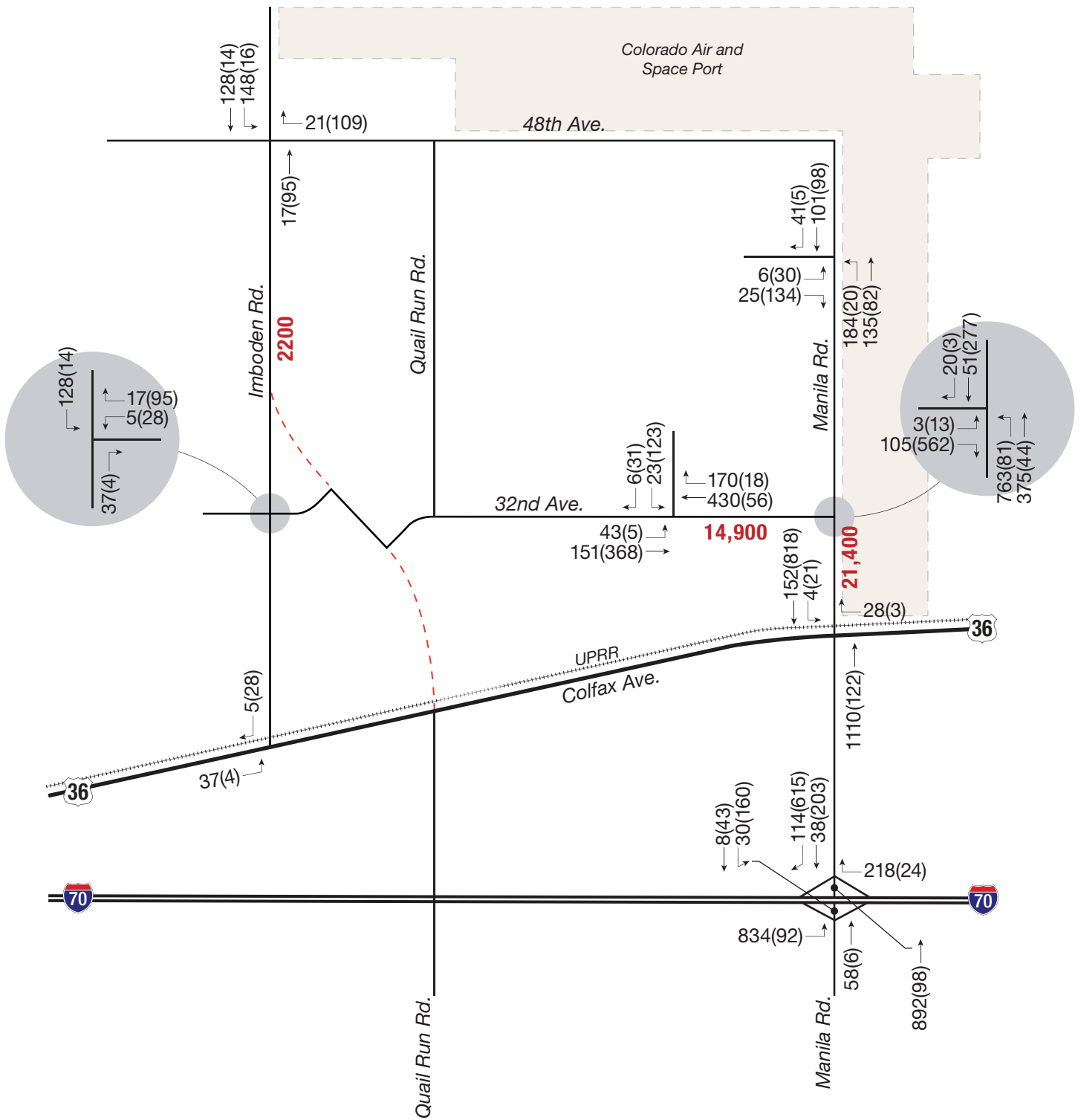
While there are varying levels of projected vehicle-trips at intersections and along the roadway network, two movements should be noted, both of which are at the I-70/Manila Road interchange: (1) the eastbound to northbound left turn (AM peak hour) movement, and (2) the southbound to westbound right turn (PM peak hour) movement. A large portion of the projected vehicle-trips for Subarea I will use this interchange for movements to/from the Denver metropolitan area; therefore, these two movements have the highest levels of projected site traffic. Peak hour vehicle-trips are projected to exceed 800 vph during the AM peak hour and 600 vph during the PM peak hour. Improvements necessary to satisfy this level of vehicle movement are contained in the following section.

VI.C. Subarea I Operational Conditions (Estimated Year 2040)

An evaluation of intersection operations was conducted for the AM and PM peak hours using the methodologies of the *Highway Capacity Manual*. The results of these analyses find that certain improvements will be necessary to provide acceptable vehicle operations during the peak hours. LOS C or better can be achieved with the traffic control recommendations of **Figure 20**, with the exception of the eastbound left turn at 32nd Avenue/Manilla Road, which is projected to operate at LOS F during the AM Peak. This intersection is not projected to meet signalization warrants and the volume in question is below 10 vph. As such, new traffic signals are proposed at three intersections:

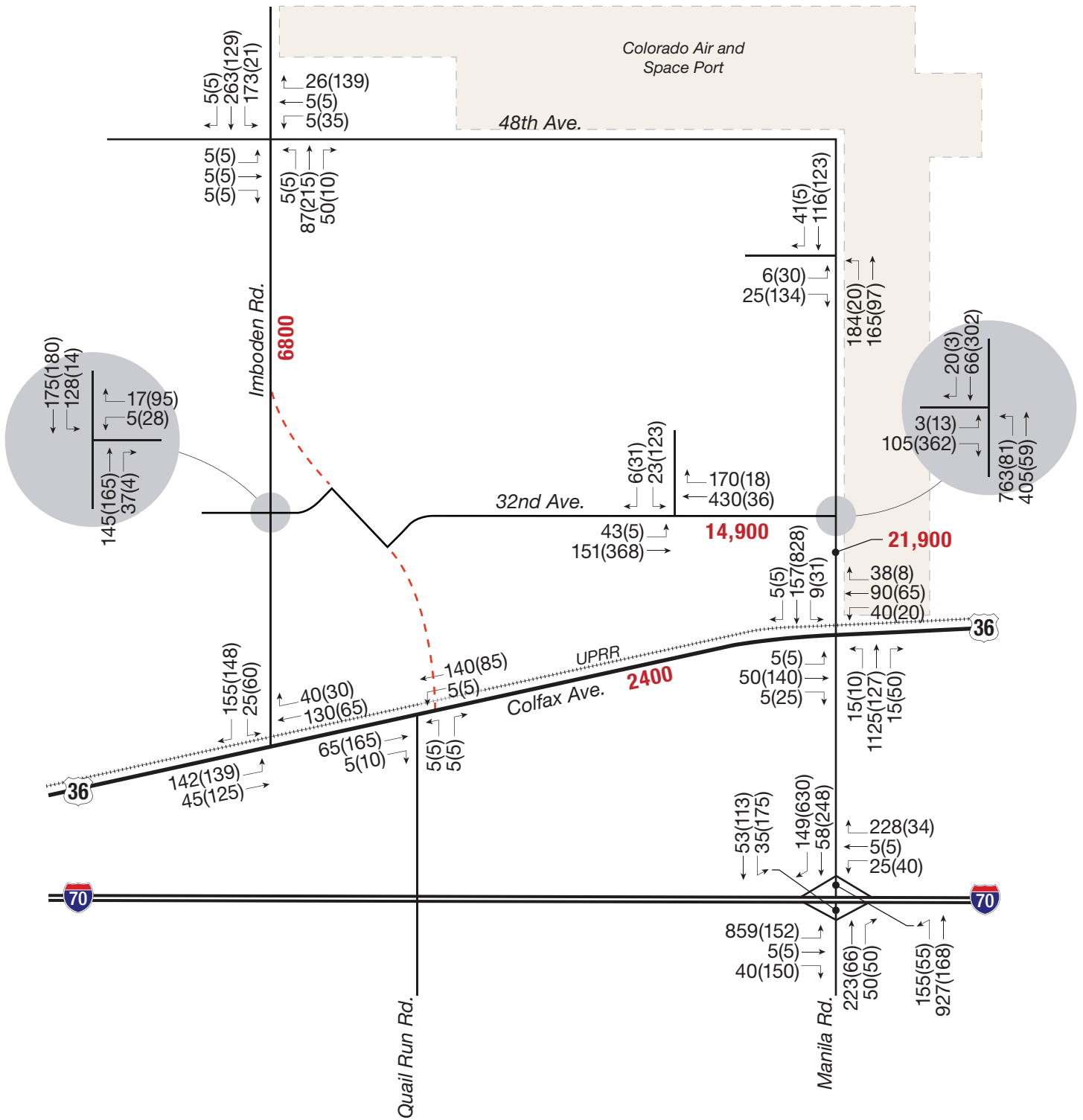
- The I-70/Manila Road interchange ramp terminals (2)
- The US 36/Manila Road intersection

Signalization at these three locations are projected to be required based on review of Warrant 2, Four-Hour Vehicular Volume and Warrant 3, Peak Hour contained in the *Manual on Uniform Traffic Control Devices* (MUTCD). While some of the intersections may not meet the exact threshold criteria for Warrant 2 or Warrant 3, there is enough evidence that these three locations will likely meet signalization criteria by completion of Subarea I. The warrant graphs are included in **Appendix F**. Operational analysis worksheets for Subarea I are included in **Appendix G**. Heavy vehicle percentages of 20 and 19 percent, respectively, were used in the AM and PM peak hours. This is an increase of 8 percent as compared to existing conditions and is consistent with percentages for sites with similar land use mixes.



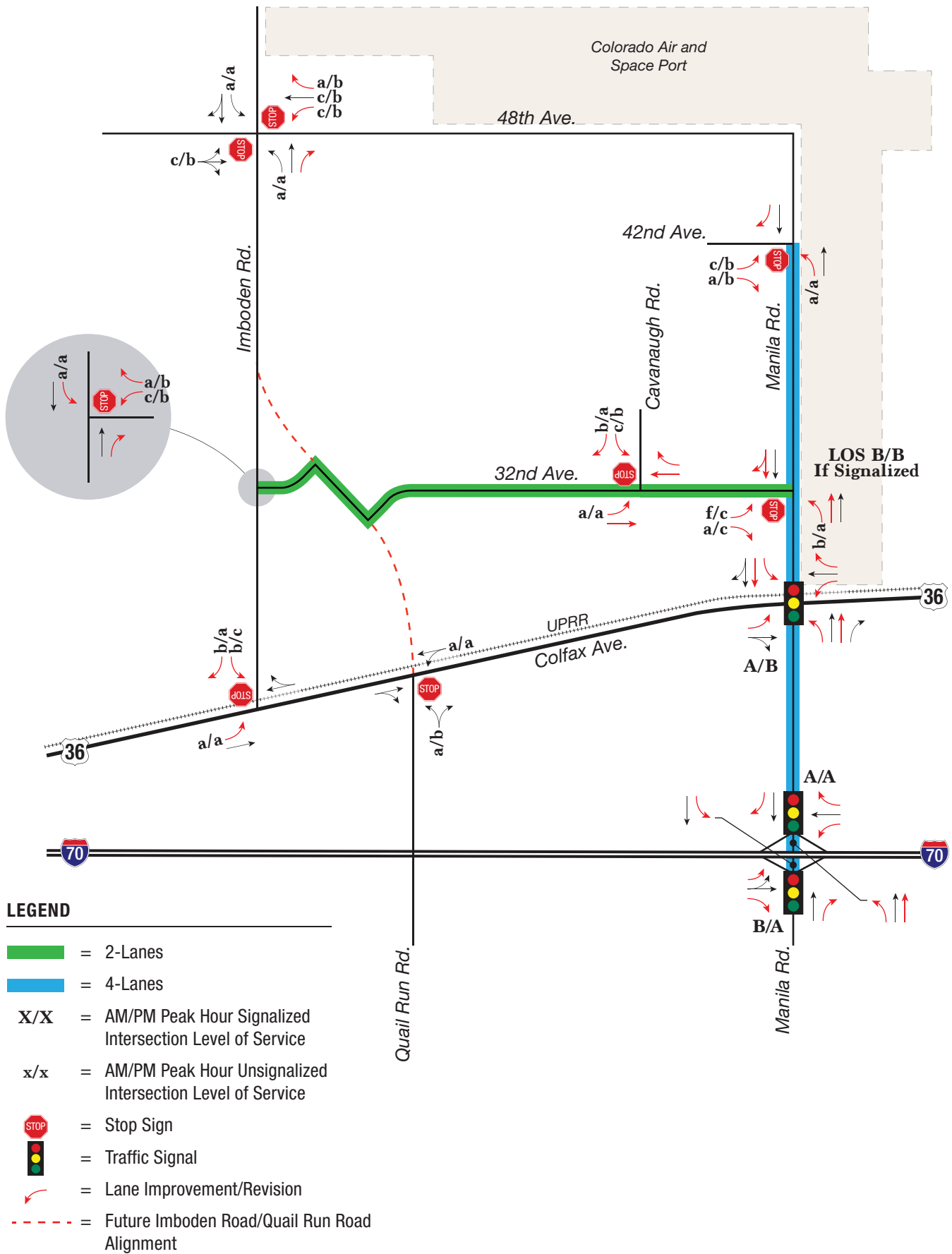
LEGEND

- XXX(XXX) = AM(PM) Peak Hour Traffic Volumes
- XXXX** = Daily Traffic Volumes
- - - - = Future Imboden Road/Quail Run Road Alignment



LEGEND

- XXX(XXX) = AM(PM) Peak Hour Traffic Volumes
- XXXX** = Daily Traffic Volumes
- - - - = Future Imboden Road/Quail Run Road Alignment



VI.D. Subarea I Roadway Network and Traffic Control

Some operational results included in the previous section rely on the construction of 32nd Avenue between an Imboden Road/Quail Run Road realignment and Manila Road. Only a portion of the Imboden Road/Quail Run Road realignment is necessary, and 32nd Avenue will provide an additional east-west travel route to limit unneeded circuitous travel and to provide an alternative life safety route.

New traffic signals are projected to be needed at the I-70 ramp terminals and at US 36 and 32nd Avenue along Manila Road at varying times during construction of Subarea I. Roundabouts have been considered at the I-70 ramp terminal intersections and, if constructed, they are only a temporary traffic control measure until more significant interchange reconstruction is necessary. All other intersections are expected to operate acceptably with stop sign control for the side street intersection movements.

VI.E. Subarea I Improvements

Table 5 contains a summary of the projected recommendations needed for the Build-Out of Subarea I. The Development Acreage column represents the approximate amount of acreage that can be constructed before the identified improvement is required. Individual analyses of traffic volumes and intersection operations, and auxiliary lane requirements will be conducted for each parcel when they are proposed for development to understand the exact improvements that are required based on the planned land use type and density. The information contained in **Table 5** should be used only as a guide for the transition from one improvement to another as Subarea I develops.

Table 5. Subarea I Improvement Recommendations

Location	Improvement	Approximate Development Acreage Corresponding to Identified Improvement	Approximate Year Corresponding to Identified Improvement ¹
32 nd Avenue	Construct a two-lane cross-section between Imboden Road and Manila Road	With the development of the first parcel adjacent to 32 nd Ave.	2020 – 2021
Manila Road	Widen to four-lanes between 32 nd Avenue and the I-70 north ramp terminal and improve the UPRR at-grade crossing; widen north toward 48 th Avenue depending on the timing of development of PA's 10, 11, and 12	680–700 Acres	2032 – 2033
I-70/Manila Road Interchange	Reconstruct I-70 bridge and ramp terminals and install turn lanes for entrance and exit movements; signalize ramp terminal intersections	800–820 Acres	2034 – 2035
US 36/Manila Road	Signalize intersection; may require a pre-signal and preemption signal timing at the UPRR crossing	800–820 Acres	2034 – 2035
32 nd Avenue/Manila Road	Signalize intersection	910–930 Acres	2036 – 2037

¹Improvement years assume a linear rate of development.

VII. SUBAREA 2

As noted previously, Subareas 1 and 2 are evaluated separately since the types of development and exact locations that will first occur in TransPort Colorado are unknown. These subareas are evaluated separately and include information related to the entire Build-Out of either subarea. Following is information related to the complete development of Subarea 2.

VII.A. Subarea 2 Land Uses

Figure 22 represents the Subarea 2 land area boundary and parcel locations. The land area abuts Imboden Road along its western edge, Space Port property on the north, and other TransPort Colorado parcels or land areas not part of TransPort Colorado on the east and south. 48th Avenue proceeds through the northern section of Subarea 2.

Subarea 2 includes a total of 1,164 acres; however, once non-developable land is removed, the summary of acreage is as shown in **Table 6**.

Table 6. Subarea 2 Land Area

Parcel 2a = 78.5 acres	Parcel 6 = 102.8 acres
Parcel 2b = 28.1 acres	Parcel 7 = 314.4 acres
Parcel 3 = 120.2 acres	Parcel 8 = 151.8 acres
Parcel 4 = 36.5 acres	Parcel 9 = 154.4 acres
Parcel 5 = 136.9 acres	
TOTAL =	1,123.6 Acres

VII.B. Subarea 2 Trip Generation Estimates and Assignment

Subarea 2 will be developed with data center and warehouse land uses; information contained in the current edition of *Trip Generation*, 10th Edition was used to estimate the projected vehicle-trips. For the purposes of this individual analysis of Subarea 2, Subarea 2 is projected to take approximately 20 years to develop (approximately Year 2040). **Table 7** summarizes the estimates of vehicle trips for this subarea. Daily trips are projected to approach 12,000 vpd, and the AM and PM peak hour vehicle movements are projected to be between 1,200 vph and 1,300 vph.

The assignment of the projected vehicle-trips of **Table 7** were applied to the proposed roadway network using the trip distribution assumptions noted in **Section IV.C**. **Figure 23** and **Figure 24** show representations of the site generated and total traffic volume projections for Subarea 2.

As with Subarea 1, there are varying levels of projected vehicle-trips at intersections and along the roadway network. Several vehicle movements should be noted:

- Imboden Road/48th Avenue Intersection – The westbound left turn lane is projected to reach or exceed 300 vph.
- US 36/Imboden Road Intersection – The eastbound to northbound left turn (AM peak hour) and southbound to westbound right turn (PM peak hour) movements are projected to exceed 400 vph.

Subarea 2 does not have the same level of impact at the I-70/Manila Road interchange as Subarea 1 given the locations of the land areas within these two subareas.

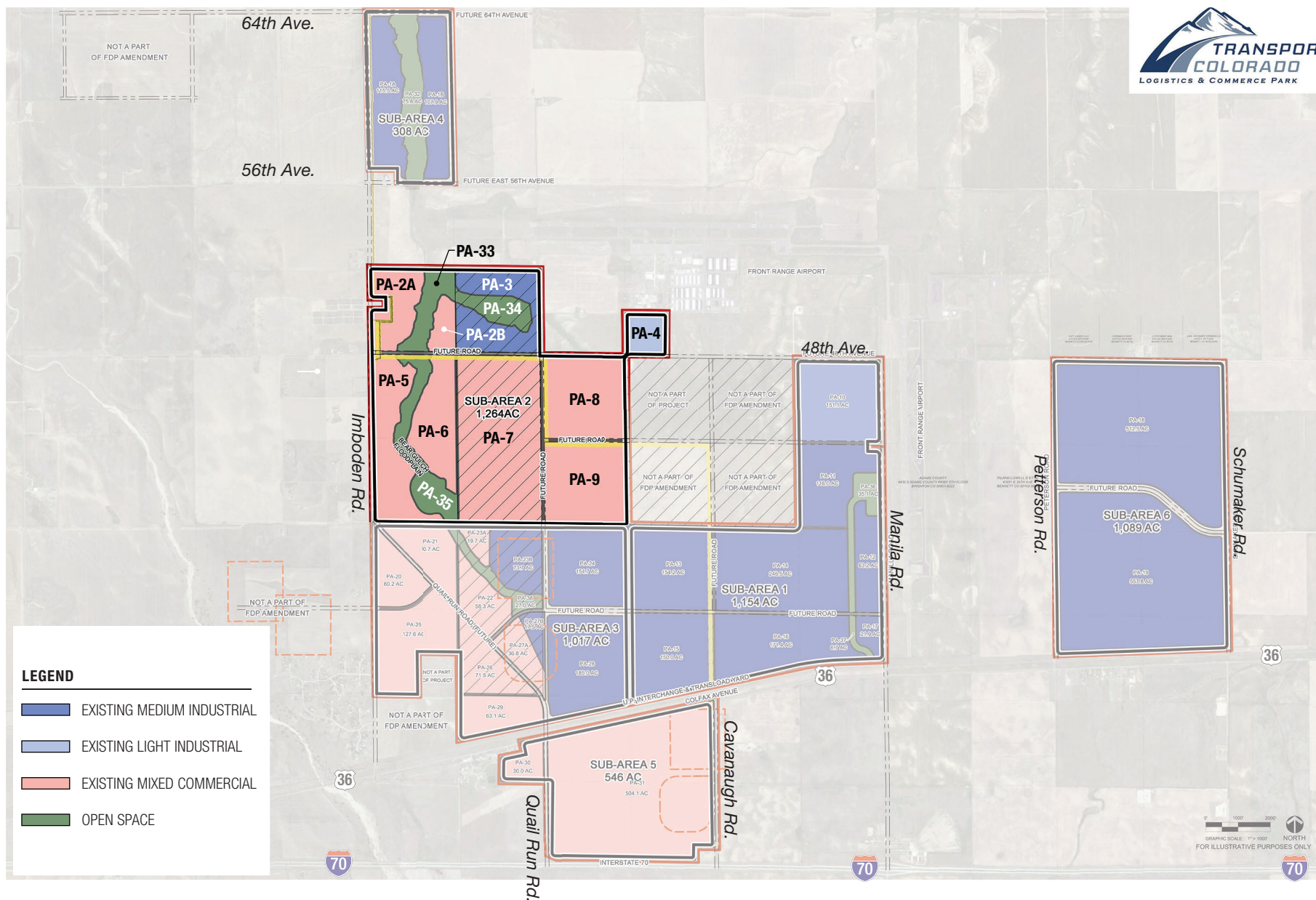
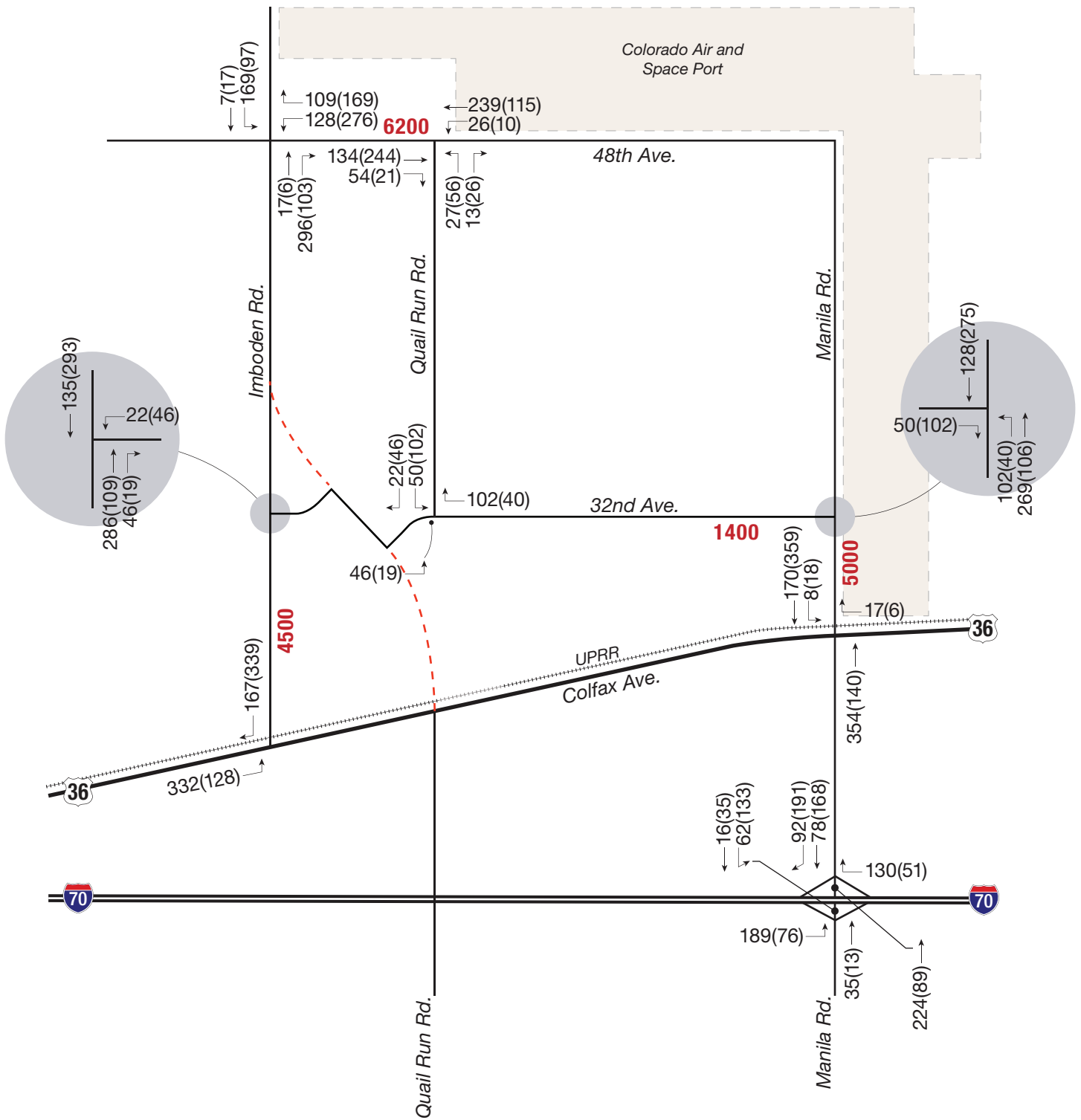


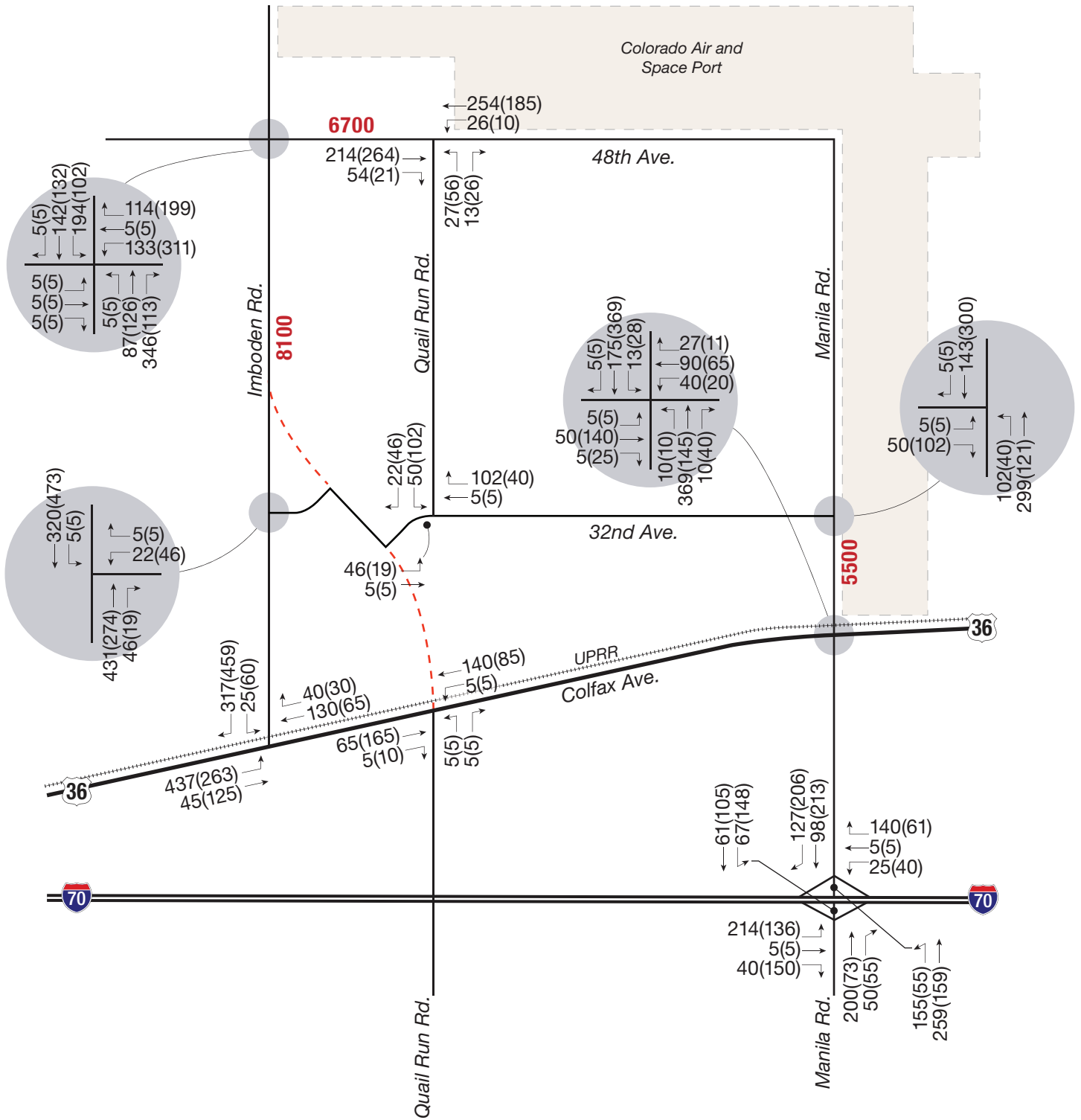
Table 7. Subarea 2 Trip Generation Estimates

Planning Area	Land Use	ITE Code	Square Footage (KSF)	Daily	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
PA-2a	Data Center	160	307.8	305	19	15	34	8	20	28
	Warehouse	150	307.8	532	48	14	62	17	48	65
	Subtotal		615.5	837	67	29	96	25	68	93
PA-2b	Data Center	160	110.2	109	5	4	9	1	5	6
	Warehouse	150	110.2	220	30	9	39	11	30	41
	Subtotal		220.3	329	35	13	48	12	35	47
PA-3	Data Center	160	471.2	467	31	25	56	14	32	46
	Warehouse	150	471.2	790	63	19	82	22	62	84
	Subtotal		942.5	1,257	94	44	138	36	94	130
PA-4	Data Center	160	143.1	142	7	6	13	3	7	10
	Warehouse	150	143.1	272	32	10	42	12	33	45
	Subtotal		286.2	414	39	16	55	15	40	55
PA-5	Data Center	160	536.7	531	35	29	64	16	37	53
	Warehouse	150	536.7	894	69	21	90	25	67	92
	Subtotal		1,073.4	1,425	104	50	154	41	114	155
PA-6	Data Center	160	403.0	399	26	21	47	12	27	39
	Warehouse	150	403.0	682	57	17	74	20	56	76
	Subtotal		806.0	1,081	83	38	121	32	83	115
PA-7	Data Center	160	1,232.6	1,220	85	70	155	39	91	130
	Warehouse	150	1,232.6	1,993	133	40	173	47	129	176
	Subtotal		2,465.1	3,213	218	110	328	86	220	306
PA-8	Data Center	160	595.1	589	39	33	72	18	42	60
	Warehouse	150	595.1	986	74	23	97	27	72	99
	Subtotal		1,190.2	1,575	113	56	169	45	114	159
PA-9	Data Center	160	605.3	599	40	33	73	18	43	61
	Warehouse	150	605.3	1,002	75	23	98	27	73	100
	Subtotal		1,201.6	1,601	115	56	171	45	116	161
Net External Trip Generation				11,732	868	412	1,280	337	884	1,221



LEGEND

- XXX(XXX) = AM(PM) Peak Hour Traffic Volumes
- XXXX** = Daily Traffic Volumes
- - - - = Future Imboden Road/Quail Run Road Alignment



LEGEND

XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes

- - - - = Future Imboden Road/Quail Run Road Alignment

VII.C. Subarea 2 Operational Conditions

Intersection operational analyses of Subarea 2 were conducted for the AM and PM peak hours using the methodologies of the *Highway Capacity Manual* also. Two intersections will likely require traffic signals and **Appendix H** provides representations of Warrant 2 (Four-Hour Vehicular Volume) and Warrant 3 (Peak Hour) evaluation graphs. The results of these analyses find that some improvements will be required to provide acceptable vehicle operations during the AM and PM peak hours. LOS D or better can be achieved with the traffic control recommendations of **Figure 25**, which may require the installation of a new traffic signal at the Imboden Road/48th Avenue intersection. **Appendix I** includes analysis worksheets for Subarea 2.

When compared to the analyses of Subarea 1, the level of traffic impact at the I-70/Manila Road interchange is substantially less. As such, it is projected that the existing intersection geometry and traffic control will operate acceptably when considering the entire Build-Out of Subarea 2; no interchange improvements are necessary. As individual parcels are proposed for development, an analysis of traffic impacts will be conducted to verify the intersection laneage and traffic control measures that are required. Heavy vehicle percentages of 16 and 15 percent, respectively, were used in the AM and PM peak hours. This is an increase of 4 percent as compared to existing conditions and is consistent with percentages for sites with similar land use mixes.

VII.D. Subarea 2 Roadway Network & Traffic Control

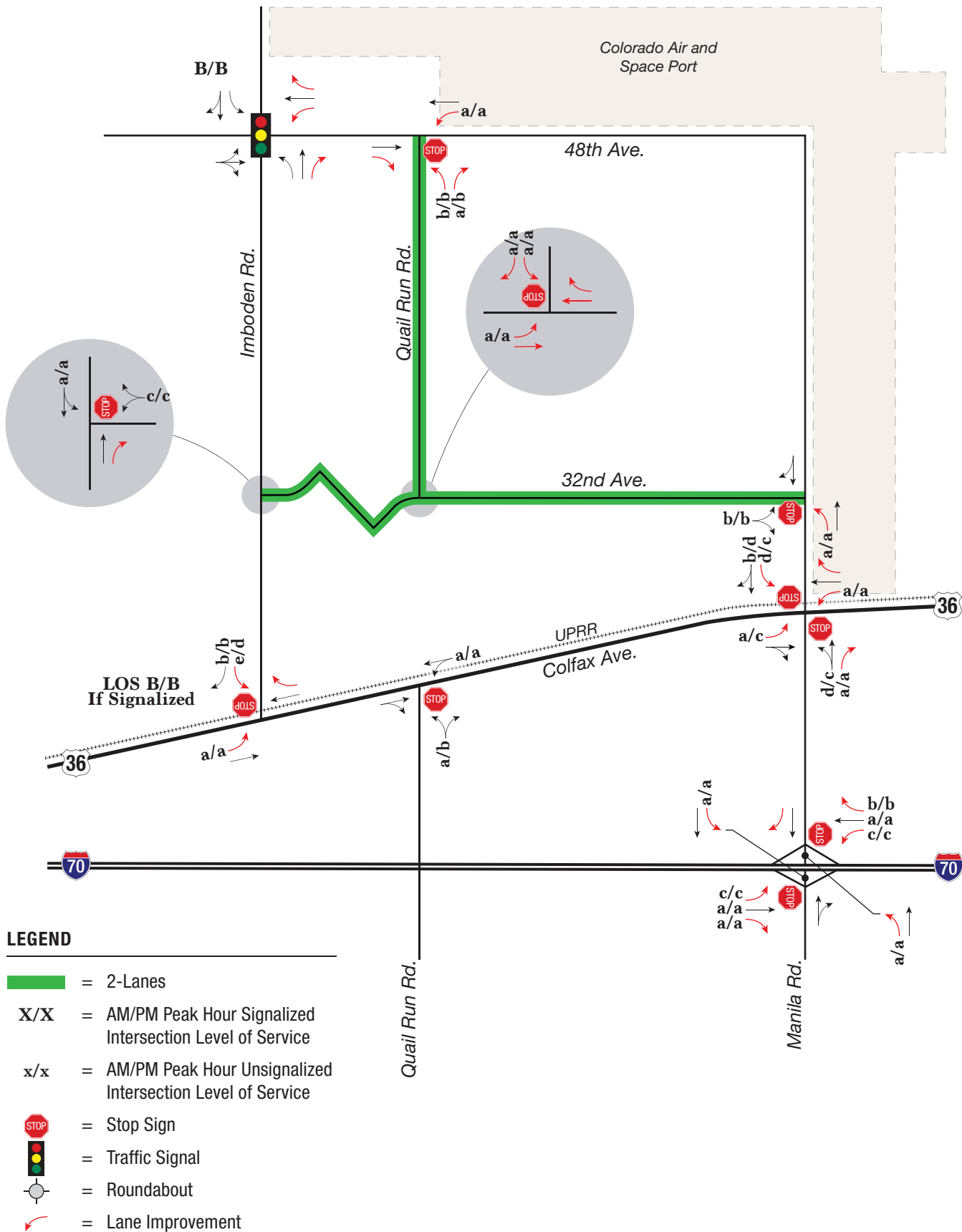
Some of the operational results included in the previous section rely on the construction of 32nd Avenue between an Imboden Road/Quail Run Road realignment and Manila Road. Evaluation on the timing of this improvement will be necessary as development construction proceeds. All intersections are projected to operate well and can continue to have stop sign control for the side street intersection movements except at the Imboden Road/48th Avenue intersection where a new traffic signal may be required by Build-Out of Subarea 2. Analyses of MUTCD traffic signalization warrants will be conducted at this intersection as new parcels are proposed to understand if/when this intersection will require a traffic signal.

VII.E. Improvements Summary

Table 8 summarizes the projected improvements needed for the Build-Out of Subarea 2. Similar to Subarea 1, the Development Acreage column represents the approximate amount of acreage that can be constructed before the identified improvement is required. Individual analyses of traffic volumes, intersection operations, and auxiliary lane requirements will be conducted for each parcel when they are proposed for development to understand the exact improvements that are required based on the planned land use type and density. The information contained in **Table 8** should be used only as a guide for the transition from one improvement to another as Subarea 2 develops.

As noted in the City's review comments on the first version of this study, several movements at the I-70 ramp terminal intersections meet *State Highway Access Code* criteria for installation of auxiliary lanes. While the criteria for exclusive left turn or right turn lanes are met, operational analyses find that each movement at each ramp terminal will operate at LOS C or better without the addition of new laneage.

Recognizing that the I-70 interchange will be reconstructed as TransPort Colorado moves toward its Build-Out scenario, possibly during the development of Subarea 2, the construction of auxiliary lanes may only provide minimal additional value to interchange operations and, therefore, is likely an unnecessary improvement. Regardless, **Figure 25** shows the laneage and levels of service with the additional auxiliary lanes that the *State Highway Access Code* would dictate.



To specifically answer a City of Aurora comment, grade-separations along US 36 that have been identified in *NEATS Refresh* (see **Figure 5** also) are not required for the Build-Out of Subarea 2 (or Subarea 1) when considered individually. The timing and location of the first grade-separation will be evaluated as parcels are being planned. It is not anticipated that a grade-separation will be required for many years, but it depends on the advancement of new parcel development, traffic operations, and coordination with UPRR.

Table 8. Subarea 2 Improvement Recommendations

Location	Improvement	Approximate Development Acreage Corresponding to Identified Improvement	Approximate Year Corresponding to Identified Improvement ¹
32 nd Avenue	Construct a two-lane cross-section between Imboden Road and Manila Road	Concurrent with Development of PA's 7 or 9	Dependent on PA 7 or 9 Development
Quail Run Road	Construct a two-lane cross-section between 32 nd Avenue and 48 th Avenue	Concurrent with Development of PA's 7 or 9	
US 36/Imboden Road Intersection	Construct eastbound left turn lane	240–260 Acres	2024 – 2025
Imboden Road/48 th Avenue Intersection	Construct westbound left turn lane	240–260 Acres	2024 – 2025
Imboden Road/48 th Avenue Intersection	Monitor for installation of a traffic signal	Build-Out	2040
¹ Improvement years assume a linear rate of development.			

VIII. SUMMARY AND RECOMMENDATIONS

TransPort Colorado is planning to develop a master-planned business environment of approximately 5,378 acres in the city of Aurora, Colorado. The project is known as TransPort Colorado and will be developed with industrial, data center, warehousing, and commercial land uses with several parcels having a rail-service component. The project will have access to national highway and rail transportation corridors and to national and international air infrastructure.

The project is located adjacent to the Colorado Air and Space Port (Space Port), formerly known as Front Range Airport, and it is also within close proximity of Denver International Airport (DEN). The project will have access to I-70, a major east-west interstate highway system via existing and planned interchanges. I-25 is located approximately 23 miles to the west of the project site and is the primary interstate access route between New Mexico and Montana. Complementing these two vital interstate highway links is the alignment of the UPRR tracks along the north side of US 36. One of TransPort Colorado's economic benefits will be its rail access for rail-served properties and transload facilities.

The majority of the project is bounded by US 36, the UPRR, and I-70 along its south edge, by 48th Avenue to the north, by Imboden Road on the west, and by Manila Road to the east. Two additional properties are included in the development, the largest of which is located to the east of the Space Port north-south runaway. This parcel consists of approximately 1,100 acres and is bounded by US 36 on the south, 48th Avenue to the north, and between Petterson and Schumaker Roads. The second parcel is about 300 acres and is adjacent to Imboden Road between 56th and 64th Avenues.

TransPort Colorado will take more than 20 years to completely develop. At completion of the project, the site will generate over 200,000 vehicle-trips per day, with about 153,000 of them added to the external roadway network after reductions for internal and pass-by trips.

The existing roadway network surrounding TransPort Colorado is somewhat limited with certain roadways still being constructed of gravel. TransPort Colorado will construct several new roadways that will serve the proposed land use types, and certain improvements replicate information contained in the recently updated *NEATS Refresh*. By Build-Out of the entire TransPort Colorado, the following roadway improvements will be necessary (see **Figure I 4**):

- Widening and/or paving of existing roadways
- Construction of new roadways
- A realigned connection of Imboden Road with Quail Run Road
- A new interchange along I-70 at the Quail Run Road alignment
- A reconstructed I-70/Manila Road interchange
- Construction of roadway grade-separations at the UPRR crossings along Quail Run and Manila Roads
- Installation of traffic signalization at numerous locations (refer to **Figure I 1**)
- Construction of the TransPort Colorado portion of the Bear Gulch Trail system

The development of TransPort Colorado will be gradual over many years, and traffic operational analyses will continue as parcels develop to support the confirmation and construction timeframes for infrastructure improvements. Analyses of individual parcels will confirm intersection laneage and traffic control recommendations. Particular recommendations for the development of Subareas 1 and 2 are contained in **Sections VI** and **VII**.

APPENDIX A. RECORDED TRAFFIC VOLUMES

All Traffic Data
Wheat Ridge, CO 80033

Date Start: 06-Sep-18
Date End: 06-Sep-18
Site Code: 7
IMBODEN RD N.O. US 36

Start Time	06-Sep-18 Thu	NB	SB							Total
12:00 AM		8	5							13
01:00		6	0							6
02:00		2	3							5
03:00		6	6							12
04:00		23	8							31
05:00		64	40							104
06:00		99	99							198
07:00		83	99							182
08:00		78	79							157
09:00		96	72							168
10:00		56	53							109
11:00		74	62							136
12:00 PM		82	78							160
01:00		70	51							121
02:00		76	61							137
03:00		82	79							161
04:00		96	121							217
05:00		102	80							182
06:00		51	71							122
07:00		43	32							75
08:00		33	25							58
09:00		24	16							40
10:00		12	21							33
11:00		7	14							21
Total		1273	1175							2448
Percent		52.0%	48.0%							
AM Peak	-	06:00	06:00	-	-	-	-	-	-	06:00
Vol.	-	99	99	-	-	-	-	-	-	198
PM Peak	-	17:00	16:00	-	-	-	-	-	-	16:00
Vol.	-	102	121	-	-	-	-	-	-	217
Grand Total		1273	1175							2448
Percent		52.0%	48.0%							
ADT		ADT 2,448	AADT 2,448							

All Traffic Data
Wheat Ridge, CO 80033

Date Start: 06-Sep-18
Date End: 06-Sep-18
Site Code: 8
N MANILA RD N.O. US 369

Start Time	06-Sep-18 Thu	NB	SB							Total
12:00 AM		0	0							0
01:00		0	0							0
02:00		0	0							0
03:00		0	0							0
04:00		0	0							0
05:00		3	1							4
06:00		11	2							13
07:00		19	3							22
08:00		13	5							18
09:00		7	7							14
10:00		8	8							16
11:00		11	8							19
12:00 PM		11	13							24
01:00		13	8							21
02:00		16	6							22
03:00		19	21							40
04:00		3	19							22
05:00		20	13							33
06:00		7	22							29
07:00		2	22							24
08:00		2	9							11
09:00		4	8							12
10:00		1	1							2
11:00		0	1							1
Total		170	177							347
Percent		49.0%	51.0%							
AM Peak	-	07:00	10:00	-	-	-	-	-	-	07:00
Vol.	-	19	8	-	-	-	-	-	-	22
PM Peak	-	17:00	18:00	-	-	-	-	-	-	15:00
Vol.	-	20	22	-	-	-	-	-	-	40
Grand Total		170	177							347
Percent		49.0%	51.0%							
ADT		ADT 347		AADT 347						



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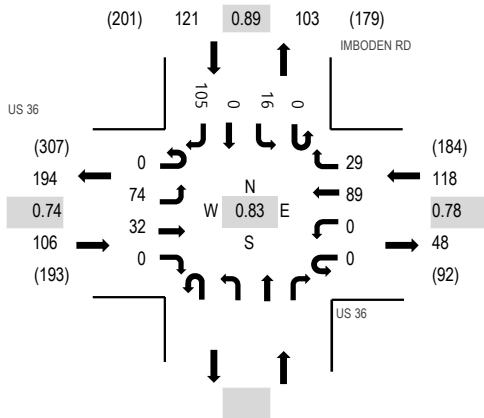
Location: 1 IMBODEN RD & US 36 AM

Date: Thursday, September 6, 2018

Peak Hour: 06:30 AM - 07:30 AM

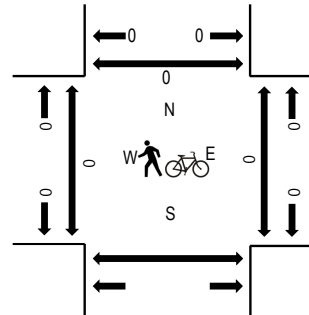
Peak 15-Minutes: 06:30 AM - 06:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	US 36 Eastbound				US 36 Westbound				Northbound				IMBODEN RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:30 AM	0	23	13	0	0	0	0	30	8				0	2	0	28	104	345	0	0	0	0
6:45 AM	0	27	7	0	0	0	0	18	5				0	7	0	27	91	303	0	0	0	0
7:00 AM	0	17	8	0	0	0	0	19	8				0	3	0	21	76	272	0	0	0	0
7:15 AM	0	7	4	0	0	0	0	22	8				0	4	0	29	74	250	0	0	0	0
7:30 AM	0	14	8	0	0	0	0	20	4				0	4	0	12	62	233	0	0	0	0
7:45 AM	0	16	4	0	0	0	0	15	3				0	7	0	15	60		0	0	0	0
8:00 AM	0	10	10	0	0	0	0	7	5				0	5	0	17	54		0	0	0	0
8:15 AM	0	20	5	0	0	0	0	8	4				0	1	0	19	57		0	0	0	0
Count Total	0	134	59	0	0	0	0	139	45				0	33	0	168	578		0	0	0	0
Peak Hour	0	74	32	0	0	0	0	89	29				0	16	0	105	345		0	0	0	0



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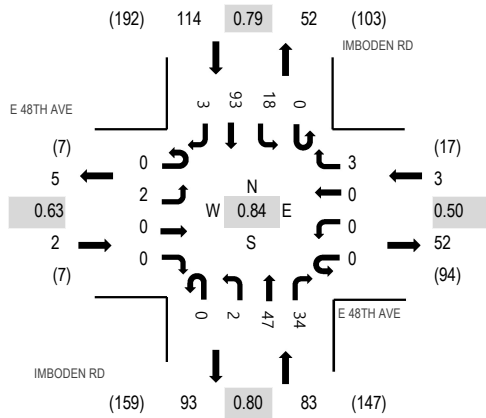
Location: 2 IMBODEN RD & E 48TH AVE AM

Date: Thursday, September 6, 2018

Peak Hour: 06:30 AM - 07:30 AM

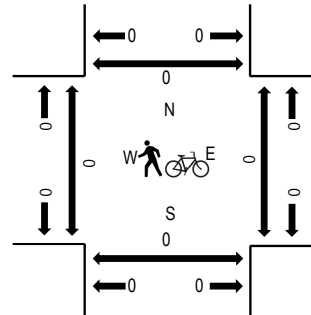
Peak 15-Minutes: 06:45 AM - 07:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	E 48TH AVE Eastbound				E 48TH AVE Westbound				IMBODEN RD Northbound				IMBODEN RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:30 AM	0	0	0	0	0	0	0	2	0	0	9	12	0	5	30	1	59	202	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	2	13	9	0	5	29	2	60	178	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0	0	0	17	9	0	5	14	0	45	160	0	0	0	0
7:15 AM	0	2	0	0	0	0	0	1	0	0	8	4	0	3	20	0	38	150	0	0	0	0
7:30 AM	0	2	0	0	0	1	0	1	0	0	12	3	0	4	12	0	35	161	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	3	0	0	10	8	0	6	14	1	42		0	0	0	0
8:00 AM	0	0	0	1	0	2	0	0	0	1	5	5	0	5	16	0	35		0	0	0	0
8:15 AM	0	2	0	0	0	6	0	1	0	0	15	5	0	6	14	0	49		0	0	0	0
Count Total	0	6	0	1	0	9	0	8	0	3	89	55	0	39	149	4	363		0	0	0	0
Peak Hour	0	2	0	0	0	0	0	3	0	2	47	34	0	18	93	3	202		0	0	0	0



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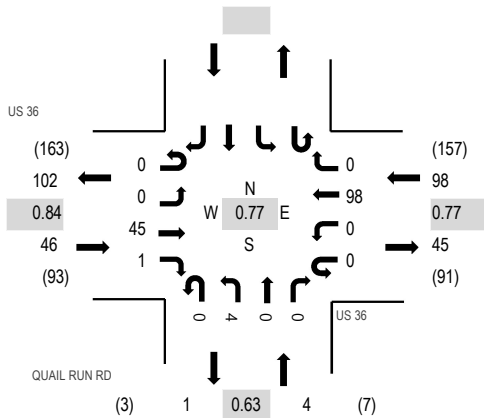
Location: 3 QUAIL RUN RD & US 36 AM

Date: Thursday, September 6, 2018

Peak Hour: 06:30 AM - 07:30 AM

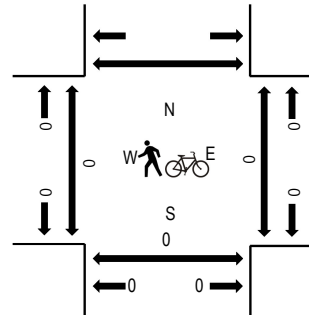
Peak 15-Minutes: 06:30 AM - 06:45 AM

Peak Hour - All Vehicles



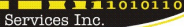
Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

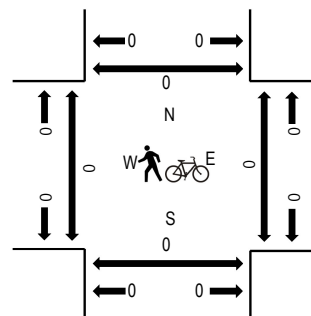
Interval Start Time	US 36				US 36				QUAIL RUN RD				Southbound				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound										West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:30 AM	0	0	15	0	0	0	32	0	0	1	0	0					48	148	0	0	0	
6:45 AM	0	0	16	0	0	0	20	0	0	0	0	0					36	136	0	0	0	
7:00 AM	0	0	9	0	0	0	20	0	0	1	0	0					30	129	0	0	0	
7:15 AM	0	0	5	1	0	0	26	0	0	2	0	0					34	128	0	0	0	
7:30 AM	0	0	14	0	0	0	20	0	0	1	0	1					36	109	0	0	0	
7:45 AM	0	0	10	2	0	0	17	0	0	0	0	0					29		0	0	0	
8:00 AM	0	0	14	0	0	0	14	0	0	1	0	0					29		0	0	0	
8:15 AM	0	0	7	0	0	0	8	0	0	0	0	0					15		0	0	0	
Count Total	0	0	90	3	0	0	157	0	0	6	0	1					257		0	0	0	
Peak Hour	0	0	45	1	0	0	98	0	0	4	0	0					148		0	0	0	



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Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

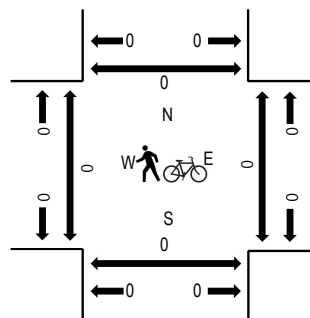
Interval Start Time	US 36 Eastbound				US 36 Westbound				MANILLA RD Northbound				MANILLA RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:30 AM	0	0	6	0	0	7	27	3	0	0	0	1	0	0	0	0	44	169	0	0	0	0
6:45 AM	0	0	9	2	0	6	14	2	0	3	2	2	0	1	0	0	41	176	0	0	0	0
7:00 AM	0	0	9	1	0	11	13	1	0	2	3	2	0	1	1	0	44	174	0	0	0	0
7:15 AM	0	0	5	1	0	2	20	2	0	3	3	3	0	0	0	1	40	164	0	0	0	0
7:30 AM	0	1	13	0	0	9	16	3	0	2	4	3	0	0	0	0	51	146	0	0	0	0
7:45 AM	0	0	6	3	0	10	13	1	0	1	2	3	0	0	0	0	39		0	0	0	0
8:00 AM	0	0	10	1	0	6	11	2	0	2	0	1	0	0	1	0	34		0	0	0	0
8:15 AM	0	1	5	0	0	4	3	1	0	3	2	2	0	0	1	0	22		0	0	0	0
Count Total	0	2	63	8	0	55	117	15	0	16	16	17	0	2	3	1	315		0	0	0	0
Peak Hour	0	1	36	4	0	28	63	8	0	10	12	10	0	2	1	1	176		0	0	0	0



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Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

Interval Start Time	I-70 WB ON RAMP				I-70 WB OFF RAMP				MANILLA RD				MANILLA RD				Total	Rolling Hour	Pedestrian Crossings			
	Eastbound				Westbound				Northbound				Southbound						West	East	South	North
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right						
6:30 AM	0	0	0	0	0	3	0	2	0	32	2	0	0	0	0	6	45	194	0	0	0	0
6:45 AM	0	0	0	0	0	2	1	1	0	25	4	0	0	0	2	3	38	192	0	0	0	0
7:00 AM	0	0	0	0	0	3	1	3	0	23	7	0	0	0	6	9	52	199	0	0	0	0
7:15 AM	0	0	0	0	0	7	2	1	0	36	9	0	0	0	1	3	59	182	0	0	0	0
7:30 AM	0	0	0	0	0	1	0	1	0	26	6	0	0	0	3	6	43	147	0	0	0	0
7:45 AM	0	0	0	0	0	7	0	2	0	23	1	0	0	0	5	7	45		0	0	0	0
8:00 AM	0	0	0	0	0	2	1	2	0	19	2	0	0	0	6	3	35		0	0	0	0
8:15 AM	0	0	0	0	0	2	0	0	0	11	6	0	0	0	3	2	24		0	0	0	0
Count Total	0	0	0	0	0	27	5	12	0	195	37	0	0	0	26	39	341		0	0	0	0
Peak Hour	0	0	0	0	0	18	3	7	0	108	23	0	0	0	15	25	199		0	0	0	0



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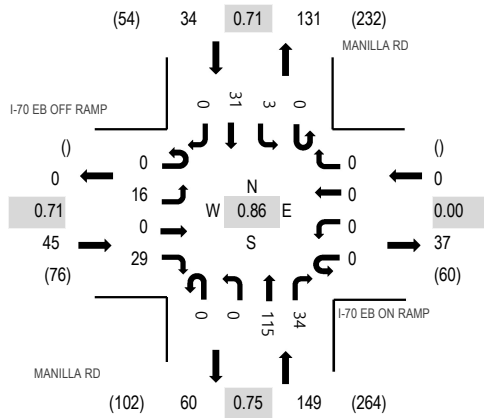
Location: 6 MANILLA RD & I-70 EB ON RAMP AM

Date: Thursday, September 6, 2018

Peak Hour: 07:00 AM - 08:00 AM

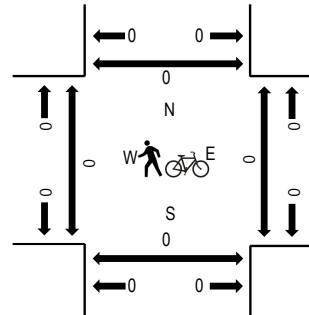
Peak 15-Minutes: 07:15 AM - 07:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	I-70 EB OFF RAMP Eastbound				I-70 EB ON RAMP Westbound				MANILLA RD Northbound				MANILLA RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
6:30 AM	0	2	0	3	0	0	0	0	0	0	32	2	0	1	2	0	42	200	0	0	0	0
6:45 AM	0	1	0	4	0	0	0	0	0	0	28	3	0	1	2	0	39	212	0	0	0	0
7:00 AM	0	3	0	7	0	0	0	0	0	0	28	5	0	1	9	0	53	228	0	0	0	0
7:15 AM	0	4	0	4	0	0	0	0	0	0	40	10	0	1	7	0	66	225	0	0	0	0
7:30 AM	0	8	0	9	0	0	0	0	0	0	23	10	0	0	4	0	54	194	0	0	0	0
7:45 AM	0	1	0	9	0	0	0	0	0	0	24	9	0	1	11	0	55		0	0	0	0
8:00 AM	0	1	0	12	0	0	0	0	0	0	20	9	0	1	7	0	50		0	0	0	0
8:15 AM	0	1	0	7	0	0	0	0	0	0	16	5	0	1	5	0	35		0	0	0	0
Count Total	0	21	0	55	0	0	0	0	0	0	211	53	0	7	47	0	394		0	0	0	0
Peak Hour	0	16	0	29	0	0	0	0	0	0	115	34	0	3	31	0	228		0	0	0	0



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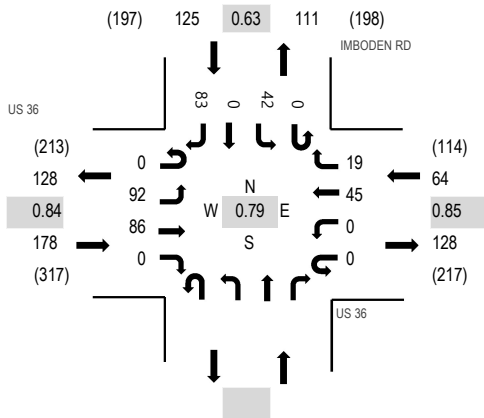
Location: 1 IMBODEN RD & US 36 PM

Date: Thursday, September 6, 2018

Peak Hour: 04:15 PM - 05:15 PM

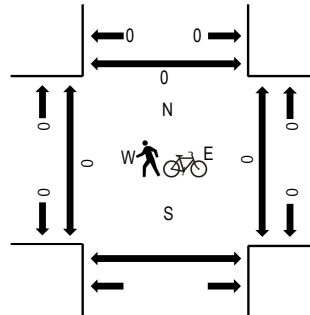
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	US 36 Eastbound				US 36 Westbound				Northbound				IMBODEN RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	15	17	0	0	0	0	15	2				0	5	0	14	68	346	0	0	0	0
4:15 PM	0	18	20	0	0	0	0	13	4				0	5	0	15	75	367	0	0	0	0
4:30 PM	0	19	19	0	0	0	0	16	5				0	9	0	19	87	363	0	0	0	0
4:45 PM	0	25	24	0	0	0	0	8	8				0	19	0	32	116	344	0	0	0	0
5:00 PM	0	30	23	0	0	0	0	8	2				0	9	0	17	89	282	0	0	0	0
5:15 PM	0	18	14	0	0	0	0	12	4				0	11	0	12	71		0	0	0	0
5:30 PM	0	21	21	0	0	0	0	5	4				0	5	0	12	68		0	0	0	0
5:45 PM	0	22	11	0	0	0	0	7	1				0	5	0	8	54		0	0	0	0
Count Total	0	168	149	0	0	0	0	84	30				0	68	0	129	628		0	0	0	0
Peak Hour	0	92	86	0	0	0	0	45	19				0	42	0	83	367		0	0	0	0



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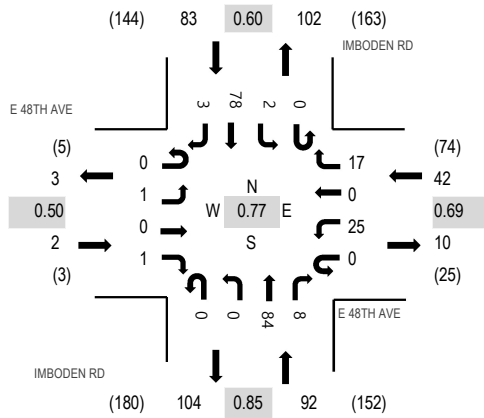
Location: 2 IMBODEN RD & E 48TH AVE PM

Date: Thursday, September 6, 2018

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

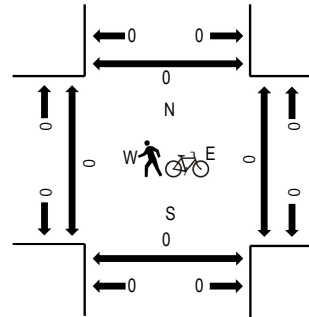
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	E 48TH AVE Eastbound				E 48TH AVE Westbound				IMBODEN RD Northbound				IMBODEN RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	0	0	0	4	0	1	0	0	11	4	0	4	12	1	37	196	0	0	0	0
4:15 PM	0	0	0	0	0	11	0	2	0	0	7	2	0	0	17	0	39	215	0	0	0	0
4:30 PM	0	0	0	0	0	7	0	3	0	0	23	0	0	1	14	1	49	219	0	0	0	0
4:45 PM	0	0	0	1	0	5	0	2	0	0	23	4	0	1	34	1	71	212	0	0	0	0
5:00 PM	0	0	0	0	0	8	0	9	0	0	25	2	0	0	11	1	56	177	0	0	0	0
5:15 PM	0	1	0	0	0	5	0	3	0	0	13	2	0	0	19	0	43		0	0	0	0
5:30 PM	0	0	0	0	0	2	0	3	0	0	19	3	0	2	13	0	42		0	0	0	0
5:45 PM	0	1	0	0	0	5	0	4	0	1	13	0	0	0	12	0	36		0	0	0	0
Count Total	0	2	0	1	0	47	0	27	0	1	134	17	0	8	132	4	373		0	0	0	0
Peak Hour	0	1	0	1	0	25	0	17	0	0	84	8	0	2	78	3	219		0	0	0	0



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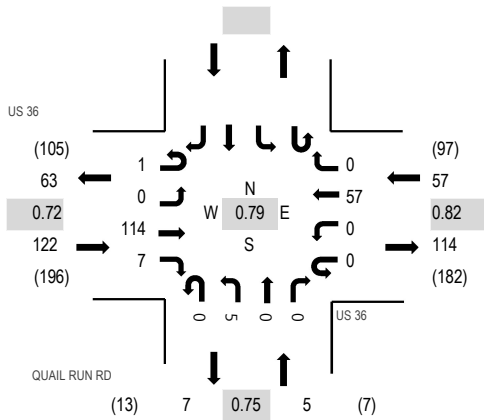
Location: 3 QUAIL RUN RD & US 36 PM

Date: Thursday, September 6, 2018

Peak Hour: 04:15 PM - 05:15 PM

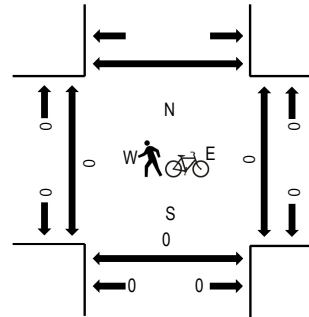
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



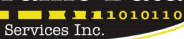
Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

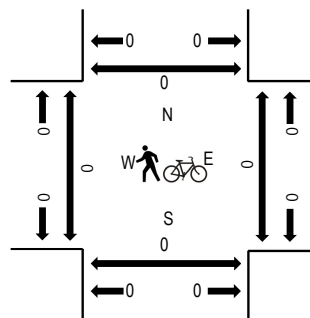
Interval Start Time	US 36 Eastbound				US 36 Westbound				QUAIL RUN RD Northbound				Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	14	3	0	0	13	0	0	1	0	0					31	175	0	0	0	
4:15 PM	0	0	18	3	0	0	14	0	0	2	0	0					37	184	0	0	0	
4:30 PM	1	0	25	3	0	0	18	0	0	2	0	0					49	181	0	0	0	
4:45 PM	0	0	42	1	0	0	14	0	0	1	0	0					58	165	0	0	0	
5:00 PM	0	0	29	0	0	0	11	0	0	0	0	0					40	125	0	0	0	
5:15 PM	0	0	22	0	0	0	11	0	0	1	0	0					34		0	0	0	
5:30 PM	0	0	21	3	0	0	9	0	0	0	0	0					33		0	0	0	
5:45 PM	0	0	11	0	0	0	7	0	0	0	0	0					18		0	0	0	
Count Total	1	0	182	13	0	0	97	0	0	7	0	0					300		0	0	0	
Peak Hour	1	0	114	7	0	0	57	0	0	5	0	0					184		0	0	0	



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Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - Pedestrians/Bicycles on Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

Interval Start Time	US 36 Eastbound				US 36 Westbound				MANILLA RD Northbound				MANILLA RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	17	0	0	6	7	0	0	2	2	8	0	3	1	0	46	227	0	0	0	0
4:15 PM	0	0	20	0	0	6	11	0	0	0	1	7	0	0	4	0	49	239	0	0	0	0
4:30 PM	0	0	22	2	0	3	15	0	0	2	0	5	0	3	1	2	55	247	0	0	0	0
4:45 PM	0	2	32	9	0	5	8	0	0	4	0	13	0	2	2	0	77	235	0	0	0	0
5:00 PM	0	0	19	6	0	3	10	2	0	2	0	10	0	3	2	1	58	195	0	0	0	0
5:15 PM	0	2	24	1	0	2	12	2	0	0	2	8	0	0	3	1	57		0	0	0	0
5:30 PM	0	0	16	3	0	2	6	1	0	1	2	11	0	0	1	0	43		0	0	0	0
5:45 PM	0	0	12	0	0	3	5	1	0	3	4	8	0	0	1	0	37		0	0	0	0
Count Total	0	4	162	21	0	30	74	6	0	14	11	70	0	11	15	4	422		0	0	0	0
Peak Hour	0	4	97	18	0	13	45	4	0	8	2	36	0	8	8	4	247		0	0	0	0



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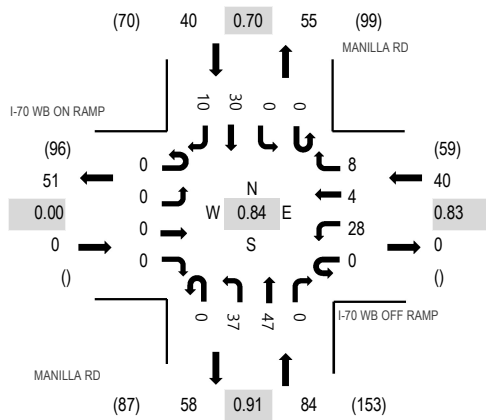
Location: 5 MANILLA RD & I-70 WB OFF RAMP PM

Date: Thursday, September 6, 2018

Peak Hour: 04:45 PM - 05:45 PM

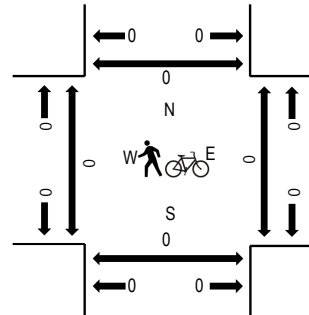
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	I-70 WB ON RAMP Eastbound				I-70 WB OFF RAMP Westbound				MANILLA RD Northbound				MANILLA RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	0	0	0	5	0	1	0	6	14	0	0	0	3	5	34	140	0	0	0	0
4:15 PM	0	0	0	0	0	1	0	0	0	11	8	0	0	0	6	4	30	149	0	0	0	0
4:30 PM	0	0	0	0	0	3	1	1	0	8	7	0	0	0	4	3	27	152	0	0	0	0
4:45 PM	0	0	0	0	0	7	0	3	0	9	14	0	0	0	13	3	49	164	0	0	0	0
5:00 PM	0	0	0	0	0	8	1	0	0	9	13	0	0	0	10	2	43	142	0	0	0	0
5:15 PM	0	0	0	0	0	5	2	2	0	12	7	0	0	0	1	4	33		0	0	0	0
5:30 PM	0	0	0	0	0	8	1	3	0	7	13	0	0	0	6	1	39		0	0	0	0
5:45 PM	0	0	0	0	0	5	0	2	0	4	11	0	0	0	2	3	27		0	0	0	0
Count Total	0	0	0	0	0	42	5	12	0	66	87	0	0	0	45	25	282		0	0	0	0
Peak Hour	0	0	0	0	0	28	4	8	0	37	47	0	0	0	30	10	164		0	0	0	0



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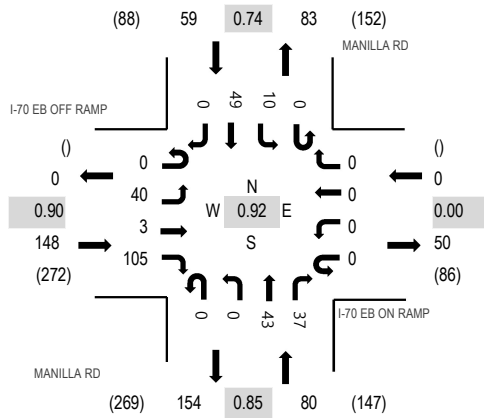
Location: 6 MANILLA RD & I-70 EB ON RAMP PM

Date: Thursday, September 6, 2018

Peak Hour: 04:45 PM - 05:45 PM

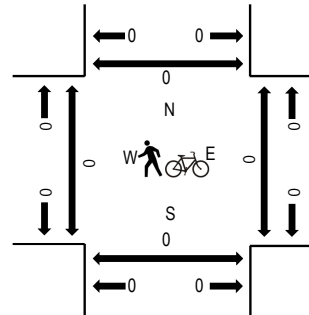
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	I-70 EB OFF RAMP Eastbound				I-70 EB ON RAMP Westbound				MANILLA RD Northbound				MANILLA RD Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	10	0	21	0	0	0	0	0	0	10	8	0	2	6	0	57	241	0	0	0	0
4:15 PM	0	9	0	24	0	0	0	0	0	0	10	7	0	3	3	0	56	261	0	0	0	0
4:30 PM	0	5	0	24	0	0	0	0	0	0	9	4	0	0	8	0	50	267	0	0	0	0
4:45 PM	0	12	3	26	0	0	0	0	0	0	11	6	0	2	18	0	78	287	0	0	0	0
5:00 PM	0	11	0	23	0	0	0	0	0	0	11	13	0	5	14	0	77	266	0	0	0	0
5:15 PM	0	7	0	30	0	0	0	0	0	0	12	7	0	1	5	0	62		0	0	0	0
5:30 PM	0	10	0	26	0	0	0	0	0	0	9	11	0	2	12	0	70		0	0	0	0
5:45 PM	0	9	0	22	0	0	0	0	0	0	7	12	0	0	7	0	57		0	0	0	0
Count Total	0	73	3	196	0	0	0	0	0	0	79	68	0	15	73	0	507		0	0	0	0
Peak Hour	0	40	3	105	0	0	0	0	0	0	43	37	0	10	49	0	287		0	0	0	0

APPENDIX B. LEVEL OF SERVICE CRITERIA

TABLE B1
LEVEL OF SERVICE CRITERIA FOR
TWO-WAY STOP CONTROLLED (TWSC) INTERSECTIONS AND ROUNDABOUTS

Level of Service	Delay Range (sec/veh)
A	0.0 – 10.0
B	>10.0 – 15.0
C	>15.0 – 25.0
D	>25.0 – 35.0
E	>35.0 – 50.0
F	> 50.0
Adapted from <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.	

TABLE B2
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Control Delay (sec/veh)	Qualitative Description
A	≤ 10.0	Good progression, short cycles, very few vehicle-stops.
B	>10.0 – 20.0	Good progression, and/or short cycle lengths, more vehicle-stops.
C	>20.0 – 35.0	Fair progression and/or longer cycle lengths, some individual cycle failures, many vehicle-stops
D	>35.0 – 55.0	Noticeable congestion and cycle failures, unfavorable progression, high v/c ratios, several stops.
E	>55.0 – 80.0	Limit of acceptable delay, poor progression, long cycles, high v/c ratios, frequent cycle failures.
F	> 80.0	Delay is unacceptable to most drivers, volume exceeds capacity, breakdown of traffic flow.
Adapted from <i>Highway Capacity Manual</i> , Transportation Research Board, 2010.		




APPENDIX C. ANALYSIS WORKSHEETS – EXISTING CONDITIONS




Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↔	↔		↔	↔	
Traffic Vol, veh/h	2	0	0	0	0	3	2	47	34	18	93	3
Future Vol, veh/h	2	0	0	0	0	3	2	47	34	18	93	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	2	0	0	0	0	4	2	56	40	21	111	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	237	255	113	235	237	76	115	0	0	96	0	0
Stage 1	155	155	-	80	80	-	-	-	-	-	-	-
Stage 2	82	100	-	155	157	-	-	-	-	-	-	-
Critical Hdwy	7.21	6.61	6.31	7.21	6.61	6.31	4.21	-	-	4.21	-	-
Critical Hdwy Stg 1	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.21	5.61	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.599	4.099	3.399	3.599	4.099	3.399	2.299	-	-	2.299	-	-
Pot Cap-1 Maneuver	699	634	916	701	649	961	1420	-	-	1443	-	-
Stage 1	826	752	-	907	811	-	-	-	-	-	-	-
Stage 2	904	795	-	826	751	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	688	624	916	693	639	961	1420	-	-	1443	-	-
Mov Cap-2 Maneuver	688	624	-	693	639	-	-	-	-	-	-	-
Stage 1	825	741	-	906	810	-	-	-	-	-	-	-
Stage 2	899	794	-	814	740	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	10.3		8.8		0.2		1.2	
HCM LOS	B		A					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1420	-	-	688	961	1443	-
HCM Lane V/C Ratio	0.002	-	-	0.003	0.004	0.015	-
HCM Control Delay (s)	7.5	-	-	10.3	8.8	7.5	-
HCM Lane LOS	A	-	-	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-





Intersection						
Int Delay, s/veh	5.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	74	32	89	29	16	105
Future Vol, veh/h	74	32	89	29	16	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	11	11	11	11	11	11
Mvmt Flow	89	39	107	35	19	127
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	142	0	-	0	342	125
Stage 1	-	-	-	-	125	-
Stage 2	-	-	-	-	217	-
Critical Hdwy	4.21	-	-	-	6.51	6.31
Critical Hdwy Stg 1	-	-	-	-	5.51	-
Critical Hdwy Stg 2	-	-	-	-	5.51	-
Follow-up Hdwy	2.299	-	-	-	3.599	3.399
Pot Cap-1 Maneuver	1387	-	-	-	636	902
Stage 1	-	-	-	-	879	-
Stage 2	-	-	-	-	798	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1387	-	-	-	594	902
Mov Cap-2 Maneuver	-	-	-	-	594	-
Stage 1	-	-	-	-	821	-
Stage 2	-	-	-	-	798	-
Approach	EB	WB		SB		
HCM Control Delay, s	5.4	0		10.2		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1387	-	-	-	844	
HCM Lane V/C Ratio	0.064	-	-	-	0.173	
HCM Control Delay (s)	7.8	0	-	-	10.2	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.2	-	-	-	0.6	




Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	45	1	0	98	4	0
Future Vol, veh/h	45	1	0	98	4	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	77	77	77	77	77	77
Heavy Vehicles, %	13	13	13	13	13	13
Mvmt Flow	58	1	0	127	5	0

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	59	0	186	59
Stage 1	-	-	-	-	59	-
Stage 2	-	-	-	-	127	-
Critical Hdwy	-	-	4.23	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	-	-	2.317	-	3.617	3.417
Pot Cap-1 Maneuver	-	-	1477	-	779	977
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	872	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1477	-	779	977
Mov Cap-2 Maneuver	-	-	-	-	779	-
Stage 1	-	-	-	-	936	-
Stage 2	-	-	-	-	872	-







Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.7
HCM LOS			A




Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	779	-	-	1477	-
HCM Lane V/C Ratio	0.007	-	-	-	-
HCM Control Delay (s)	9.7	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-




Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	36	4	28	63	8	10	12	10	2	1	1
Future Vol, veh/h	1	36	4	28	63	8	10	12	10	2	1	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	1	42	5	33	73	9	12	14	12	2	1	1
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	82	0	0	47	0	0	192	195	45	204	193	78
Stage 1	-	-	-	-	-	-	47	47	-	144	144	-
Stage 2	-	-	-	-	-	-	145	148	-	60	49	-
Critical Hdwy	4.21	-	-	4.21	-	-	7.21	6.61	6.31	7.21	6.61	6.31
Critical Hdwy Stg 1	-	-	-	-	-	-	6.21	5.61	-	6.21	5.61	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.21	5.61	-	6.21	5.61	-
Follow-up Hdwy	2.299	-	-	2.299	-	-	3.599	4.099	3.399	3.599	4.099	3.399
Pot Cap-1 Maneuver	1460	-	-	1505	-	-	748	685	1000	735	686	958
Stage 1	-	-	-	-	-	-	944	838	-	838	761	-
Stage 2	-	-	-	-	-	-	837	758	-	929	837	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1460	-	-	1505	-	-	732	669	1000	702	670	958
Mov Cap-2 Maneuver	-	-	-	-	-	-	732	669	-	702	670	-
Stage 1	-	-	-	-	-	-	943	837	-	837	743	-
Stage 2	-	-	-	-	-	-	815	741	-	902	836	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			2.1			9.9			9.9		
HCM LOS							A			A		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	769	1460	-	-	1505	-	-	743				
HCM Lane V/C Ratio	0.048	0.001	-	-	0.022	-	-	0.006				
HCM Control Delay (s)	9.9	7.5	0	-	7.4	0	-	9.9				
HCM Lane LOS	A	A	A	-	A	A	-	A				
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0				

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	18	3	7	108	23	0	0	15	25
Future Vol, veh/h	0	0	0	18	3	7	108	23	0	0	15	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	11	11	11	11	11	11	11	11	11	11	11	11
Mvmt Flow	0	0	0	21	4	8	129	27	0	0	18	30
Major/Minor				Minor1		Major1		Major2				
Conflicting Flow All				318	333	27	48	0	-	-	-	0
Stage 1				285	285	-	-	-	-	-	-	-
Stage 2				33	48	-	-	-	-	-	-	-
Critical Hdwy				6.51	6.61	6.31	4.21	-	-	-	-	-
Critical Hdwy Stg 1				5.51	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2				5.51	5.61	-	-	-	-	-	-	-
Follow-up Hdwy				3.599	4.099	3.399	2.299	-	-	-	-	-
Pot Cap-1 Maneuver				657	573	1023	1503	-	0	0	-	-
Stage 1				743	660	-	-	-	0	0	-	-
Stage 2				967	837	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver				600	0	1023	1503	-	-	-	-	-
Mov Cap-2 Maneuver				600	0	-	-	-	-	-	-	-
Stage 1				678	0	-	-	-	-	-	-	-
Stage 2				967	0	-	-	-	-	-	-	-
Approach				WB		NB		SB				
HCM Control Delay, s				10.6		6.3		0				
HCM LOS				B								
Minor Lane/Major Mvmt		NBL	NBTWBLn1	SBT	SBR							
Capacity (veh/h)		1503	-	679	-	-						
HCM Lane V/C Ratio		0.086	-	0.049	-	-						
HCM Control Delay (s)		7.6	0	10.6	-	-						
HCM Lane LOS		A	A	B	-	-						
HCM 95th %tile Q(veh)		0.3	-	0.2	-	-						

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕			↕	
Traffic Vol, veh/h	16	0	29	0	0	0	0	115	34	3	31	0
Future Vol, veh/h	16	0	29	0	0	0	0	115	34	3	31	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	19	0	34	0	0	0	0	134	40	3	36	0
Major/Minor	Minor2						Major1			Major2		
Conflicting Flow All	196	216	36				-	0	0	174	0	0
Stage 1	42	42	-				-	-	-	-	-	-
Stage 2	154	174	-				-	-	-	-	-	-
Critical Hdwy	6.55	6.65	6.35				-	-	-	4.25	-	-
Critical Hdwy Stg 1	5.55	5.65	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.55	5.65	-				-	-	-	-	-	-
Follow-up Hdwy	3.635	4.135	3.435				-	-	-	2.335	-	-
Pot Cap-1 Maneuver	764	660	1001				0	-	-	1328	-	0
Stage 1	948	835	-				0	-	-	-	-	0
Stage 2	843	731	-				0	-	-	-	-	0
Platoon blocked, %								-	-	-		
Mov Cap-1 Maneuver	762	0	1001				-	-	-	1328	-	-
Mov Cap-2 Maneuver	762	0	-				-	-	-	-	-	-
Stage 1	948	0	-				-	-	-	-	-	-
Stage 2	841	0	-				-	-	-	-	-	-
Approach	EB						NB			SB		
HCM Control Delay, s	9.2						0			0.7		
HCM LOS	A											
Minor Lane/Major Mvmt		NBT	NBR	EBLn1	SBL	SBT						
Capacity (veh/h)		-	-	901	1328	-						
HCM Lane V/C Ratio		-	-	0.058	0.003	-						
HCM Control Delay (s)		-	-	9.2	7.7	0						
HCM Lane LOS		-	-	A	A	A						
HCM 95th %tile Q(veh)		-	-	0.2	0	-						

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	0	1	25	0	17	0	84	8	2	78	3
Future Vol, veh/h	1	0	1	25	0	17	0	84	8	2	78	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	100	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	1	0	1	32	0	22	0	109	10	3	101	4
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	234	228	103	224	225	114	105	0	0	119	0	0
Stage 1	109	109	-	114	114	-	-	-	-	-	-	-
Stage 2	125	119	-	110	111	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.6	6.3	7.2	6.6	6.3	4.2	-	-	4.2	-	-
Critical Hdwy Stg 1	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.6	-	6.2	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	3.59	4.09	3.39	2.29	-	-	2.29	-	-
Pot Cap-1 Maneuver	704	658	930	715	660	917	1438	-	-	1421	-	-
Stage 1	877	790	-	872	786	-	-	-	-	-	-	-
Stage 2	860	782	-	876	788	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	686	657	930	713	659	917	1438	-	-	1421	-	-
Mov Cap-2 Maneuver	686	657	-	713	659	-	-	-	-	-	-	-
Stage 1	877	788	-	872	786	-	-	-	-	-	-	-
Stage 2	839	782	-	873	786	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	9.6		9.9		0		0.2					
HCM LOS	A		A									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR					
Capacity (veh/h)	1438	-	-	790	784	1421	-	-				
HCM Lane V/C Ratio	-	-	-	0.003	0.07	0.002	-	-				
HCM Control Delay (s)	0	-	-	9.6	9.9	7.5	-	-				
HCM Lane LOS	A	-	-	A	A	A	-	-				
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0	-	-				

Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	92	86	45	19	42	83
Future Vol, veh/h	92	86	45	19	42	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	116	109	57	24	53	105
Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	81	0	-	0	410	69
Stage 1	-	-	-	-	69	-
Stage 2	-	-	-	-	341	-
Critical Hdwy	4.2	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.29	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	1467	-	-	-	583	972
Stage 1	-	-	-	-	934	-
Stage 2	-	-	-	-	703	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1467	-	-	-	534	972
Mov Cap-2 Maneuver	-	-	-	-	534	-
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	703	-
Approach	EB	WB		SB		
HCM Control Delay, s	4	0		11		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1467	-	-	-	762	
HCM Lane V/C Ratio	0.079	-	-	-	0.208	
HCM Control Delay (s)	7.7	0	-	-	11	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.3	-	-	-	0.8	

Intersection						
Int Delay, s/veh	0.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	114	7	0	57	5	0
Future Vol, veh/h	114	7	0	57	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	10	10	10	10	10	10
Mvmt Flow	152	9	0	76	7	0




Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	161	0	233
Stage 1	-	-	-	-	157
Stage 2	-	-	-	-	76
Critical Hdwy	-	-	4.2	-	6.5
Critical Hdwy Stg 1	-	-	-	-	5.5
Critical Hdwy Stg 2	-	-	-	-	5.5
Follow-up Hdwy	-	-	2.29	-	3.59
Pot Cap-1 Maneuver	-	-	1371	-	738
Stage 1	-	-	-	-	852
Stage 2	-	-	-	-	927
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1371	-	738
Mov Cap-2 Maneuver	-	-	-	-	738
Stage 1	-	-	-	-	852
Stage 2	-	-	-	-	927

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.9
HCM LOS			A

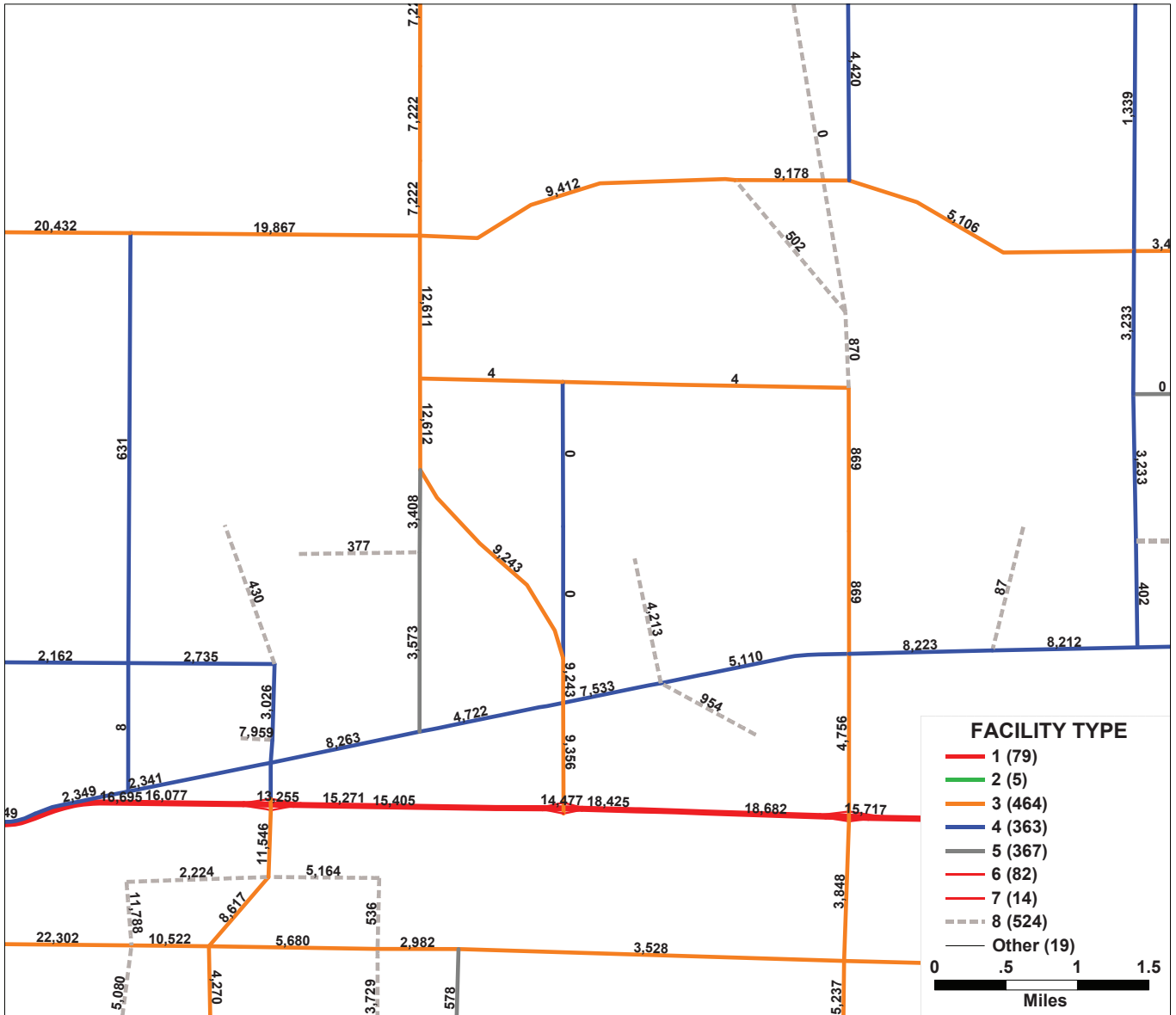
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	738	-	-	1371	-
HCM Lane V/C Ratio	0.009	-	-	-	-
HCM Control Delay (s)	9.9	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	97	18	13	45	4	8	2	36	8	8	4
Future Vol, veh/h	4	97	18	13	45	4	8	2	36	8	8	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	8	8	8	8	8	8	8	8	8	8	8	8
Mvmt Flow	5	117	22	16	54	5	10	2	43	10	10	5
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	59	0	0	139	0	0	234	229	128	250	238	57
Stage 1	-	-	-	-	-	-	138	138	-	89	89	-
Stage 2	-	-	-	-	-	-	96	91	-	161	149	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.18	6.58	6.28	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Follow-up Hdwy	2.272	-	-	2.272	-	-	3.572	4.072	3.372	3.572	4.072	3.372
Pot Cap-1 Maneuver	1507	-	-	1408	-	-	708	660	906	691	653	993
Stage 1	-	-	-	-	-	-	851	771	-	904	810	-
Stage 2	-	-	-	-	-	-	896	808	-	827	763	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1507	-	-	1408	-	-	688	649	906	648	643	993
Mov Cap-2 Maneuver	-	-	-	-	-	-	688	649	-	648	643	-
Stage 1	-	-	-	-	-	-	848	768	-	900	800	-
Stage 2	-	-	-	-	-	-	870	798	-	782	760	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1.6			9.6			10.4		
HCM LOS							A			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	845	1507	-	-	1408	-	-	694				
HCM Lane V/C Ratio	0.066	0.003	-	-	0.011	-	-	0.035				
HCM Control Delay (s)	9.6	7.4	0	-	7.6	0	-	10.4				
HCM Lane LOS	A	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.1				

Intersection												
Int Delay, s/veh	4.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔			↔			↔	
Traffic Vol, veh/h	0	0	0	28	4	8	37	47	0	0	30	10
Future Vol, veh/h	0	0	0	28	4	8	37	47	0	0	30	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	0	0	0	33	5	10	44	56	0	0	36	12
Major/Minor												
	Minor1			Major1			Major2					
Conflicting Flow All				186	192	56	48	0	-	-	-	0
Stage 1				144	144	-	-	-	-	-	-	-
Stage 2				42	48	-	-	-	-	-	-	-
Critical Hdwy				6.55	6.65	6.35	4.25	-	-	-	-	-
Critical Hdwy Stg 1				5.55	5.65	-	-	-	-	-	-	-
Critical Hdwy Stg 2				5.55	5.65	-	-	-	-	-	-	-
Follow-up Hdwy				3.635	4.135	3.435	2.335	-	-	-	-	-
Pot Cap-1 Maneuver				774	680	975	1480	-	0	0	-	-
Stage 1				852	754	-	-	-	0	0	-	-
Stage 2				948	830	-	-	-	0	0	-	-
Platoon blocked, %								-			-	-
Mov Cap-1 Maneuver				750	0	975	1480	-	-	-	-	-
Mov Cap-2 Maneuver				750	0	-	-	-	-	-	-	-
Stage 1				826	0	-	-	-	-	-	-	-
Stage 2				948	0	-	-	-	-	-	-	-
Approach												
	WB			NB			SB					
HCM Control Delay, s				9.8			3.3			0		
HCM LOS				A								
Minor Lane/Major Mvmt												
	NBL	NBTWBLn1	SBT	SBR								
Capacity (veh/h)	1480	-	791	-	-							
HCM Lane V/C Ratio	0.03	-	0.06	-	-							
HCM Control Delay (s)	7.5	0	9.8	-	-							
HCM Lane LOS	A	A	A	-	-							
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-							

Intersection												
Int Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	3	105	0	0	0	0	43	37	10	49	0
Future Vol, veh/h	40	3	105	0	0	0	0	43	37	10	49	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	13	13	13	13	13	13	13	13	13	13	13	13
Mvmt Flow	43	3	114	0	0	0	0	47	40	11	53	0
Major/Minor	Minor2						Major1			Major2		
Conflicting Flow All	142	162	53				-	0	0	87	0	0
Stage 1	75	75	-				-	-	-	-	-	-
Stage 2	67	87	-				-	-	-	-	-	-
Critical Hdwy	6.53	6.63	6.33				-	-	-	4.23	-	-
Critical Hdwy Stg 1	5.53	5.63	-				-	-	-	-	-	-
Critical Hdwy Stg 2	5.53	5.63	-				-	-	-	-	-	-
Follow-up Hdwy	3.617	4.117	3.417				-	-	-	2.317	-	-
Pot Cap-1 Maneuver	825	711	984				0	-	-	1442	-	0
Stage 1	921	811	-				0	-	-	-	-	0
Stage 2	929	802	-				0	-	-	-	-	0
Platoon blocked, %								-	-	-		
Mov Cap-1 Maneuver	818	0	984				-	-	-	1442	-	-
Mov Cap-2 Maneuver	818	0	-				-	-	-	-	-	-
Stage 1	921	0	-				-	-	-	-	-	-
Stage 2	922	0	-				-	-	-	-	-	-
Approach	EB						NB			SB		
HCM Control Delay, s	9.7						0			1.3		
HCM LOS	A											
Minor Lane/Major Mvmt		NBT	NBR	EBLn1	SBL	SBT						
Capacity (veh/h)		-	-	932	1442	-						
HCM Lane V/C Ratio		-	-	0.173	0.008	-						
HCM Control Delay (s)		-	-	9.7	7.5	0						
HCM Lane LOS		-	-	A	A	A						
HCM 95th %tile Q(veh)		-	-	0.6	0	-						

APPENDIX D. NEATS *REFRESH* BUILD-OUT TRAVEL DEMAND MODEL INFORMATION



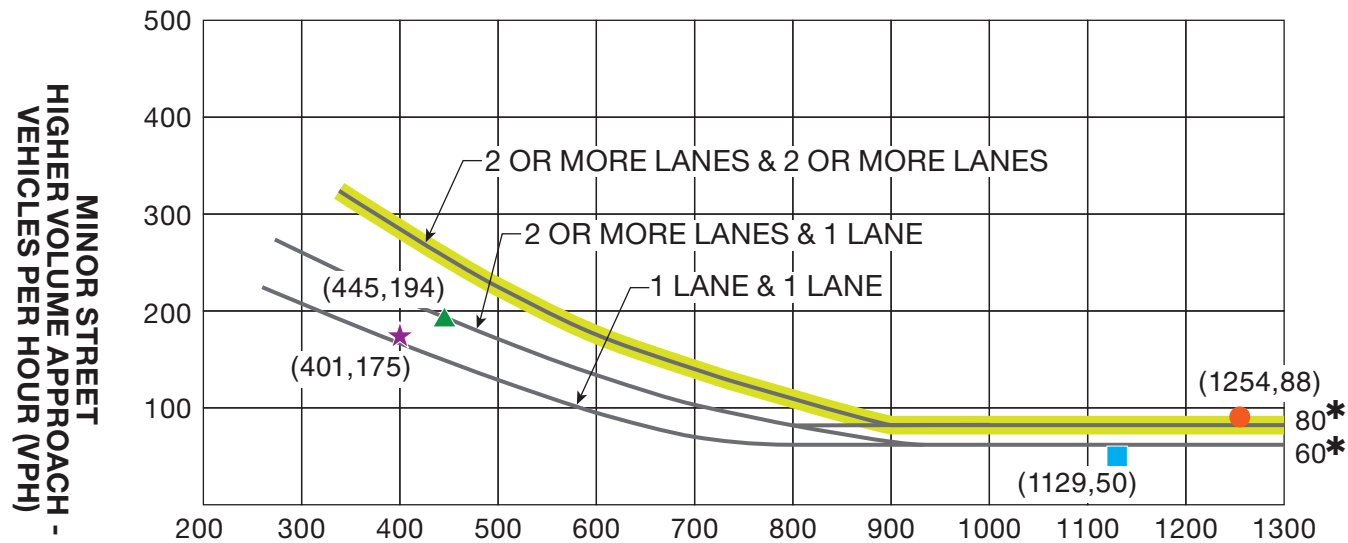
APPENDIX E. TRIP GENERATION ESTIMATES

TransPort Colorado Build-Out Trip Generation Estimates

Planning Area	Land Use	Developable Acreage	Potential Building Square Footage (KSF) ¹	Land Use % of SF	Land Use Size (KSF)	Daily Vehicle-Trips
PA-1a	Warehouse	115.5	754.7	100%	754.7	1,238
PA-1b	Warehouse	107.9	705.0	100%	705.0	1,159
PA-2a	Data Center	39.3	615.5	50%	307.8	305
	Warehouse	39.3		50%	307.8	532
	Sub Total	78.5		100%	615.5	837
PA-2b	Data Center	14.1	220.3	50%	110.2	109
	Warehouse	14.1		50%	110.2	220
	Sub Total	28.1		100%	220.3	329
PA-3	Data Center	60.1	942.5	50%	471.2	467
	Warehouse	60.1		50%	471.2	790
	Sub Total	120.2		100%	942.5	1,257
PA-4	Data Center	18.3	286.2	50%	143.1	142
	Warehouse	18.3		50%	143.1	272
	Sub Total	36.5		100%	286.2	414
PA-5	Data Center	68.5	1,073.4	50%	536.7	531
	Warehouse	68.5		50%	536.7	894
	Sub Total	136.9		100%	1,073.4	1,425
PA-6	Data Center	51.4	806.0	50%	403.0	399
	Warehouse	51.4		50%	403.0	682
	Sub Total	102.8		100%	806.0	1,081
PA-7	Data Center	157.2	2,465.1	50%	1,232.6	1,220
	Warehouse	157.2		50%	1,232.6	1,993
	Sub Total	314.4		100%	2,465.1	3,213
PA-8	Data Center	75.9	1,190.2	50%	595.1	589
	Warehouse	75.9		50%	595.1	986
	Sub Total	151.8		100%	1,190.2	1,575
PA-9	Data Center	77.2	1,210.6	50%	605.3	599
	Warehouse	77.2		50%	605.3	1,002
	Sub Total	154.4		100%	1,210.6	1,601
PA-10	Industrial	151.1	987.3	100%	987.3	3,800
PA-11	Industrial	116.0	757.9	100%	757.9	2,931
PA-12	Industrial	63.2	412.9	100%	888.6	1,623
PA-13	Industrial	154.2	1,007.5	100%	1,007.5	3,877
PA-14	Industrial	246.5	1,610.6	100%	1,610.6	6,162
PA-15	Industrial	150.0	980.1	100%	980.1	3,773

Planning Area	Land Use	Developable Acreage	Potential Building Square Footage (KSF) ¹	Land Use % of SF	Land Use Size (KSF)	Daily Vehicle-Trips
PA-16	Industrial	93.1	709.7	86%	608.3	2,363
	Rail Transload Facility	78.3		14%	101.3	162
	Sub Total	171.4		100%	709.7	2,525
PA-17	Industrial	21.9	143.1	100%	143.1	600
PA-18	Industrial	512.5	3,348.7	100%	3,348.7	12,749
PA-19	Industrial	557.8	3,644.7	100%	3,644.7	13,871
PA-20	Warehouse	60.2	472.0	100%	472.0	791
PA-21	Warehouse	70.7	554.3	100%	554.3	921
PA-22	Warehouse	58.3	457.1	100%	457.1	768
PA-23a	Warehouse	19.7	128.7	100%	128.7	249
PA-23b	Warehouse	73.7	481.6	100%	481.6	806
PA-24	Industrial	154.7	1,213.0	100%	1,213.0	4,655
PA-25	Warehouse	127.6	1,000.5	100%	1,000.5	1,626
PA-26	Warehouse	71.5	560.6	100%	560.6	931
PA-27a	Warehouse	36.8	288.5	100%	288.5	501
PA-27b	Warehouse	17.5	137.2	100%	137.2	262
PA-28	Industrial	185.0	1,208.8	100%	1,208.8	4,639
PA-29	Warehouse	63.1	494.8	100%	494.8	827
PA-30	Mixed Use	29.7	388.1	100%	405.1	15,199
PA-31	Mixed Use	502.4	6,565.4	100%	483.5	103,456
Totals		4,962.5	37,822.7			201,671
Industrial =		2,484.3	16,024.3			61,205
Data Center =		561.8	10,440.0			4,361
Warehouse =		1,384.3	4,405.0			17,450
Mixed Use =		532.1	6,953.5			118,655
Mixed Use Internal Capture Reductions ²						-42,715
Mixed Use Pass-By Reductions ³						-5,933
Net External Trip Generation						153,059
¹ Potential square footage amounts and percentage breakout were estimated by LAI Design Group and represent the maximum allowable development. Floor-Area-Ratios are 0.15 for Industrial, 0.18 for Data Center and Warehouse, and 0.3 for Mixed-Use. ² Internal Capture reductions for the mixed-use sites in Planning Areas 30 and 31 are at a rate of 36 percent, the average rate reported for mixed-use sites in NCHRP Report 684. ³ Pass-by reductions for Planning Areas 30 and 31 are at a rate of 5 percent.						

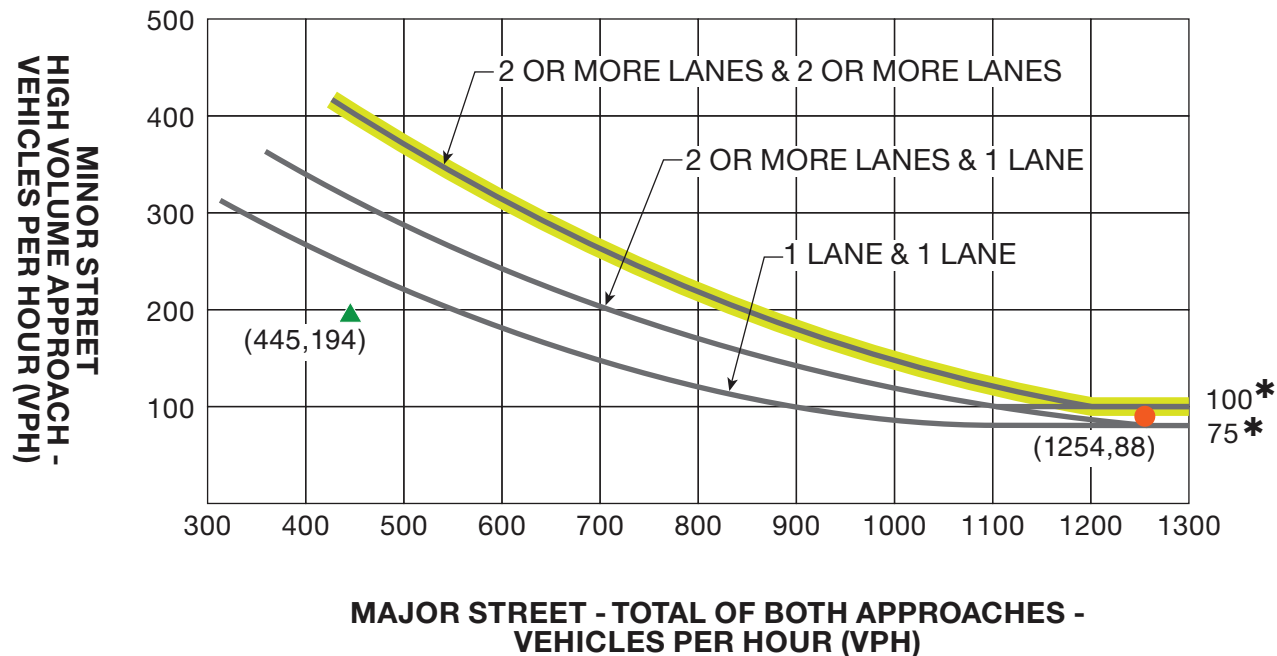
APPENDIX F. SUBAREA I WARRANT GRAPHS



* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

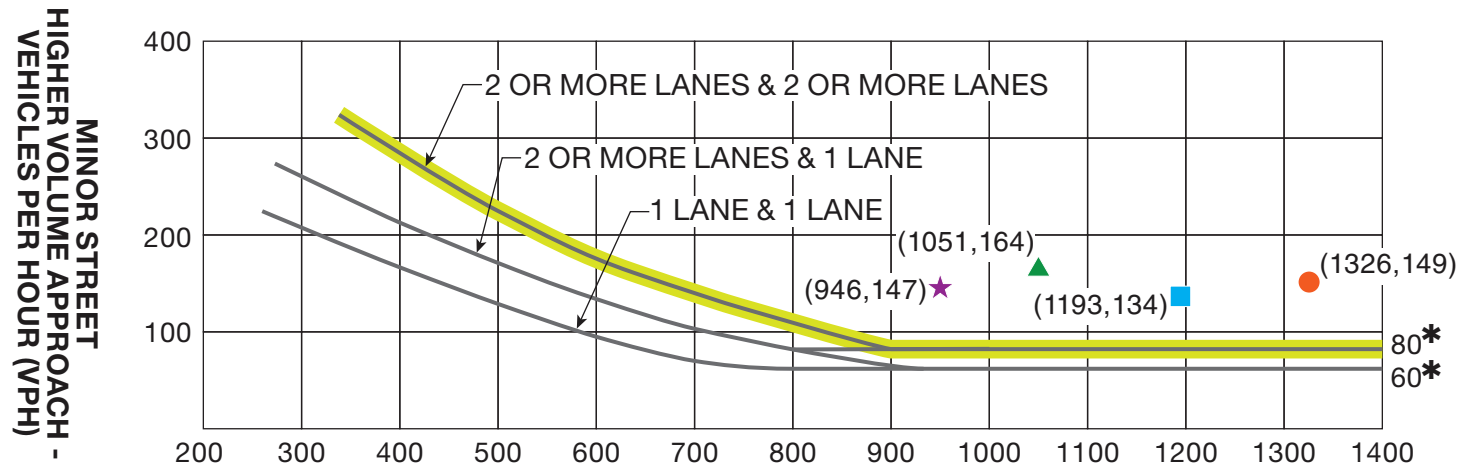
- = AM
- = 90% AM
- ▲ = PM
- ★ = 90% PM



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

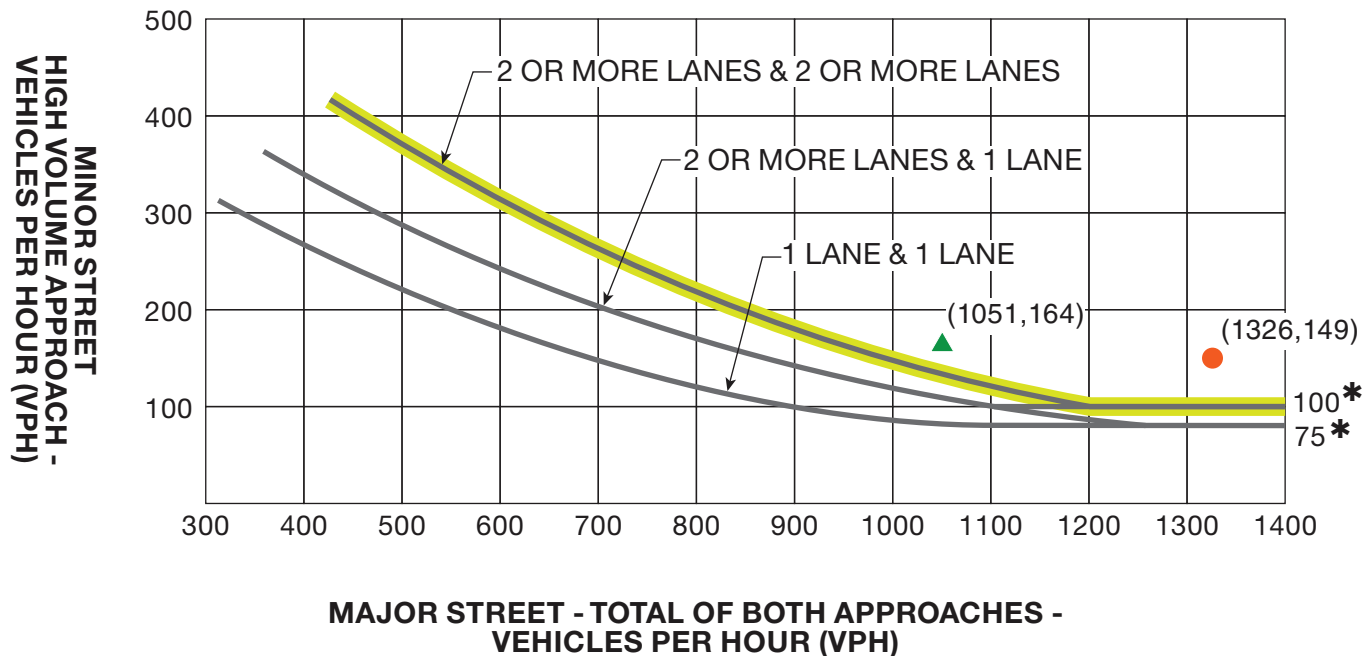
- = Peak Hour AM
- ▲ = Peak Hour PM



* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

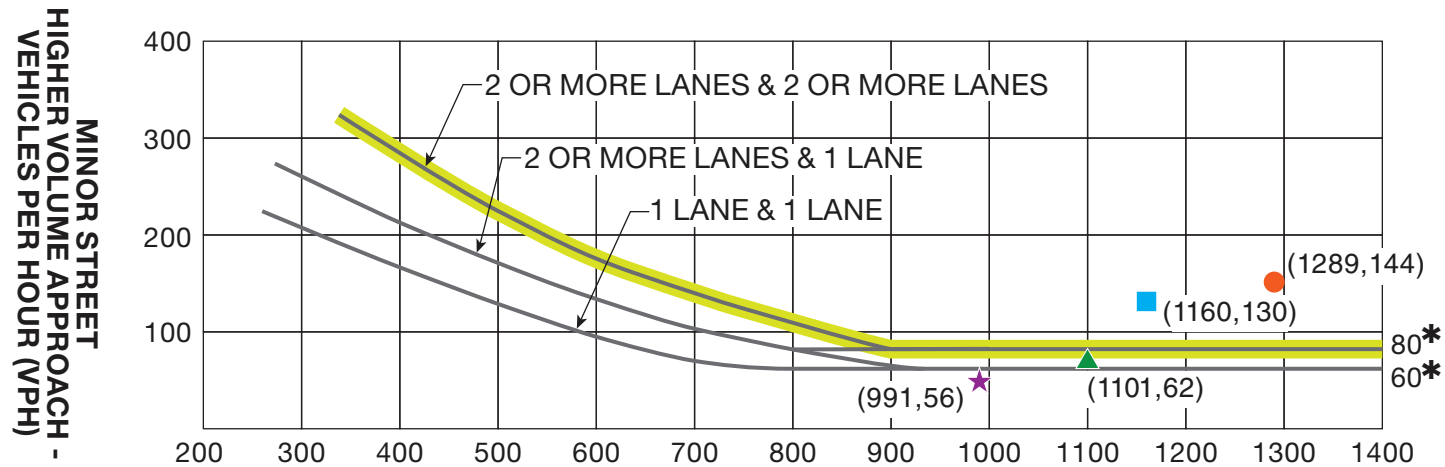
- = AM
- = 90% AM
- ▲ = PM
- ★ = 90% PM



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = Peak Hour AM
- ▲ = Peak Hour PM

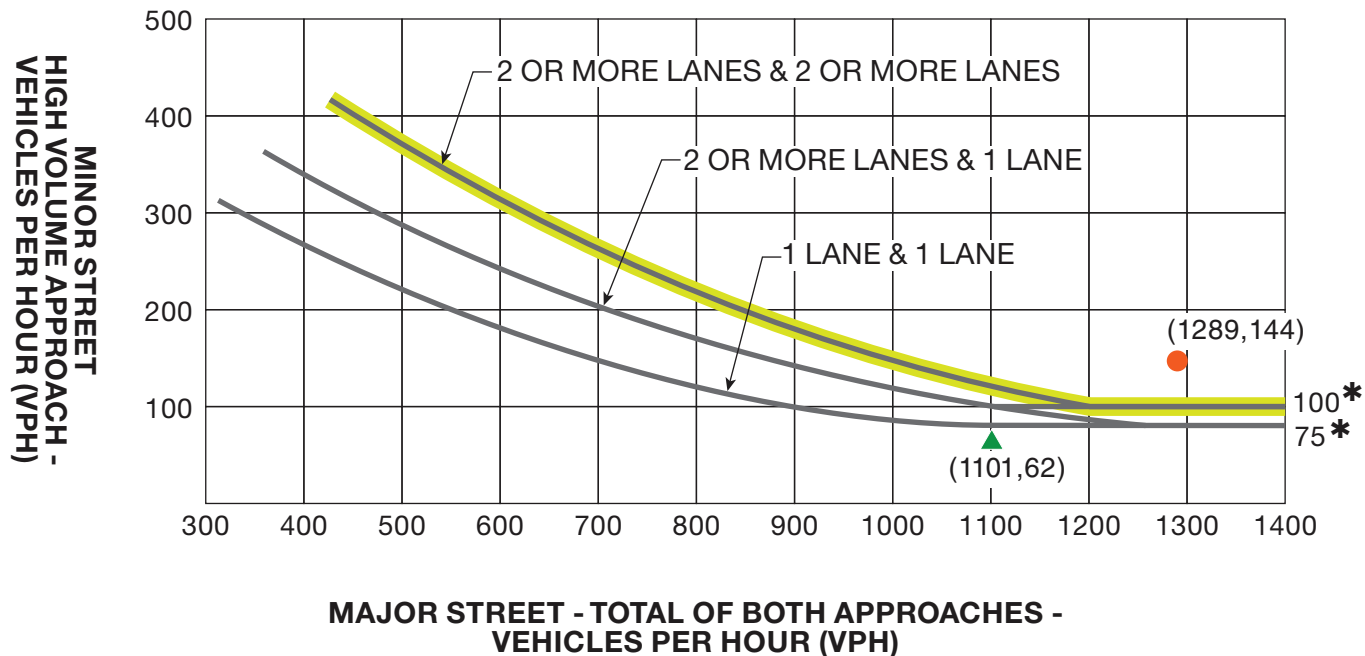


**MAJOR STREET - TOTAL OF BOTH APPROACHES -
VEHICLES PER HOUR (VPH)**

* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

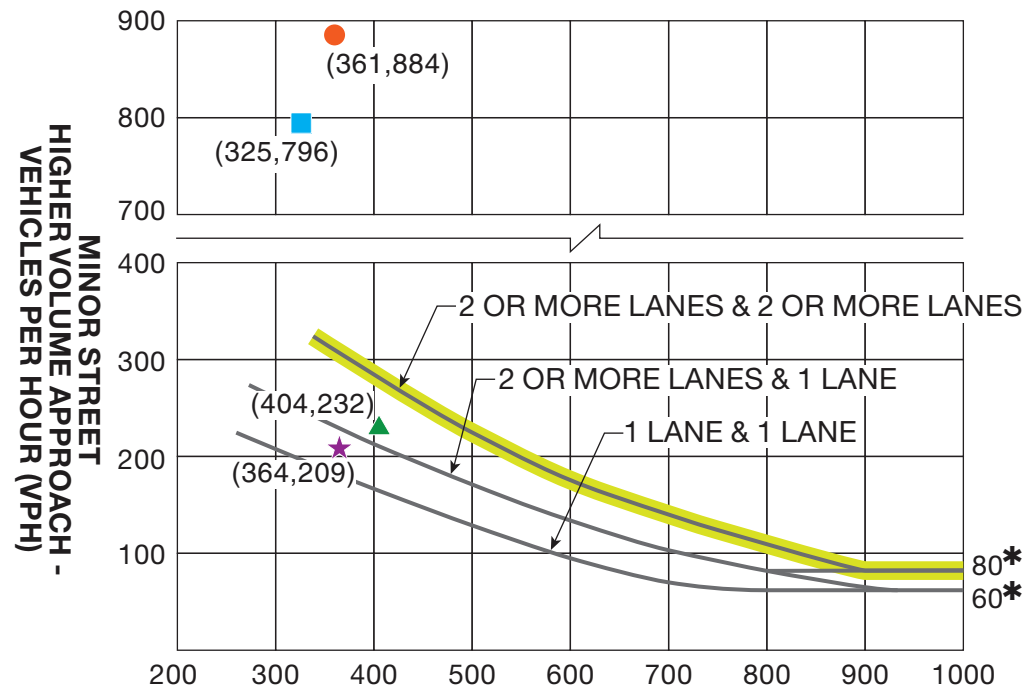
- = AM
- = 90% AM
- ▲ = PM
- ★ = 90% PM



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = Peak Hour AM
- ▲ = Peak Hour PM



LEGEND

- = AM
- = 90% AM
- ▲ = PM
- ★ = 90% PM

* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

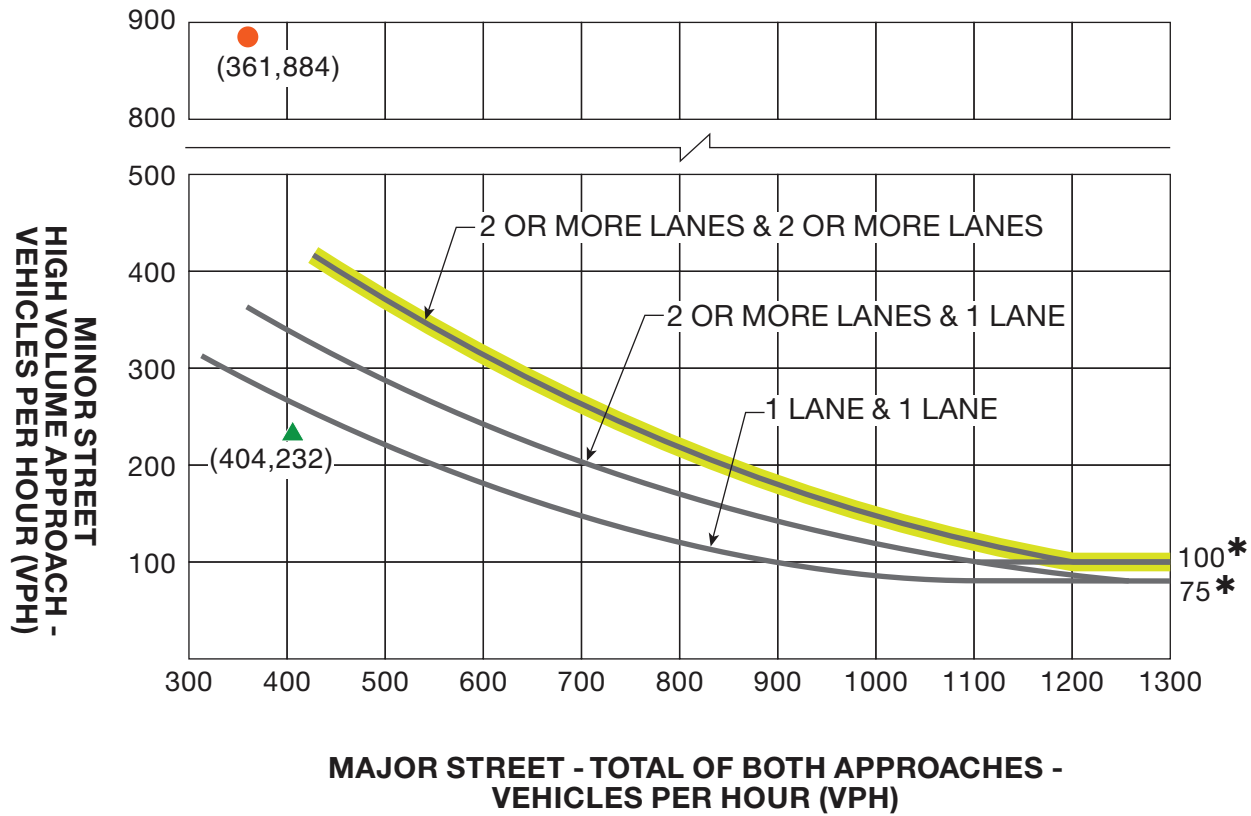
WARRANT 2

Subarea I

Manila Road/I-70 EB Ramp

Four-Hour Vehicular Volume (70% Factor)

(Community Less than 10,000 Population or Above 40 mph On Major Street)



LEGEND

- = Peak Hour AM
- ▲ = Peak Hour PM

APPENDIX G. ANALYSIS WORKSHEETS – SUBAREA I

Intersection												
Int Delay, s/veh	3.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕	↕	↕	↕	↕	↕	↕	
Traffic Vol, veh/h	5	5	5	5	5	26	5	87	50	173	263	5
Future Vol, veh/h	5	5	5	5	5	26	5	87	50	173	263	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	100	0	-	0	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20	20	20	20	20	20	20
Mvmt Flow	6	6	6	6	6	31	6	102	59	204	309	6







Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	882	893	312	840	837	102	315	0	0	161	0	0
Stage 1	720	720	-	114	114	-	-	-	-	-	-	-
Stage 2	162	173	-	726	723	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.7	6.4	7.3	6.7	6.4	4.3	-	-	4.3	-	-
Critical Hdwy Stg 1	6.3	5.7	-	6.3	5.7	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.3	5.7	-	6.3	5.7	-	-	-	-	-	-	-
Follow-up Hdwy	3.68	4.18	3.48	3.68	4.18	3.48	2.38	-	-	2.38	-	-
Pot Cap-1 Maneuver	248	263	688	265	284	906	1150	-	-	1316	-	-
Stage 1	392	406	-	849	768	-	-	-	-	-	-	-
Stage 2	799	723	-	389	405	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	206	221	688	226	239	906	1150	-	-	1316	-	-
Mov Cap-2 Maneuver	206	221	-	226	239	-	-	-	-	-	-	-
Stage 1	390	343	-	845	764	-	-	-	-	-	-	-
Stage 2	762	719	-	320	342	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	18.9		12.4		0.3		3.2	
HCM LOS	C		B					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1150	-	-	277 226 239 906 1316	-	-	-
HCM Lane V/C Ratio	0.005	-	-	0.064 0.026 0.025 0.034 0.155	-	-	-
HCM Control Delay (s)	8.1	-	-	18.9 21.4 20.4 9.1 8.2	-	-	-
HCM Lane LOS	A	-	-	C C C A A	-	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2 0.1 0.1 0.1 0.5	-	-	-

Intersection




Int Delay, s/veh 5.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	142	45	130	40	25	155
Future Vol, veh/h	142	45	130	40	25	155
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	167	53	153	47	29	182

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	200	0	0 540 153
Stage 1	-	-	- 153 -
Stage 2	-	-	- 387 -
Critical Hdwy	4.3	-	- 6.6 6.4
Critical Hdwy Stg 1	-	-	- 5.6 -
Critical Hdwy Stg 2	-	-	- 5.6 -
Follow-up Hdwy	2.38	-	- 3.68 3.48
Pot Cap-1 Maneuver	1272	-	- 473 848
Stage 1	-	-	- 833 -
Stage 2	-	-	- 649 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1272	-	- 411 848
Mov Cap-2 Maneuver	-	-	- 411 -
Stage 1	-	-	- 724 -
Stage 2	-	-	- 649 -

Approach	EB	WB	SB
HCM Control Delay, s	6.3	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1272	-	-	-	411	848
HCM Lane V/C Ratio	0.131	-	-	-	0.072	0.215
HCM Control Delay (s)	8.3	-	-	-	14.4	10.4
HCM Lane LOS	A	-	-	-	B	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.2	0.8

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	65	5	5	140	5	5
Future Vol, veh/h	65	5	5	140	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	76	6	6	165	6	6





















Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	82	0	256	79
Stage 1	-	-	-	-	79	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	-	-	4.3	-	6.6	6.4
Critical Hdwy Stg 1	-	-	-	-	5.6	-
Critical Hdwy Stg 2	-	-	-	-	5.6	-
Follow-up Hdwy	-	-	2.38	-	3.68	3.48
Pot Cap-1 Maneuver	-	-	1409	-	695	934
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	812	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1409	-	692	934
Mov Cap-2 Maneuver	-	-	-	-	692	-
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	808	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	795	-	-	1409	-
HCM Lane V/C Ratio	0.015	-	-	0.004	-
HCM Control Delay (s)	9.6	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Timings
4: Manila Rd & E Colfax Ave

TransPort
11/12/2019

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	50	40	90	38	15	1125	15	9	157
Future Volume (vph)	5	50	40	90	38	15	1125	15	9	157
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		4		8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	4	4	8	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	30.0	30.0	30.0	30.0	30.0	12.0	78.0	78.0	12.0	78.0
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%	10.0%	65.0%	65.0%	10.0%	65.0%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min
Act Effect Green (s)	10.6	10.6	11.0	11.0	11.0	41.0	41.6	41.6	40.9	41.5
Actuated g/C Ratio	0.18	0.18	0.19	0.19	0.19	0.69	0.71	0.71	0.69	0.70
v/c Ratio	0.03	0.23	0.22	0.36	0.15	0.02	0.62	0.02	0.04	0.09
Control Delay	27.0	26.3	28.6	29.3	8.9	3.8	9.0	0.1	4.0	5.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	26.3	28.6	29.3	8.9	3.8	9.0	0.1	4.0	5.1
LOS	C	C	C	C	A	A	A	A	A	A
Approach Delay		26.3		24.5			8.8			5.0
Approach LOS		C		C			A			A

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 59

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 10.8


Intersection LOS: B

Intersection Capacity Utilization 50.7%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Manila Rd & E Colfax Ave
























		
Ø1	Ø2	Ø4
12 s	78 s	30 s
		
Ø5	Ø6	Ø8
12 s	78 s	30 s

HCM 6th Signalized Intersection Summary

4: Manila Rd & E Colfax Ave

TransPort

11/12/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	50	5	40	90	38	15	1125	15	9	157	5
Future Volume (veh/h)	5	50	5	40	90	38	15	1125	15	9	157	5
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	1604	1604	1604	1604	1604	1604	1604	1604	1604	1604	1604	1604
Adj Flow Rate, veh/h	6	59	6	47	106	45	18	1324	18	11	185	6
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	20	20	20	20	20	20	20	20	20	20	20	20
Cap, veh/h	201	178	18	234	200	169	756	1858	829	264	1813	59
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.02	0.61	0.61	0.01	0.60	0.60
Sat Flow, veh/h	1060	1432	146	1146	1604	1359	1527	3047	1359	1527	3012	97
Grp Volume(v), veh/h	6	0	65	47	106	45	18	1324	18	11	93	98
Grp Sat Flow(s),veh/h/ln	1060	0	1577	1146	1604	1359	1527	1523	1359	1527	1523	1586
Q Serve(g_s), s	0.3	0.0	2.0	2.1	3.3	1.6	0.2	16.1	0.3	0.1	1.4	1.4
Cycle Q Clear(g_c), s	3.6	0.0	2.0	4.1	3.3	1.6	0.2	16.1	0.3	0.1	1.4	1.4
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		0.06
Lane Grp Cap(c), veh/h	201	0	197	234	200	169	756	1858	829	264	917	955
V/C Ratio(X)	0.03	0.00	0.33	0.20	0.53	0.27	0.02	0.71	0.02	0.04	0.10	0.10
Avail Cap(c_a), veh/h	572	0	750	636	762	646	936	4173	1861	456	2087	2172
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.7	0.0	21.4	23.3	22.0	21.3	3.9	7.2	4.1	6.3	4.5	4.5
Incr Delay (d2), s/veh	0.1	0.0	1.0	0.4	2.2	0.8	0.0	0.5	0.0	0.1	0.0	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	0.1	0.0	0.7	0.5	1.1	0.5	0.0	3.3	0.1	0.0	0.2	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.8	0.0	22.4	23.7	24.2	22.1	3.9	7.7	4.2	6.4	4.6	4.6
LnGrp LOS	C	A	C	C	C	C	A	A	A	A	A	A
Approach Vol, veh/h	71			198			1360			202		
Approach Delay, s/veh	22.5			23.6			7.6			4.7		
Approach LOS	C			C			A			A		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.3	37.2		11.2	5.7	36.8		11.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	7.5	73.5		25.5	7.5	73.5		25.5				
Max Q Clear Time (g_c+I1), s	2.1	18.1		5.6	2.2	3.4		6.1				
Green Ext Time (p_c), s	0.0	14.6		0.2	0.0	1.0		0.7				
Intersection Summary												
HCM 6th Ctrl Delay	9.6											
HCM 6th LOS	A											

Timings 5: Manila Rd & I-70 WB Ramp

TransPort
11/12/2019

Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	25	5	228	155	917	58	149
Future Volume (vph)	25	5	228	155	917	58	149
Turn Type	Perm	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases		8		5	2	6	
Permitted Phases	8		8	2			6
Detector Phase	8	8	8	5	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	45.0	45.0	45.0	18.0	75.0	57.0	57.0
Total Split (%)	37.5%	37.5%	37.5%	15.0%	62.5%	47.5%	47.5%
Yellow Time (s)	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
Lost Time Adjust (s)	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
Lead/Lag				Lead		Lag	Lag
Lead-Lag Optimize?				Yes		Yes	Yes
Recall Mode	None	None	None	None	Min	Min	Min
Act Effect Green (s)	14.0	14.0	14.0	27.1	27.1	11.3	11.3
Actuated g/C Ratio	0.28	0.28	0.28	0.53	0.53	0.22	0.22
v/c Ratio	0.07	0.01	0.61	0.31	0.67	0.19	0.40
Control Delay	16.4	16.2	18.3	8.5	11.5	18.6	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	16.2	18.3	8.5	11.5	18.6	6.7
LOS	B	B	B	A	B	B	A
Approach Delay		18.0			11.1	10.0	
Approach LOS		B			B	B	

Intersection Summary


Cycle Length: 120
Actuated Cycle Length: 50.8
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 12.1
Intersection LOS: B
Intersection Capacity Utilization 66.0%
ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 5: Manila Rd & I-70 WB Ramp

















HCM 6th Signalized Intersection Summary 5: Manila Rd & I-70 WB Ramp

TransPort
11/12/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↱	↰	↰	↱			↱	↰
Traffic Volume (veh/h)	0	0	0	25	5	228	155	917	0	0	58	149
Future Volume (veh/h)	0	0	0	25	5	228	155	917	0	0	58	149
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1604	1604	1604	1604	1604	0	0	1604	1604
Adj Flow Rate, veh/h				29	6	268	182	1079	0	0	68	175
Peak Hour Factor				0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %				20	20	20	20	20	0	0	20	20
Cap, veh/h				384	403	342	613	1598	0	0	481	407
Arrive On Green				0.25	0.25	0.25	0.11	0.52	0.00	0.00	0.30	0.30
Sat Flow, veh/h				1527	1604	1359	1527	3127	0	0	1604	1359
Grp Volume(v), veh/h				29	6	268	182	1079	0	0	68	175
Grp Sat Flow(s),veh/h/ln				1527	1604	1359	1527	1523	0	0	1604	1359
Q Serve(g_s), s				0.6	0.1	7.4	2.9	10.5	0.0	0.0	1.2	4.2
Cycle Q Clear(g_c), s				0.6	0.1	7.4	2.9	10.5	0.0	0.0	1.2	4.2
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				384	403	342	613	1598	0	0	481	407
V/C Ratio(X)				0.08	0.01	0.78	0.30	0.68	0.00	0.00	0.14	0.43
Avail Cap(c_a), veh/h				1541	1618	1371	955	5350	0	0	2097	1777
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				11.5	11.3	14.0	6.8	7.0	0.0	0.0	10.3	11.3
Incr Delay (d2), s/veh				0.1	0.0	4.0	0.3	0.5	0.0	0.0	0.1	0.7
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.2	0.0	2.1	0.4	1.2	0.0	0.0	0.3	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				11.6	11.3	18.0	7.0	7.5	0.0	0.0	10.4	12.0
LnGrp LOS				B	B	B	A	A	A	A	B	B
Approach Vol, veh/h					303			1261			243	
Approach Delay, s/veh					17.2			7.5			11.6	
Approach LOS					B			A			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		25.6			9.0	16.5		14.6				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		70.5			13.5	52.5		40.5				
Max Q Clear Time (g_c+I1), s		12.5			4.9	6.2		9.4				
Green Ext Time (p_c), s		8.6			0.3	0.9		1.1				
Intersection Summary												
HCM 6th Ctrl Delay				9.7								
HCM 6th LOS				A								

Timings
6: Manila Rd & I-70 EB Ramp

TransPort
11/12/2019





							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	859	5	40	223	50	35	53
Future Volume (vph)	859	5	40	223	50	35	53
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		4		2		1	6
Permitted Phases	4		4		2	6	
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	68.0	68.0	68.0	40.0	40.0	12.0	52.0
Total Split (%)	56.7%	56.7%	56.7%	33.3%	33.3%	10.0%	43.3%
Yellow Time (s)	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
Lost Time Adjust (s)	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
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	None	None	None	Min	Min	None	Min
Act Effect Green (s)	36.9	36.9	36.9	19.8	19.8	25.5	25.5
Actuated g/C Ratio	0.50	0.50	0.50	0.27	0.27	0.35	0.35
v/c Ratio	0.70	0.71	0.07	0.61	0.15	0.14	0.11
Control Delay	21.7	22.0	3.2	35.1	10.4	19.9	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.7	22.0	3.2	35.1	10.4	19.9	19.3
LOS	C	C	A	D	B	B	B
Approach Delay		21.0		30.6			19.6
Approach LOS		C		C			B

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 73.2
 Natural Cycle: 65
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 23.0
 Intersection Capacity Utilization 64.3%
 Analysis Period (min) 15




















Intersection LOS: C
 ICU Level of Service C







Splits and Phases: 6: Manila Rd & I-70 EB Ramp







		
Ø1	Ø2	Ø4
12 s	40 s	68 s
		
Ø6		
52 s		

HCM 6th Signalized Intersection Summary 6: Manila Rd & I-70 EB Ramp

TransPort
11/12/2019











												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	859	5	40	0	0	0	0	223	50	35	53	0
Future Volume (veh/h)	859	5	40	0	0	0	0	223	50	35	53	0
Initial Q (Qb), veh	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
Parking Bus, Adj	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		
Adj Sat Flow, veh/h/ln	1604	1604	1604				0	1604	1604	1604	1604	0
Adj Flow Rate, veh/h	1015	0	47				0	262	59	41	62	0
Peak Hour Factor	0.85	0.85	0.85				0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	20	20	20				0	20	20	20	20	0
Cap, veh/h	1321	0	588				0	364	309	295	594	0
Arrive On Green	0.43	0.00	0.43				0.00	0.23	0.23	0.04	0.37	0.00
Sat Flow, veh/h	3054	0	1359				0	1604	1359	1527	1604	0
Grp Volume(v), veh/h	1015	0	47				0	262	59	41	62	0
Grp Sat Flow(s),veh/h/ln	1527	0	1359				0	1604	1359	1527	1604	0
Q Serve(g_s), s	12.9	0.0	0.9				0.0	6.9	1.6	0.9	1.2	0.0
Cycle Q Clear(g_c), s	12.9	0.0	0.9				0.0	6.9	1.6	0.9	1.2	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1321	0	588				0	364	309	295	594	0
V/C Ratio(X)	0.77	0.00	0.08				0.00	0.72	0.19	0.14	0.10	0.00
Avail Cap(c_a), veh/h	4253	0	1892				0	1248	1058	478	1670	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.0	0.0	7.6				0.0	16.3	14.2	11.9	9.4	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.1				0.0	2.7	0.3	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
%ile BackOfQ(50%),veh/ln	3.3	0.0	0.2				0.0	2.1	0.4	0.2	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	0.0	7.7				0.0	19.0	14.5	12.1	9.5	0.0
LnGrp LOS	B	A	A				A	B	B	B	A	A
Approach Vol, veh/h	1062						321			103		
Approach Delay, s/veh	11.8						18.2			10.5		
Approach LOS	B						B			B		
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	6.5	14.9		24.2		21.4						
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5						
Max Green Setting (Gmax), s	7.5	35.5		63.5		47.5						
Max Q Clear Time (g_c+l1), s	2.9	8.9		14.9		3.2						
Green Ext Time (p_c), s	0.0	1.5		4.8		0.3						
Intersection Summary												
HCM 6th Ctrl Delay	13.1											
HCM 6th LOS	B											
Notes												
User approved pedestrian interval to be less than phase max green.												
User approved volume balancing among the lanes for turning movement.												

Intersection						
Int Delay, s/veh	2.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	17	145	37	128	175
Future Vol, veh/h	5	17	145	37	128	175
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	100	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	6	20	171	44	151	206
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	679	171	0	0	215	0
Stage 1	171	-	-	-	-	-
Stage 2	508	-	-	-	-	-
Critical Hdwy	6.6	6.4	-	-	4.3	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	-	-	2.38	-
Pot Cap-1 Maneuver	391	828	-	-	1255	-
Stage 1	817	-	-	-	-	-
Stage 2	569	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	344	828	-	-	1255	-
Mov Cap-2 Maneuver	344	-	-	-	-	-
Stage 1	817	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10.9	0	3.5			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 344 828	1255	-		
HCM Lane V/C Ratio	-	- 0.017 0.024	0.12	-		
HCM Control Delay (s)	-	- 15.6 9.5	8.3	-		
HCM Lane LOS	-	- C A	A	-		
HCM 95th %tile Q(veh)	-	- 0.1 0.1	0.4	-		

Intersection						
Int Delay, s/veh	8.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	3	105	763	405	66	20
Future Vol, veh/h	3	105	763	405	66	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	4	124	898	476	78	24
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	2124	51	102	0	-	0
Stage 1	90	-	-	-	-	-
Stage 2	2034	-	-	-	-	-
Critical Hdwy	7.2	7.3	4.5	-	-	-
Critical Hdwy Stg 1	6.2	-	-	-	-	-
Critical Hdwy Stg 2	6.2	-	-	-	-	-
Follow-up Hdwy	3.7	3.5	2.4	-	-	-
Pot Cap-1 Maneuver	34	951	1366	-	-	-
Stage 1	872	-	-	-	-	-
Stage 2	70	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	12	951	1366	-	-	-
Mov Cap-2 Maneuver	12	-	-	-	-	-
Stage 1	299	-	-	-	-	-
Stage 2	70	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	20.3	8.2		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1366	-	12	951	-	-
HCM Lane V/C Ratio	0.657	-	0.294	0.13	-	-
HCM Control Delay (s)	12.5	-	\$ 401	9.4	-	-
HCM Lane LOS	B	-	F	A	-	-
HCM 95th %tile Q(veh)	5.3	-	0.7	0.4	-	-

Timings
20: Manila Rd & 32nd Ave

TransPort
11/12/2019

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	3	105	763	405	66
Future Volume (vph)	3	105	763	405	66
Turn Type	Prot	Perm	pm+pt	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4	2		
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5
Total Split (s)	26.0	26.0	71.0	94.0	23.0
Total Split (%)	21.7%	21.7%	59.2%	78.3%	19.2%
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			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	None	None	None	Min	Min
Act Effect Green (s)	7.2	7.2	65.7	65.7	7.9
Actuated g/C Ratio	0.09	0.09	0.80	0.80	0.10
v/c Ratio	0.03	0.54	0.83	0.20	0.34
Control Delay	40.7	17.5	14.8	2.2	34.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.7	17.5	14.8	2.2	34.9
LOS	D	B	B	A	C
Approach Delay	18.3			10.4	34.9
Approach LOS	B			B	C

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 82.3
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 12.6
 Intersection LOS: B
 Intersection Capacity Utilization 60.6%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 20: Manila Rd & 32nd Ave














HCM 6th Signalized Intersection Summary

20: Manila Rd & 32nd Ave

TransPort
11/12/2019









Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	105	763	405	66	20
Future Volume (veh/h)	3	105	763	405	66	20
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	1604	1604	1604	1604	1604	1604
Adj Flow Rate, veh/h	4	124	898	476	78	24
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	20	20	20	20	20	20
Cap, veh/h	171	152	1041	2213	208	61
Arrive On Green	0.11	0.11	0.56	0.73	0.09	0.09
Sat Flow, veh/h	1527	1359	1527	3127	2399	685
Grp Volume(v), veh/h	4	124	898	476	50	52
Grp Sat Flow(s),veh/h/ln	1527	1359	1527	1523	1523	1480
Q Serve(g_s), s	0.1	5.0	25.3	2.8	1.7	1.8
Cycle Q Clear(g_c), s	0.1	5.0	25.3	2.8	1.7	1.8
Prop In Lane	1.00	1.00	1.00			0.46
Lane Grp Cap(c), veh/h	171	152	1041	2213	137	133
V/C Ratio(X)	0.02	0.81	0.86	0.22	0.37	0.39
Avail Cap(c_a), veh/h	589	524	2015	4894	506	491
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.0	24.2	7.2	2.5	23.9	23.9
Incr Delay (d2), s/veh	0.1	10.0	2.3	0.0	1.6	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.4	2.6	0.1	0.6	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	22.1	34.2	9.4	2.5	25.5	25.8
LnGrp LOS	C	C	A	A	C	C
Approach Vol, veh/h	128			1374	102	
Approach Delay, s/veh	33.8			7.0	25.6	
Approach LOS	C			A	C	
Timer - Assigned Phs	2		4		5	6
Phs Duration (G+Y+Rc), s	45.0		10.7		35.5	9.5
Change Period (Y+Rc), s	4.5		4.5		4.5	4.5
Max Green Setting (Gmax), s	89.5		21.5		66.5	18.5
Max Q Clear Time (g_c+I1), s	4.8		7.0		27.3	3.8
Green Ext Time (p_c), s	3.0		0.3		3.7	0.3
Intersection Summary						
HCM 6th Ctrl Delay			10.4			
HCM 6th LOS			B			

Intersection						
Int Delay, s/veh	3.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	6	25	184	165	116	41
Future Vol, veh/h	6	25	184	165	116	41
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	0	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	7	29	216	194	136	48
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	762	136	184	0	-	0
Stage 1	136	-	-	-	-	-
Stage 2	626	-	-	-	-	-
Critical Hdwy	6.6	6.4	4.3	-	-	-
Critical Hdwy Stg 1	5.6	-	-	-	-	-
Critical Hdwy Stg 2	5.6	-	-	-	-	-
Follow-up Hdwy	3.68	3.48	2.38	-	-	-
Pot Cap-1 Maneuver	348	867	1290	-	-	-
Stage 1	848	-	-	-	-	-
Stage 2	500	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	290	867	1290	-	-	-
Mov Cap-2 Maneuver	290	-	-	-	-	-
Stage 1	706	-	-	-	-	-
Stage 2	500	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.9	4.4		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1290	-	290	867	-	-
HCM Lane V/C Ratio	0.168	-	0.024	0.034	-	-
HCM Control Delay (s)	8.4	-	17.7	9.3	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th %tile Q(veh)	0.6	-	0.1	0.1	-	-

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	151	430	170	23	6
Future Vol, veh/h	43	151	430	170	23	6
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	20	20	20	20	20	20
Mvmt Flow	51	178	506	200	27	7

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	706	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.3	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.38	-	-
Pot Cap-1 Maneuver	815	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	815	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	2.2	0	16.3
HCM LOS			C







Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	815	-	-	-	316	532
HCM Lane V/C Ratio	0.062	-	-	-	0.086	0.013
HCM Control Delay (s)	9.7	-	-	-	17.5	11.9
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.3	0




Intersection												
Int Delay, s/veh	4.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		↕	↕	↕	↕	↕	↕	↕	↕	
Traffic Vol, veh/h	5	5	5	35	5	139	5	215	10	21	129	5
Future Vol, veh/h	5	5	5	35	5	139	5	215	10	21	129	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	100	100	-	0	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19	19	19	19	19	19	19
Mvmt Flow	6	6	6	41	6	164	6	253	12	25	152	6

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	561	482	155	476	473	253	158	0	0	265	0	0
Stage 1	205	205	-	265	265	-	-	-	-	-	-	-
Stage 2	356	277	-	211	208	-	-	-	-	-	-	-
Critical Hdwy	7.29	6.69	6.39	7.29	6.69	6.39	4.29	-	-	4.29	-	-
Critical Hdwy Stg 1	6.29	5.69	-	6.29	5.69	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.29	5.69	-	6.29	5.69	-	-	-	-	-	-	-
Follow-up Hdwy	3.671	4.171	3.471	3.671	4.171	3.471	2.371	-	-	2.371	-	-
Pot Cap-1 Maneuver	413	460	848	472	465	746	1324	-	-	1207	-	-
Stage 1	760	701	-	704	659	-	-	-	-	-	-	-
Stage 2	628	651	-	754	699	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	313	448	848	455	453	746	1324	-	-	1207	-	-
Mov Cap-2 Maneuver	313	448	-	455	453	-	-	-	-	-	-	-
Stage 1	756	686	-	700	656	-	-	-	-	-	-	-
Stage 2	484	648	-	727	684	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB				
HCM Control Delay, s	13.3		11.7		0.2			1.1				
HCM LOS	B		B									

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1WBLn2WBLn3	SBL	SBT	SBR
Capacity (veh/h)	1324	-	-	454 455 453 746	1207	-	-
HCM Lane V/C Ratio	0.004	-	-	0.039 0.09 0.013 0.219	0.02	-	-
HCM Control Delay (s)	7.7	-	-	13.3 13.7 13.1 11.2	8	-	-
HCM Lane LOS	A	-	-	B B B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1 0.3 0 0.8	0.1	-	-

Intersection						
Int Delay, s/veh	6.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	139	125	65	30	60	148
Future Vol, veh/h	139	125	65	30	60	148
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	100	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19
Mvmt Flow	164	147	76	35	71	174
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	111	0	-	0	551	76
Stage 1	-	-	-	-	76	-
Stage 2	-	-	-	-	475	-
Critical Hdwy	4.29	-	-	-	6.59	6.39
Critical Hdwy Stg 1	-	-	-	-	5.59	-
Critical Hdwy Stg 2	-	-	-	-	5.59	-
Follow-up Hdwy	2.371	-	-	-	3.671	3.471
Pot Cap-1 Maneuver	1379	-	-	-	468	940
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	592	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1379	-	-	-	412	940
Mov Cap-2 Maneuver	-	-	-	-	412	-
Stage 1	-	-	-	-	798	-
Stage 2	-	-	-	-	592	-
Approach	EB	WB		SB		
HCM Control Delay, s	4.2	0		11.4		
HCM LOS	B					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1379	-	-	-	412	940
HCM Lane V/C Ratio	0.119	-	-	-	0.171	0.185
HCM Control Delay (s)	8	-	-	-	15.5	9.7
HCM Lane LOS	A	-	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	-	0.6	0.7

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	165	10	5	85	5	5
Future Vol, veh/h	165	10	5	85	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19
Mvmt Flow	194	12	6	100	6	6





















Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	206	0	312
Stage 1	-	-	-	-	200
Stage 2	-	-	-	-	112
Critical Hdwy	-	-	4.29	-	6.59
Critical Hdwy Stg 1	-	-	-	-	5.59
Critical Hdwy Stg 2	-	-	-	-	5.59
Follow-up Hdwy	-	-	2.371	-	3.671
Pot Cap-1 Maneuver	-	-	1270	-	647
Stage 1	-	-	-	-	795
Stage 2	-	-	-	-	872
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1270	-	644
Mov Cap-2 Maneuver	-	-	-	-	644
Stage 1	-	-	-	-	795
Stage 2	-	-	-	-	868

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	714	-	-	1270	-
HCM Lane V/C Ratio	0.016	-	-	0.005	-
HCM Control Delay (s)	10.1	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Timings
4: Manila Rd & E Colfax Ave

TransPort
11/12/2019

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	140	20	65	8	10	127	50	31	828
Future Volume (vph)	5	140	20	65	8	10	127	50	31	828
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		4		8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	4	4	8	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	40.0	40.0	40.0	40.0	40.0	12.0	68.0	68.0	12.0	68.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	10.0%	56.7%	56.7%	10.0%	56.7%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag						Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min
Act Effect Green (s)	13.3	13.3	13.3	13.3	13.3	27.2	25.1	25.1	28.2	27.3
Actuated g/C Ratio	0.26	0.26	0.26	0.26	0.26	0.53	0.48	0.48	0.54	0.53
v/c Ratio	0.02	0.48	0.10	0.19	0.02	0.04	0.10	0.09	0.06	0.61
Control Delay	18.6	22.0	19.3	18.7	0.1	5.9	9.8	4.1	5.9	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	22.0	19.3	18.7	0.1	5.9	9.8	4.1	5.9	11.7
LOS	B	C	B	B	A	A	A	A	A	B
Approach Delay		21.9		17.3			8.1			11.5
Approach LOS		C		B			A			B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 51.8

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 12.8

Intersection LOS: B

Intersection Capacity Utilization 49.9%

ICU Level of Service A

Analysis Period (min) 15
























Splits and Phases: 4: Manila Rd & E Colfax Ave

		
Ø1	Ø2	Ø4
12 s	68 s	40 s
		
Ø5	Ø6	Ø8
12 s	68 s	40 s

HCM 6th Signalized Intersection Summary















4: Manila Rd & E Colfax Ave

TransPort
11/12/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	140	25	20	65	8	10	127	50	31	828	5
Future Volume (veh/h)	5	140	25	20	65	8	10	127	50	31	828	5
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	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618	1618
Adj Flow Rate, veh/h	6	165	29	24	76	9	12	149	59	36	974	6
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	19	19	19	19	19	19	19	19	19	19	19	19
Cap, veh/h	347	254	45	255	307	260	311	1344	600	655	1450	9
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.02	0.44	0.44	0.04	0.46	0.46
Sat Flow, veh/h	1136	1340	236	1029	1618	1372	1541	3075	1372	1541	3133	19
Grp Volume(v), veh/h	6	0	194	24	76	9	12	149	59	36	478	502
Grp Sat Flow(s),veh/h/ln	1136	0	1576	1029	1618	1372	1541	1537	1372	1541	1537	1615
Q Serve(g_s), s	0.2	0.0	4.6	0.9	1.6	0.2	0.2	1.2	1.0	0.5	9.9	9.9
Cycle Q Clear(g_c), s	1.8	0.0	4.6	5.5	1.6	0.2	0.2	1.2	1.0	0.5	9.9	9.9
Prop In Lane	1.00		0.15	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	347	0	299	255	307	260	311	1344	600	655	711	747
V/C Ratio(X)	0.02	0.00	0.65	0.09	0.25	0.03	0.04	0.11	0.10	0.05	0.67	0.67
Avail Cap(c_a), veh/h	1124	0	1376	958	1413	1198	571	4803	2142	876	2402	2523
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.8	0.0	15.2	17.8	14.0	13.4	7.1	6.8	6.7	5.7	8.5	8.5
Incr Delay (d2), s/veh	0.0	0.0	2.4	0.2	0.4	0.1	0.1	0.0	0.1	0.0	1.1	1.1
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	0.0	0.0	1.3	0.2	0.4	0.1	0.0	0.3	0.2	0.1	2.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	0.0	17.6	17.9	14.4	13.5	7.2	6.8	6.8	5.7	9.6	9.6
LnGrp LOS	B	A	B	B	B	B	A	A	A	A	A	A
Approach Vol, veh/h	200			109			220			1016		
Approach Delay, s/veh	17.5			15.1			6.8			9.5		
Approach LOS	B			B			A			A		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.2	22.3		12.2	5.1	23.3		12.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	7.5	63.5		35.5	7.5	63.5		35.5				
Max Q Clear Time (g_c+I1), s	2.5	3.2		6.6	2.2	11.9		7.5				
Green Ext Time (p_c), s	0.0	1.2		1.0	0.0	7.0		0.4				
Intersection Summary												
HCM 6th Ctrl Delay				10.5								
HCM 6th LOS				B								

Timings 5: Manila Rd & I-70 WB Ramp

TransPort
11/12/2019

							
Lane Group	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Configurations							
Traffic Volume (vph)	40	5	34	55	168	248	630
Future Volume (vph)	40	5	34	55	168	248	630
Turn Type	Perm	NA	Perm	pm+pt	NA	NA	Perm
Protected Phases		8		5	2	6	
Permitted Phases	8		8	2			6
Detector Phase	8	8	8	5	2	6	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	9.5	22.5	22.5	22.5
Total Split (s)	30.0	30.0	30.0	12.0	90.0	78.0	78.0
Total Split (%)	25.0%	25.0%	25.0%	10.0%	75.0%	65.0%	65.0%
Yellow Time (s)	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
Lost Time Adjust (s)	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
Lead/Lag				Lead		Lag	Lag
Lead-Lag Optimize?				Yes		Yes	Yes
Recall Mode	None	None	None	None	Min	Min	Min
Act Effect Green (s)	7.3	7.3	7.3	30.3	32.8	26.7	26.7
Actuated g/C Ratio	0.18	0.18	0.18	0.73	0.79	0.64	0.64
v/c Ratio	0.18	0.02	0.14	0.09	0.08	0.28	0.65
Control Delay	20.3	19.0	6.7	3.2	2.8	9.5	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	19.0	6.7	3.2	2.8	9.5	4.4
LOS	C	B	A	A	A	A	A
Approach Delay		14.4			2.9	5.8	
Approach LOS		B			A	A	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 41.4

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.65

Intersection Signal Delay: 5.8

Intersection LOS: A

Intersection Capacity Utilization 58.6%

ICU Level of Service B









Analysis Period (min) 15

Splits and Phases: 5: Manila Rd & I-70 WB Ramp

















HCM 6th Signalized Intersection Summary 5: Manila Rd & I-70 WB Ramp

TransPort
11/12/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	40	5	34	55	168	0	0	248	630
Future Volume (veh/h)	0	0	0	40	5	34	55	168	0	0	248	630
Initial Q (Qb), veh				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
Parking Bus, Adj				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	
Adj Sat Flow, veh/h/ln				1618	1618	1618	1618	1618	0	0	1618	1618
Adj Flow Rate, veh/h				47	6	40	65	198	0	0	292	741
Peak Hour Factor				0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %				19	19	19	19	19	0	0	19	19
Cap, veh/h				110	116	98	477	2315	0	0	981	831
Arrive On Green				0.07	0.07	0.07	0.06	0.75	0.00	0.00	0.61	0.61
Sat Flow, veh/h				1541	1618	1372	1541	3156	0	0	1618	1372
Grp Volume(v), veh/h				47	6	40	65	198	0	0	292	741
Grp Sat Flow(s),veh/h/ln				1541	1618	1372	1541	1537	0	0	1618	1372
Q Serve(g_s), s				1.5	0.2	1.4	0.7	0.9	0.0	0.0	4.4	23.7
Cycle Q Clear(g_c), s				1.5	0.2	1.4	0.7	0.9	0.0	0.0	4.4	23.7
Prop In Lane				1.00		1.00	1.00		0.00	0.00		1.00
Lane Grp Cap(c), veh/h				110	116	98	477	2315	0	0	981	831
V/C Ratio(X)				0.43	0.05	0.41	0.14	0.09	0.00	0.00	0.30	0.89
Avail Cap(c_a), veh/h				767	805	682	611	5129	0	0	2320	1967
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh				22.8	22.2	22.8	2.8	1.7	0.0	0.0	4.9	8.6
Incr Delay (d2), s/veh				2.6	0.2	2.7	0.1	0.0	0.0	0.0	0.2	3.6
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.6	0.1	0.5	0.0	0.0	0.0	0.0	0.8	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh				25.4	22.4	25.5	2.9	1.7	0.0	0.0	5.0	12.2
LnGrp LOS				C	C	C	A	A	A	A	A	B
Approach Vol, veh/h					93			263			1033	
Approach Delay, s/veh					25.2			2.0			10.2	
Approach LOS					C			A			B	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		43.1			7.5	35.6		8.2				
Change Period (Y+Rc), s		4.5			4.5	4.5		4.5				
Max Green Setting (Gmax), s		85.5			7.5	73.5		25.5				
Max Q Clear Time (g_c+I1), s		2.9			2.7	25.7		3.5				
Green Ext Time (p_c), s		1.2			0.0	5.3		0.2				
Intersection Summary												
HCM 6th Ctrl Delay				9.6								
HCM 6th LOS				A								

Timings 6: Manila Rd & I-70 EB Ramp

TransPort
11/12/2019

							
Lane Group	EBL	EBT	EBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	152	5	150	66	55	175	113
Future Volume (vph)	152	5	150	66	55	175	113
Turn Type	Perm	NA	Perm	NA	Perm	pm+pt	NA
Protected Phases		4		2		1	6
Permitted Phases	4		4		2	6	
Detector Phase	4	4	4	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	9.5	22.5
Total Split (s)	46.0	46.0	46.0	34.0	34.0	40.0	74.0
Total Split (%)	38.3%	38.3%	38.3%	28.3%	28.3%	33.3%	61.7%
Yellow Time (s)	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
Lost Time Adjust (s)	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
Lead/Lag				Lag	Lag	Lead	
Lead-Lag Optimize?				Yes	Yes	Yes	
Recall Mode	None	None	None	Min	Min	None	Min
Act Effect Green (s)	8.3	8.3	8.3	6.6	6.6	20.0	20.0
Actuated g/C Ratio	0.22	0.22	0.22	0.18	0.18	0.53	0.53
v/c Ratio	0.29	0.29	0.40	0.15	0.22	0.37	0.16
Control Delay	15.4	15.3	6.1	15.1	7.6	7.2	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	15.3	6.1	15.1	7.6	7.2	5.4
LOS	B	B	A	B	A	A	A
Approach Delay		10.8		11.7			6.5
Approach LOS		B		B			A

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 37.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.40
Intersection Signal Delay: 9.2
Intersection Capacity Utilization 58.6%
Analysis Period (min) 15










Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Manila Rd & I-70 EB Ramp



HCM 6th Signalized Intersection Summary 6: Manila Rd & I-70 EB Ramp

TransPort
11/12/2019







												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	152	5	150	0	0	0	0	66	55	175	113	0
Future Volume (veh/h)	152	5	150	0	0	0	0	66	55	175	113	0
Initial Q (Qb), veh	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
Parking Bus, Adj	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		
Adj Sat Flow, veh/h/ln	1618	1618	1618				0	1618	1618	1618	1618	0
Adj Flow Rate, veh/h	183	0	176				0	78	65	206	133	0
Peak Hour Factor	0.85	0.85	0.85				0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	19	19	19				0	19	19	19	19	0
Cap, veh/h	665	0	296				0	529	236	638	768	0
Arrive On Green	0.22	0.00	0.22				0.00	0.17	0.17	0.15	0.47	0.00
Sat Flow, veh/h	3083	0	1372				0	3156	1372	1541	1618	0
Grp Volume(v), veh/h	183	0	176				0	78	65	206	133	0
Grp Sat Flow(s),veh/h/ln	1541	0	1372				0	1537	1372	1541	1618	0
Q Serve(g_s), s	1.4	0.0	3.4				0.0	0.6	1.2	2.7	1.4	0.0
Cycle Q Clear(g_c), s	1.4	0.0	3.4				0.0	0.6	1.2	2.7	1.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	665	0	296				0	529	236	638	768	0
V/C Ratio(X)	0.28	0.00	0.59				0.00	0.15	0.28	0.32	0.17	0.00
Avail Cap(c_a), veh/h	4398	0	1957				0	3118	1391	2291	3867	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	9.5	0.0	10.3				0.0	10.2	10.5	6.4	4.4	0.0
Incr Delay (d2), s/veh	0.2	0.0	1.9				0.0	0.1	0.6	0.3	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
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.8				0.0	0.1	0.2	0.4	0.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.7	0.0	12.2				0.0	10.4	11.1	6.7	4.5	0.0
LnGrp LOS	A	A	B				A	B	B	A	A	A
Approach Vol, veh/h	359						143			339		
Approach Delay, s/veh	10.9						10.7			5.8		
Approach LOS	B						B			A		
Timer - Assigned Phs	1	2		4			6					
Phs Duration (G+Y+Rc), s	8.8	9.5		10.8			18.3					
Change Period (Y+Rc), s	4.5	4.5		4.5			4.5					
Max Green Setting (Gmax), s	35.5	29.5		41.5			69.5					
Max Q Clear Time (g_c+I1), s	4.7	3.2		5.4			3.4					
Green Ext Time (p_c), s	0.6	0.6		1.3			0.7					







Intersection Summary

HCM 6th Ctrl Delay	8.8
HCM 6th LOS	A

Notes











User approved volume balancing among the lanes for turning movement.

Intersection						
Int Delay, s/veh	2.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	95	165	4	14	180
Future Vol, veh/h	28	95	165	4	14	180
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	100	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19
Mvmt Flow	33	112	194	5	16	212
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	438	194	0	0	199	0
Stage 1	194	-	-	-	-	-
Stage 2	244	-	-	-	-	-
Critical Hdwy	6.59	6.39	-	-	4.29	-
Critical Hdwy Stg 1	5.59	-	-	-	-	-
Critical Hdwy Stg 2	5.59	-	-	-	-	-
Follow-up Hdwy	3.671	3.471	-	-	2.371	-
Pot Cap-1 Maneuver	545	806	-	-	1278	-
Stage 1	800	-	-	-	-	-
Stage 2	758	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	538	806	-	-	1278	-
Mov Cap-2 Maneuver	538	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	748	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	10.6	0	0.6			
HCM LOS	B					
Minor Lane/Major Mvmt	NBT	NBRWBLn1WBLn2	SBL	SBT		
Capacity (veh/h)	-	- 538 806 1278	-	-		
HCM Lane V/C Ratio	-	- 0.061 0.139 0.013	-	-		
HCM Control Delay (s)	-	- 12.1 10.2 7.9	-	-		
HCM Lane LOS	-	- B B A	-	-		
HCM 95th %tile Q(veh)	-	- 0.2 0.5 0	-	-		

Intersection						
Int Delay, s/veh	7.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	13	362	81	59	302	3
Future Vol, veh/h	13	362	81	59	302	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19
Mvmt Flow	15	426	95	69	355	4
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	582	180	359	0	-	0
Stage 1	357	-	-	-	-	-
Stage 2	225	-	-	-	-	-
Critical Hdwy	7.18	7.28	4.48	-	-	-
Critical Hdwy Stg 1	6.18	-	-	-	-	-
Critical Hdwy Stg 2	6.18	-	-	-	-	-
Follow-up Hdwy	3.69	3.49	2.39	-	-	-
Pot Cap-1 Maneuver	406	781	1083	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	742	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	370	781	1083	-	-	-
Mov Cap-2 Maneuver	370	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	742	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	15		5		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL		NBT	EBLn1	EBLn2	SBT SBR
Capacity (veh/h)	1083		-	370	781	- -
HCM Lane V/C Ratio	0.088		-	0.041	0.545	- -
HCM Control Delay (s)	8.6		-	15.1	15	- -
HCM Lane LOS	A		-	C	C	- -
HCM 95th %tile Q(veh)	0.3		-	0.1	3.3	- -

Timings
20: Manila Rd & 32nd Ave

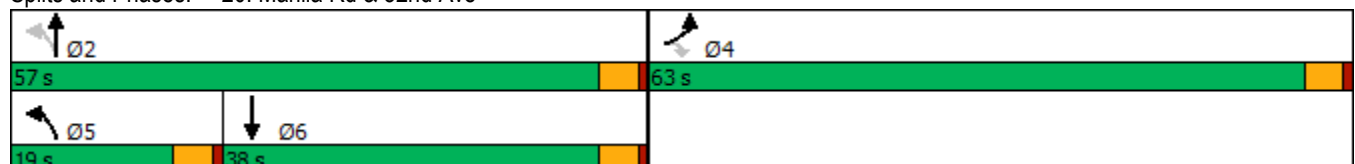
TransPort
11/12/2019

					
Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	13	362	81	59	302
Future Volume (vph)	13	362	81	59	302
Turn Type	Prot	Perm	pm+pt	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4	2		
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5
Total Split (s)	63.0	63.0	19.0	57.0	38.0
Total Split (%)	52.5%	52.5%	15.8%	47.5%	31.7%
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			Lead		Lag
Lead-Lag Optimize?			Yes		Yes
Recall Mode	None	None	None	Min	Min
Act Effect Green (s)	8.1	8.1	17.9	17.9	10.9
Actuated g/C Ratio	0.22	0.22	0.49	0.49	0.30
v/c Ratio	0.04	0.67	0.18	0.05	0.39
Control Delay	14.8	8.3	5.5	4.5	14.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	8.3	5.5	4.5	14.0
LOS	B	A	A	A	B
Approach Delay	8.5			5.1	14.0
Approach LOS	A			A	B

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 36.2
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 9.9
 Intersection LOS: A
 Intersection Capacity Utilization 38.4%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 20: Manila Rd & 32nd Ave














HCM 6th Signalized Intersection Summary

20: Manila Rd & 32nd Ave

TransPort
11/12/2019









Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	13	362	81	59	302	3
Future Volume (veh/h)	13	362	81	59	302	3
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	1618	1618	1618	1618	1618	1618
Adj Flow Rate, veh/h	15	426	95	69	355	4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	19	19	19	19	19	19
Cap, veh/h	572	509	398	1228	630	7
Arrive On Green	0.37	0.37	0.08	0.40	0.20	0.20
Sat Flow, veh/h	1541	1372	1541	3156	3195	35
Grp Volume(v), veh/h	15	426	95	69	175	184
Grp Sat Flow(s),veh/h/ln	1541	1372	1541	1537	1537	1612
Q Serve(g_s), s	0.2	11.1	1.7	0.5	4.0	4.0
Cycle Q Clear(g_c), s	0.2	11.1	1.7	0.5	4.0	4.0
Prop In Lane	1.00	1.00	1.00			0.02
Lane Grp Cap(c), veh/h	572	509	398	1228	311	326
V/C Ratio(X)	0.03	0.84	0.24	0.06	0.56	0.56
Avail Cap(c_a), veh/h	2299	2046	842	4117	1313	1377
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	7.8	11.2	9.7	7.2	14.1	14.1
Incr Delay (d2), s/veh	0.0	3.7	0.3	0.0	1.6	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.4	0.1	1.1	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.8	15.0	10.0	7.3	15.7	15.6
LnGrp LOS	A	B	B	A	B	B
Approach Vol, veh/h	441			164	359	
Approach Delay, s/veh	14.7			8.9	15.6	
Approach LOS	B			A	B	
Timer - Assigned Phs	2			4	5	6
Phs Duration (G+Y+Rc), s	20.2			19.1	7.7	12.4
Change Period (Y+Rc), s	4.5			4.5	4.5	4.5
Max Green Setting (Gmax), s	52.5			58.5	14.5	33.5
Max Q Clear Time (g_c+I1), s	2.5			13.1	3.7	6.0
Green Ext Time (p_c), s	0.4			1.6	0.1	1.9
Intersection Summary						
HCM 6th Ctrl Delay			14.1			
HCM 6th LOS			B			

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	30	134	20	97	123	5
Future Vol, veh/h	30	134	20	97	123	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	100	0	0	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19
Mvmt Flow	35	158	24	114	145	6
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	307	145	151	0	-	0
Stage 1	145	-	-	-	-	-
Stage 2	162	-	-	-	-	-
Critical Hdwy	6.59	6.39	4.29	-	-	-
Critical Hdwy Stg 1	5.59	-	-	-	-	-
Critical Hdwy Stg 2	5.59	-	-	-	-	-
Follow-up Hdwy	3.671	3.471	2.371	-	-	-
Pot Cap-1 Maneuver	651	859	1332	-	-	-
Stage 1	842	-	-	-	-	-
Stage 2	827	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	639	859	1332	-	-	-
Mov Cap-2 Maneuver	639	-	-	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	827	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.3	1.3		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1332	-	639	859	-	-
HCM Lane V/C Ratio	0.018	-	0.055	0.184	-	-
HCM Control Delay (s)	7.8	-	11	10.1	-	-
HCM Lane LOS	A	-	B	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	0.7	-	-

Intersection

Int Delay, s/veh 3.7

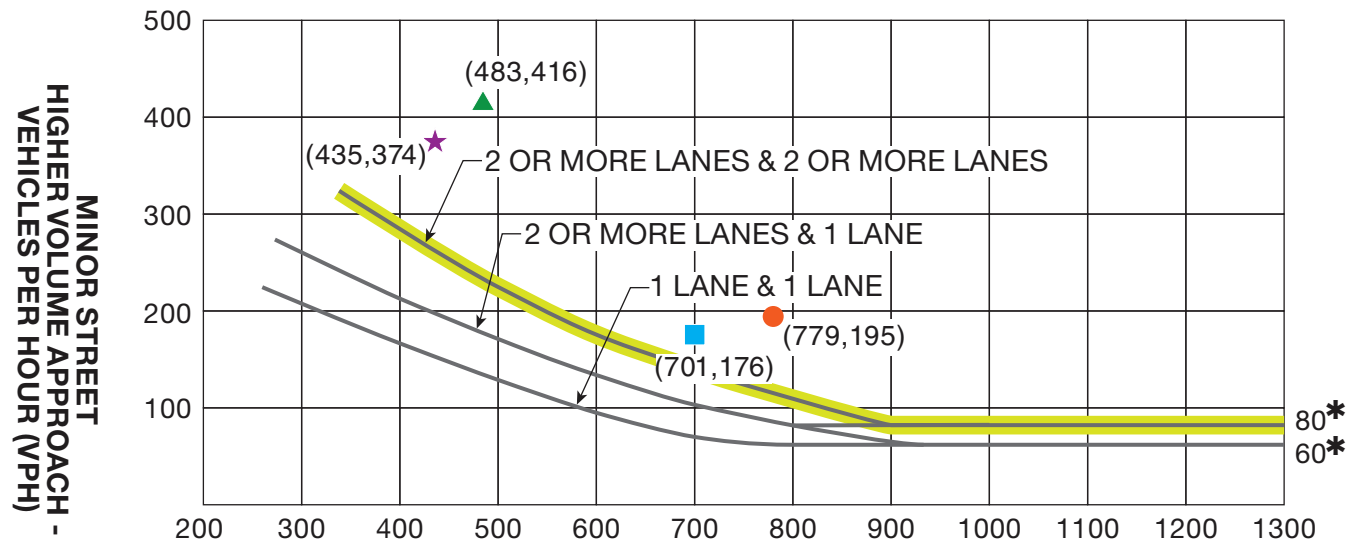
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	368	36	18	123	31
Future Vol, veh/h	5	368	36	18	123	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	100	0	100
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	19	19	19	19	19	19
Mvmt Flow	6	433	42	21	145	36

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	63	0	0 487 42
Stage 1	-	-	- 42 -
Stage 2	-	-	- 445 -
Critical Hdwy	4.29	-	- 6.59 6.39
Critical Hdwy Stg 1	-	-	- 5.59 -
Critical Hdwy Stg 2	-	-	- 5.59 -
Follow-up Hdwy	2.371	-	- 3.671 3.471
Pot Cap-1 Maneuver	1438	-	- 510 982
Stage 1	-	-	- 939 -
Stage 2	-	-	- 611 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1438	-	- 508 982
Mov Cap-2 Maneuver	-	-	- 508 -
Stage 1	-	-	- 935 -
Stage 2	-	-	- 611 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	13.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1438	-	-	-	508	982
HCM Lane V/C Ratio	0.004	-	-	-	0.285	0.037
HCM Control Delay (s)	7.5	-	-	-	14.9	8.8
HCM Lane LOS	A	-	-	-	B	A
HCM 95th %tile Q(veh)	0	-	-	-	1.2	0.1

APPENDIX H. SUBAREA 2 WARRANT GRAPHS

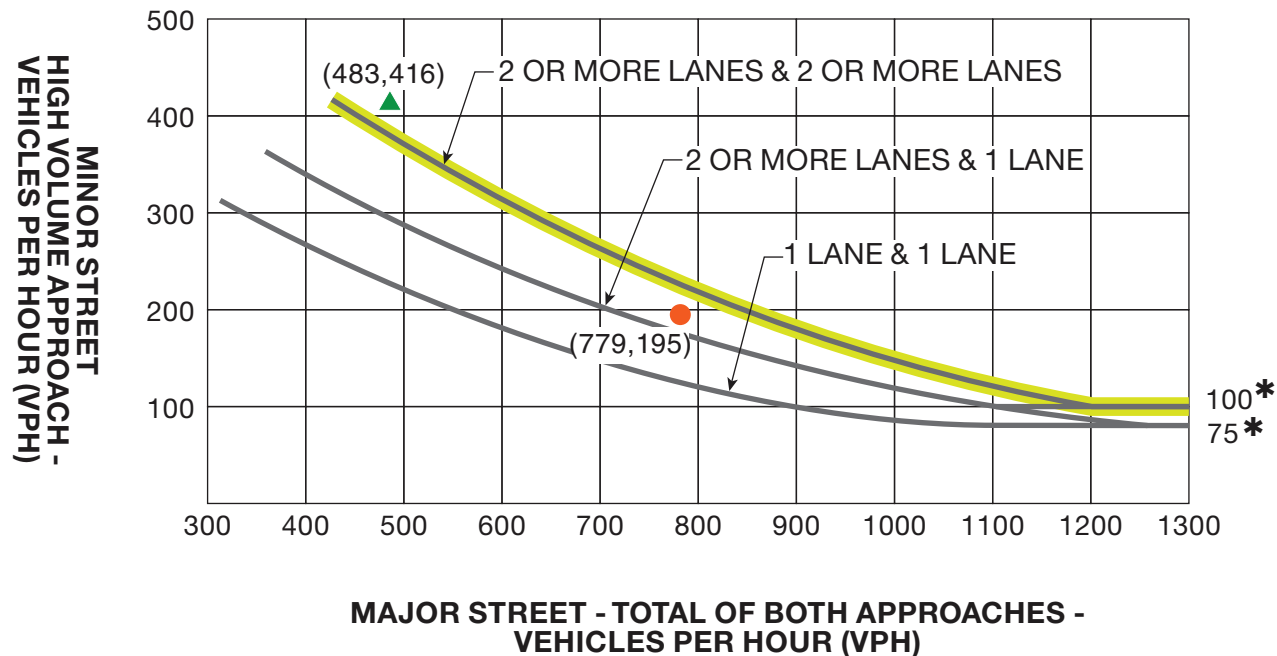


**MAJOR STREET - TOTAL OF BOTH APPROACHES -
VEHICLES PER HOUR (VPH)**

* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = AM
- = 90% AM
- ▲ = PM
- ★ = 90% PM

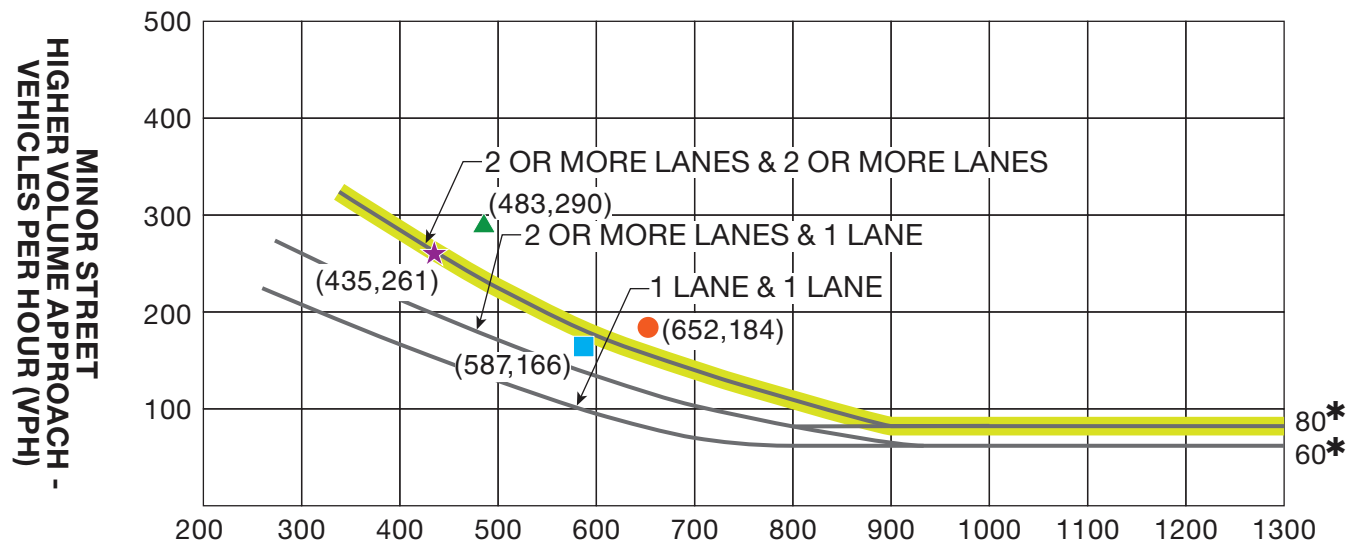


* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

● = Peak Hour AM

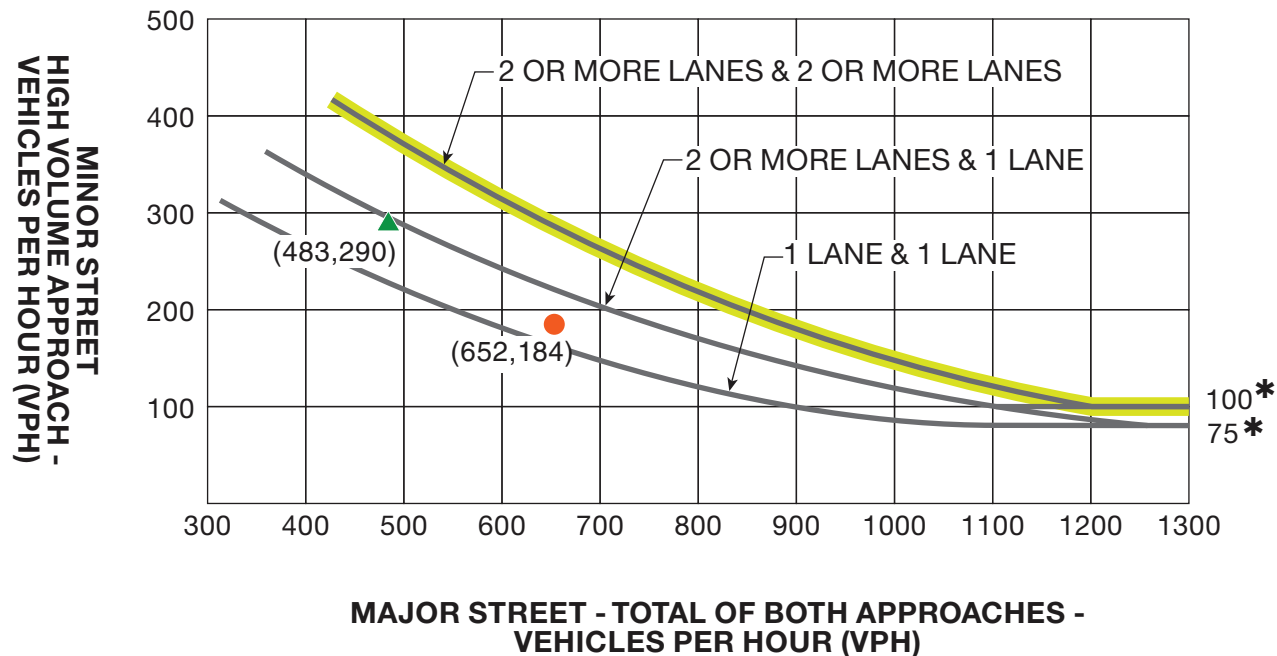
▲ = Peak Hour PM



* Note: 80 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor street approach with one lane.

LEGEND

- = AM
- = 90% AM
- ▲ = PM
- ★ = 90% PM



* Note: 100 vph applies as the lower threshold volume for a minor street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor street approach with one lane.




















LEGEND

- = Peak Hour AM
- ▲ = Peak Hour PM

APPENDIX I. ANALYSIS WORKSHEETS – SUBAREA 2

Timings 1: Imboden Rd & E 48th Ave

TransPort
11/08/2019

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	133	5	114	5	87	346	194	142
Future Volume (vph)	5	5	133	5	114	5	87	346	194	142
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		4	3	8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	4	4	3	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	23.0	23.0	21.0	44.0	44.0	12.0	54.0	54.0	22.0	64.0
Total Split (%)	19.2%	19.2%	17.5%	36.7%	36.7%	10.0%	45.0%	45.0%	18.3%	53.3%
Yellow Time (s)	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
Lost Time Adjust (s)		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
Lead/Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min
Act Effect Green (s)		6.9	11.5	11.1	11.1	16.5	10.0	10.0	25.7	26.3
Actuated g/C Ratio		0.16	0.27	0.26	0.26	0.38	0.23	0.23	0.59	0.61
v/c Ratio		0.07	0.39	0.01	0.29	0.01	0.27	0.64	0.33	0.17
Control Delay		20.5	18.3	14.4	5.5	8.0	19.6	8.1	8.1	9.5
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		20.5	18.3	14.4	5.5	8.0	19.6	8.1	8.1	9.5
LOS		C	B	B	A	A	B	A	A	A
Approach Delay		20.5		12.4			10.4			8.7
Approach LOS		C		B			B			A

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 43.3

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.64

Intersection Signal Delay: 10.5

Intersection LOS: B

Intersection Capacity Utilization 47.6%

ICU Level of Service A

Analysis Period (min) 15





















Splits and Phases: 1: Imboden Rd & E 48th Ave

 Ø1	 Ø2	 Ø3	 Ø4
22 s	54 s	21 s	23 s
 Ø5	 Ø6	 Ø7	 Ø8
12 s	64 s	44 s	

HCM 6th Signalized Intersection Summary







1: Imboden Rd & E 48th Ave

TransPort
11/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	5	133	5	114	5	87	346	194	142	5
Future Volume (veh/h)	5	5	5	133	5	114	5	87	346	194	142	5
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	1663	1663	1663	1663	1663	1663	1663	1663	1663	1663	1663	1663
Adj Flow Rate, veh/h	6	6	6	156	6	134	6	102	407	228	167	6
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	16	16	16	16	16	16	16	16	16	16	16	16
Cap, veh/h	113	58	41	482	469	397	515	567	481	568	731	26
Arrive On Green	0.08	0.08	0.08	0.11	0.28	0.28	0.01	0.34	0.34	0.12	0.46	0.46
Sat Flow, veh/h	277	682	479	1584	1663	1409	1584	1663	1409	1584	1595	57
Grp Volume(v), veh/h	18	0	0	156	6	134	6	102	407	228	0	173
Grp Sat Flow(s),veh/h/ln	1438	0	0	1584	1663	1409	1584	1663	1409	1584	0	1653
Q Serve(g_s), s	0.0	0.0	0.0	4.5	0.1	4.0	0.1	2.3	14.3	4.5	0.0	3.4
Cycle Q Clear(g_c), s	0.6	0.0	0.0	4.5	0.1	4.0	0.1	2.3	14.3	4.5	0.0	3.4
Prop In Lane	0.33		0.33	1.00		1.00	1.00		1.00	1.00		0.03
Lane Grp Cap(c), veh/h	211	0	0	482	469	397	515	567	481	568	0	757
V/C Ratio(X)	0.09	0.00	0.00	0.32	0.01	0.34	0.01	0.18	0.85	0.40	0.00	0.23
Avail Cap(c_a), veh/h	565	0	0	790	1227	1039	724	1537	1303	888	0	1836
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.7	0.0	0.0	17.4	13.9	15.3	11.4	12.4	16.3	8.0	0.0	8.8
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.4	0.0	0.5	0.0	0.2	4.2	0.5	0.0	0.2
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	0.2	0.0	0.0	1.4	0.0	1.1	0.0	0.6	4.1	1.0	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.9	0.0	0.0	17.8	13.9	15.8	11.4	12.5	20.6	8.4	0.0	8.9
LnGrp LOS	C	A	A	B	B	B	B	B	C	A	A	A
Approach Vol, veh/h	18			296			515			401		
Approach Delay, s/veh	22.9			16.8			18.9			8.6		
Approach LOS	C			B			B			A		
Timer - Assigned Phs	1	2	3	4	5	6	8					
Phs Duration (G+Y+Rc), s	11.2	22.8	10.6	9.0	4.9	29.0	19.6					
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5					
Max Green Setting (Gmax), s	17.5	49.5	16.5	18.5	7.5	59.5	39.5					
Max Q Clear Time (g_c+I1), s	6.5	16.3	6.5	2.6	2.1	5.4	6.0					
Green Ext Time (p_c), s	0.4	1.9	0.3	0.0	0.0	0.9	0.4					
Intersection Summary												
HCM 6th Ctrl Delay	15.1											
HCM 6th LOS	B											

Intersection

Int Delay, s/veh 9.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	437	45	130	40	25	317
Future Vol, veh/h	437	45	130	40	25	317
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	0	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16
Mvmt Flow	514	53	153	47	29	373

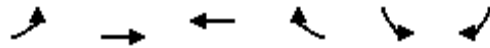
Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	200	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.26	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.344	-	-
Pot Cap-1 Maneuver	1293	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1293	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	8.7	0	15.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1293	-	-	-	110	858
HCM Lane V/C Ratio	0.398	-	-	-	0.267	0.435
HCM Control Delay (s)	9.6	-	-	-	49.3	12.4
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	1.9	-	-	-	1	2.2

Timings 2: E Colfax Ave & Imboden Rd

TransPort
11/08/2019



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	437	45	130	40	25	317
Future Volume (vph)	437	45	130	40	25	317
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	45.0	80.0	35.0	35.0	40.0	40.0
Total Split (%)	37.5%	66.7%	29.2%	29.2%	33.3%	33.3%
Yellow Time (s)	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
Lost Time Adjust (s)	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
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Min	Min	Min	None	None
Act Effect Green (s)	40.5	40.5	10.2	10.2	8.0	8.0
Actuated g/C Ratio	0.70	0.70	0.18	0.18	0.14	0.14
v/c Ratio	0.59	0.05	0.53	0.17	0.14	0.73
Control Delay	7.1	3.0	32.9	10.8	27.9	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	3.0	32.9	10.8	27.9	13.0
LOS	A	A	C	B	C	B
Approach Delay		6.7	27.7		14.0	
Approach LOS		A	C		B	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 58.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.73
Intersection Signal Delay: 12.8
Intersection LOS: B
Intersection Capacity Utilization 46.5%
ICU Level of Service A
Analysis Period (min) 15

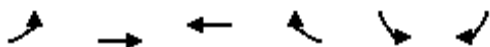
Splits and Phases: 2: E Colfax Ave & Imboden Rd






HCM 6th Signalized Intersection Summary

2: E Colfax Ave & Imboden Rd

TransPort
11/08/2019












Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	437	45	130	40	25	317
Future Volume (veh/h)	437	45	130	40	25	317
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	1663	1663	1663	1663	1663	1663
Adj Flow Rate, veh/h	514	53	153	47	29	373
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	16	16	16	16	16	16
Cap, veh/h	676	882	229	194	488	434
Arrive On Green	0.31	0.53	0.14	0.14	0.31	0.31
Sat Flow, veh/h	1584	1663	1663	1409	1584	1409
Grp Volume(v), veh/h	514	53	153	47	29	373
Grp Sat Flow(s),veh/h/ln	1584	1663	1663	1409	1584	1409
Q Serve(g_s), s	13.8	0.9	4.9	1.7	0.7	13.9
Cycle Q Clear(g_c), s	13.8	0.9	4.9	1.7	0.7	13.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	676	882	229	194	488	434
V/C Ratio(X)	0.76	0.06	0.67	0.24	0.06	0.86
Avail Cap(c_a), veh/h	1336	2257	912	773	1011	899
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.6	6.3	22.8	21.4	13.6	18.1
Incr Delay (d2), s/veh	1.8	0.0	3.3	0.6	0.1	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.2	1.8	0.5	0.2	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	13.4	6.4	26.1	22.0	13.6	23.2
LnGrp LOS	B	A	C	C	B	C
Approach Vol, veh/h		567	200		402	
Approach Delay, s/veh		12.7	25.1		22.5	
Approach LOS		B	C		C	
Timer - Assigned Phs			4		6	7
Phs Duration (G+Y+Rc), s			34.0		21.6	21.8
Change Period (Y+Rc), s			4.5		4.5	4.5
Max Green Setting (Gmax), s			75.5		35.5	40.5
Max Q Clear Time (g_c+I1), s			2.9		15.9	15.8
Green Ext Time (p_c), s			0.2		1.3	1.6
Green Ext Time (p_c), s					0.8	
Intersection Summary						
HCM 6th Ctrl Delay			18.2			
HCM 6th LOS			B			

Intersection						
Int Delay, s/veh	0.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	65	5	5	140	5	5
Future Vol, veh/h	65	5	5	140	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16
Mvmt Flow	76	6	6	165	6	6

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	82	0	256	79
Stage 1	-	-	-	-	79	-
Stage 2	-	-	-	-	177	-
Critical Hdwy	-	-	4.26	-	6.56	6.36
Critical Hdwy Stg 1	-	-	-	-	5.56	-
Critical Hdwy Stg 2	-	-	-	-	5.56	-
Follow-up Hdwy	-	-	2.344	-	3.644	3.444
Pot Cap-1 Maneuver	-	-	1431	-	703	944
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	821	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1431	-	699	944
Mov Cap-2 Maneuver	-	-	-	-	699	-
Stage 1	-	-	-	-	910	-
Stage 2	-	-	-	-	817	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	803	-	-	1431	-
HCM Lane V/C Ratio	0.015	-	-	0.004	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-








Intersection												
Int Delay, s/veh	19.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	50	5	40	90	27	10	369	10	13	175	5
Future Vol, veh/h	5	50	5	40	90	27	10	369	10	13	175	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	100	-	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	6	59	6	47	106	32	12	434	12	15	206	6
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	138	0	0	65	0	0	396	306	62	497	277	106
Stage 1	-	-	-	-	-	-	74	74	-	200	200	-
Stage 2	-	-	-	-	-	-	322	232	-	297	77	-
Critical Hdwy	4.26	-	-	4.26	-	-	7.26	6.66	6.36	7.26	6.66	6.36
Critical Hdwy Stg 1	-	-	-	-	-	-	6.26	5.66	-	6.26	5.66	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.26	5.66	-	6.26	5.66	-
Follow-up Hdwy	2.344	-	-	2.344	-	-	3.644	4.144	3.444	3.644	4.144	3.444
Pot Cap-1 Maneuver	1364	-	-	1452	-	-	540	585	965	461	608	911
Stage 1	-	-	-	-	-	-	902	807	-	771	710	-
Stage 2	-	-	-	-	-	-	661	687	-	682	804	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1364	-	-	1452	-	-	380	564	965	163	586	911
Mov Cap-2 Maneuver	-	-	-	-	-	-	380	564	-	163	586	-
Stage 1	-	-	-	-	-	-	898	804	-	768	687	-
Stage 2	-	-	-	-	-	-	445	665	-	309	801	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.6			1.9			31.9			15.4		
HCM LOS							D			C		
Minor Lane/Major Mvmt	NBLn1		NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2	
Capacity (veh/h)	557		965	1364	-	-	1452	-	-	163	592	
HCM Lane V/C Ratio	0.801		0.012	0.004	-	-	0.032	-	-	0.094	0.358	
HCM Control Delay (s)	32.5		8.8	7.7	-	-	7.6	-	-	29.4	14.4	
HCM Lane LOS	D		A	A	-	-	A	-	-	D	B	
HCM 95th %tile Q(veh)	7.7		0	0	-	-	0.1	-	-	0.3	1.6	

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↱	↰	↰	↱			↱	↰
Traffic Vol, veh/h	0	0	0	25	5	140	155	259	0	0	98	127
Future Vol, veh/h	0	0	0	25	5	140	155	259	0	0	98	127
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	0	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	0	0	0	29	6	165	182	305	0	0	115	149

Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	859	933	305	264	0	-	0
Stage 1	669	669	-	-	-	-	-
Stage 2	190	264	-	-	-	-	-
Critical Hdwy	6.56	6.66	6.36	4.26	-	-	-
Critical Hdwy Stg 1	5.56	5.66	-	-	-	-	-
Critical Hdwy Stg 2	5.56	5.66	-	-	-	-	-
Follow-up Hdwy	3.644	4.144	3.444	2.344	-	-	-
Pot Cap-1 Maneuver	309	252	703	1223	-	0	-
Stage 1	484	435	-	-	0	0	-
Stage 2	810	665	-	-	0	0	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	263	0	703	1223	-	-	-
Mov Cap-2 Maneuver	263	0	-	-	-	-	-
Stage 1	412	0	-	-	-	-	-
Stage 2	810	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		3.2	0
HCM LOS	-		





Minor Lane/Major Mvmt	NBL	NBTWBLn1WBLn2WBLn3	SBT	SBR
Capacity (veh/h)	1223	- 263	- 703	-
HCM Lane V/C Ratio	0.149	- 0.112	- 0.234	-
HCM Control Delay (s)	8.5	- 20.4	- 11.7	-
HCM Lane LOS	A	- C	- B	-
HCM 95th %tile Q(veh)	0.5	- 0.4	- 0.9	-

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	214	5	40	0	0	0	0	200	50	67	61	0
Future Vol, veh/h	214	5	40	0	0	0	0	200	50	67	61	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	0	0	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16	16	16	16	16	16	16
Mvmt Flow	252	6	47	0	0	0	0	235	59	79	72	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	495	524	72	-	0	0	294	0	0
Stage 1	230	230	-	-	-	-	-	-	-
Stage 2	265	294	-	-	-	-	-	-	-
Critical Hdwy	6.56	6.66	6.36	-	-	-	4.26	-	-
Critical Hdwy Stg 1	5.56	5.66	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.56	5.66	-	-	-	-	-	-	-
Follow-up Hdwy	3.644	4.144	3.444	-	-	-	2.344	-	-
Pot Cap-1 Maneuver	510	439	953	0	-	-	1192	-	0
Stage 1	776	689	-	0	-	-	-	-	0
Stage 2	748	645	-	0	-	-	-	-	0
Platoon blocked, %				-	-	-	-	-	-
Mov Cap-1 Maneuver	476	0	953	-	-	-	1192	-	-
Mov Cap-2 Maneuver	476	0	-	-	-	-	-	-	-
Stage 1	776	0	-	-	-	-	-	-	-
Stage 2	699	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s		0	4.3
HCM LOS	-		






Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	EBLn3	SBL	SBT
Capacity (veh/h)	-	-	476	-	953	1192	-
HCM Lane V/C Ratio	-	-	0.529	-	0.049	0.066	-
HCM Control Delay (s)	-	-	20.7	-	9	8.2	-
HCM Lane LOS	-	-	C	-	A	A	-
HCM 95th %tile Q(veh)	-	-	3	-	0.2	0.2	-

Intersection						
Int Delay, s/veh	0.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	5	431	46	5	320
Future Vol, veh/h	22	5	431	46	5	320
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16
Mvmt Flow	26	6	507	54	6	376

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	895	507	0	0	561	0
Stage 1	507	-	-	-	-	-
Stage 2	388	-	-	-	-	-
Critical Hdwy	6.56	6.36	-	-	4.26	-
Critical Hdwy Stg 1	5.56	-	-	-	-	-
Critical Hdwy Stg 2	5.56	-	-	-	-	-
Follow-up Hdwy	3.644	3.444	-	-	2.344	-
Pot Cap-1 Maneuver	294	539	-	-	944	-
Stage 1	577	-	-	-	-	-
Stage 2	656	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	292	539	-	-	944	-
Mov Cap-2 Maneuver	292	-	-	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	651	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.5	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	319	944
HCM Lane V/C Ratio	-	-	0.1	0.006
HCM Control Delay (s)	-	-	17.5	8.8
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.3	0

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	50	102	299	143	5
Future Vol, veh/h	5	50	102	299	143	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16
Mvmt Flow	6	59	120	352	168	6
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	763	171	174	0	-	0
Stage 1	171	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Critical Hdwy	6.56	6.36	4.26	-	-	-
Critical Hdwy Stg 1	5.56	-	-	-	-	-
Critical Hdwy Stg 2	5.56	-	-	-	-	-
Follow-up Hdwy	3.644	3.444	2.344	-	-	-
Pot Cap-1 Maneuver	353	838	1322	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	526	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	321	838	1322	-	-	-
Mov Cap-2 Maneuver	321	-	-	-	-	-
Stage 1	751	-	-	-	-	-
Stage 2	526	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	10.4	2		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1322	-	731	-	-	
HCM Lane V/C Ratio	0.091	-	0.089	-	-	
HCM Control Delay (s)	8	-	10.4	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0.3	-	0.3	-	-	

Intersection







Int Delay, s/veh 1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	214	54	26	254	27	13
Future Vol, veh/h	214	54	26	254	27	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	0	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16
Mvmt Flow	252	64	31	299	32	15

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	316
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.26
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.344
Pot Cap-1 Maneuver	-	-	1169
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1169
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-




















Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	422	754	-	-	1169	-
HCM Lane V/C Ratio	0.075	0.02	-	-	0.026	-
HCM Control Delay (s)	14.2	9.9	-	-	8.2	-
HCM Lane LOS	B	A	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.1	-	-	0.1	-

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	46	5	5	102	50	22
Future Vol, veh/h	46	5	5	102	50	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	16	16	16	16	16	16
Mvmt Flow	54	6	6	120	59	26
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	126	0	-	0	120	6
Stage 1	-	-	-	-	6	-
Stage 2	-	-	-	-	114	-
Critical Hdwy	4.26	-	-	-	6.56	6.36
Critical Hdwy Stg 1	-	-	-	-	5.56	-
Critical Hdwy Stg 2	-	-	-	-	5.56	-
Follow-up Hdwy	2.344	-	-	-	3.644	3.444
Pot Cap-1 Maneuver	1378	-	-	-	843	1037
Stage 1	-	-	-	-	982	-
Stage 2	-	-	-	-	877	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1378	-	-	-	810	1037
Mov Cap-2 Maneuver	-	-	-	-	810	-
Stage 1	-	-	-	-	944	-
Stage 2	-	-	-	-	877	-
Approach	EB	WB		SB		
HCM Control Delay, s	7	0		9.4		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1378	-	-	-	810	1037
HCM Lane V/C Ratio	0.039	-	-	-	0.073	0.025
HCM Control Delay (s)	7.7	-	-	-	9.8	8.6
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2	0.1

Timings 1: Imboden Rd & E 48th Ave

TransPort
11/08/2019

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	5	5	311	5	199	5	126	113	102	132
Future Volume (vph)	5	5	311	5	199	5	126	113	102	132
Turn Type	Perm	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA
Protected Phases		4	3	8		5	2		1	6
Permitted Phases	4		8		8	2		2	6	
Detector Phase	4	4	3	8	8	5	2	2	1	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	24.0	24.0	43.0	67.0	67.0	12.0	34.0	34.0	19.0	41.0
Total Split (%)	20.0%	20.0%	35.8%	55.8%	55.8%	10.0%	28.3%	28.3%	15.8%	34.2%
Yellow Time (s)	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
Lost Time Adjust (s)		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
Lead/Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	Min	Min	None	Min
Act Effect Green (s)		7.0	17.6	17.6	17.6	15.8	11.4	11.4	21.4	20.1
Actuated g/C Ratio		0.14	0.35	0.35	0.35	0.32	0.23	0.23	0.43	0.41
v/c Ratio		0.08	0.67	0.01	0.36	0.01	0.39	0.31	0.24	0.24
Control Delay		23.9	21.2	11.8	3.8	11.4	24.4	7.3	11.5	14.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		23.9	21.2	11.8	3.8	11.4	24.4	7.3	11.5	14.1
LOS		C	C	B	A	B	C	A	B	B
Approach Delay		23.9		14.4			16.2			13.0
Approach LOS		C		B			B			B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 49.6

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 14.6









Intersection LOS: B

Intersection Capacity Utilization 47.4%

ICU Level of Service A

Analysis Period (min) 15























Splits and Phases: 1: Imboden Rd & E 48th Ave







			
Ø1	Ø2	Ø3	Ø4
19 s	34 s	43 s	24 s
			
Ø5	Ø6	Ø8	
12 s	41 s	67 s	

HCM 6th Signalized Intersection Summary

1: Imboden Rd & E 48th Ave

TransPort
11/08/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	5	5	311	5	199	5	126	113	102	132	5
Future Volume (veh/h)	5	5	5	311	5	199	5	126	113	102	132	5
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	1678	1678	1678	1678	1678	1678	1678	1678	1678	1678	1678	1678
Adj Flow Rate, veh/h	6	6	6	366	6	234	6	148	133	120	155	6
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	15	15	15	15	15	15	15	15	15	15	15	15
Cap, veh/h	135	76	51	765	762	646	342	262	222	373	377	15
Arrive On Green	0.11	0.11	0.11	0.25	0.45	0.45	0.01	0.16	0.16	0.09	0.23	0.23
Sat Flow, veh/h	251	703	477	1598	1678	1422	1598	1678	1422	1598	1604	62
Grp Volume(v), veh/h	18	0	0	366	6	234	6	148	133	120	0	161
Grp Sat Flow(s),veh/h/ln	1431	0	0	1598	1678	1422	1598	1678	1422	1598	0	1667
Q Serve(g_s), s	0.0	0.0	0.0	8.0	0.1	4.8	0.1	3.6	3.9	2.7	0.0	3.6
Cycle Q Clear(g_c), s	0.5	0.0	0.0	8.0	0.1	4.8	0.1	3.6	3.9	2.7	0.0	3.6
Prop In Lane	0.33		0.33	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	262	0	0	765	762	646	342	262	222	373	0	391
V/C Ratio(X)	0.07	0.00	0.00	0.48	0.01	0.36	0.02	0.57	0.60	0.32	0.00	0.41
Avail Cap(c_a), veh/h	697	0	0	1753	2353	1994	599	1111	941	755	0	1365
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.9	0.0	0.0	10.5	6.7	7.9	15.6	17.4	17.5	13.3	0.0	14.4
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.5	0.0	0.3	0.0	1.9	2.6	0.5	0.0	0.7
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	0.2	0.0	0.0	1.9	0.0	0.9	0.0	1.2	1.2	0.7	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.1	0.0	0.0	10.9	6.7	8.3	15.7	19.3	20.1	13.8	0.0	15.1
LnGrp LOS	B	A	A	B	A	A	B	B	C	B	A	B
Approach Vol, veh/h		18			606			287			281	
Approach Delay, s/veh		18.1			9.9			19.6			14.6	
Approach LOS		B			A			B			B	
Timer - Assigned Phs	1	2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s	8.4	11.4	15.4	9.3	4.9	15.0		24.7				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	14.5	29.5	38.5	19.5	7.5	36.5		62.5				
Max Q Clear Time (g_c+I1), s	4.7	5.9	10.0	2.5	2.1	5.6		6.8				
Green Ext Time (p_c), s	0.2	1.1	1.1	0.0	0.0	0.7		0.8				
Intersection Summary												
HCM 6th Ctrl Delay				13.4								
HCM 6th LOS				B								

Intersection						
Int Delay, s/veh	9.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	263	125	65	30	60	459
Future Vol, veh/h	263	125	65	30	60	459
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	309	147	76	35	71	540

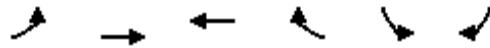
Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	111	0	0 841 76
Stage 1	-	-	- 76 -
Stage 2	-	-	- 765 -
Critical Hdwy	4.25	-	- 6.55 6.35
Critical Hdwy Stg 1	-	-	- 5.55 -
Critical Hdwy Stg 2	-	-	- 5.55 -
Follow-up Hdwy	2.335	-	- 3.635 3.435
Pot Cap-1 Maneuver	1402	-	- 318 950
Stage 1	-	-	- 915 -
Stage 2	-	-	- 437 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1402	-	- 248 950
Mov Cap-2 Maneuver	-	-	- 248 -
Stage 1	-	-	- 714 -
Stage 2	-	-	- 437 -

Approach	EB	WB	SB
HCM Control Delay, s	5.6	0	15
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1402	-	-	-	248	950
HCM Lane V/C Ratio	0.221	-	-	-	0.285	0.568
HCM Control Delay (s)	8.3	-	-	-	25.2	13.7
HCM Lane LOS	A	-	-	-	D	B
HCM 95th %tile Q(veh)	0.8	-	-	-	1.1	3.7

Timings 2: E Colfax Ave & Imboden Rd

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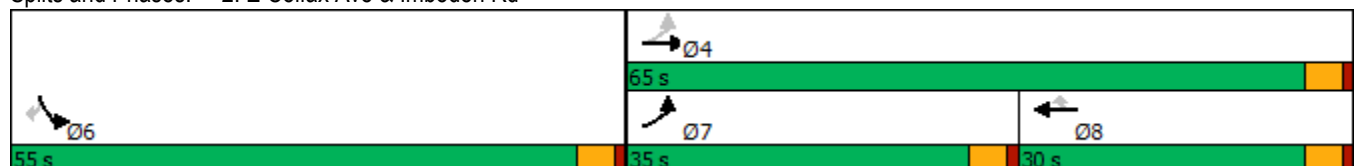


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	263	125	65	30	60	459
Future Volume (vph)	263	125	65	30	60	459
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	35.0	65.0	30.0	30.0	55.0	55.0
Total Split (%)	29.2%	54.2%	25.0%	25.0%	45.8%	45.8%
Yellow Time (s)	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
Lost Time Adjust (s)	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
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Recall Mode	None	Min	Min	Min	None	None
Act Effect Green (s)	27.5	27.5	7.6	7.6	8.8	8.8
Actuated g/C Ratio	0.60	0.60	0.17	0.17	0.19	0.19
v/c Ratio	0.43	0.15	0.28	0.13	0.24	0.77
Control Delay	7.0	4.9	22.9	10.5	19.5	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	4.9	22.9	10.5	19.5	10.6
LOS	A	A	C	B	B	B
Approach Delay		6.3	19.0		11.6	
Approach LOS		A	B		B	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 45.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 10.2
Intersection LOS: B
Intersection Capacity Utilization 40.1%
ICU Level of Service A
Analysis Period (min) 15

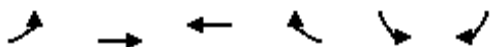
Splits and Phases: 2: E Colfax Ave & Imboden Rd












HCM 6th Signalized Intersection Summary

2: E Colfax Ave & Imboden Rd

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Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations							
Traffic Volume (veh/h)	263	125	65	30	60	459	
Future Volume (veh/h)	263	125	65	30	60	459	
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	1678	1678	1678	1678	1678	1678	
Adj Flow Rate, veh/h	309	147	76	35	71	540	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	
Percent Heavy Veh, %	15	15	15	15	15	15	
Cap, veh/h	537	661	163	138	689	613	
Arrive On Green	0.21	0.39	0.10	0.10	0.43	0.43	
Sat Flow, veh/h	1598	1678	1678	1422	1598	1422	
Grp Volume(v), veh/h	309	147	76	35	71	540	
Grp Sat Flow(s),veh/h/ln	1598	1678	1678	1422	1598	1422	
Q Serve(g_s), s	8.1	3.0	2.2	1.2	1.4	17.9	
Cycle Q Clear(g_c), s	8.1	3.0	2.2	1.2	1.4	17.9	
Prop In Lane	1.00			1.00	1.00	1.00	
Lane Grp Cap(c), veh/h	537	661	163	138	689	613	
V/C Ratio(X)	0.58	0.22	0.47	0.25	0.10	0.88	
Avail Cap(c_a), veh/h	1149	1972	831	704	1567	1395	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	
Uniform Delay (d), s/veh	13.9	10.4	22.0	21.5	8.7	13.4	
Incr Delay (d2), s/veh	1.0	0.2	2.1	1.0	0.1	4.3	
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	
%ile BackOfQ(50%),veh/ln	2.2	0.8	0.8	0.4	0.4	12.8	
Unsig. Movement Delay, s/veh							
LnGrp Delay(d),s/veh	14.9	10.5	24.0	22.5	8.8	17.7	
LnGrp LOS	B	B	C	C	A	B	
Approach Vol, veh/h		456	111		611		
Approach Delay, s/veh		13.5	23.5		16.7		
Approach LOS		B	C		B		
Timer - Assigned Phs				4	6	7	8
Phs Duration (G+Y+Rc), s				24.8	26.7	15.3	9.5
Change Period (Y+Rc), s				4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s				60.5	50.5	30.5	25.5
Max Q Clear Time (g_c+l1), s				5.0	19.9	10.1	4.2
Green Ext Time (p_c), s				0.7	2.3	0.8	0.4
Intersection Summary							
HCM 6th Ctrl Delay			16.1				
HCM 6th LOS			B				

Intersection						
Int Delay, s/veh	0.5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	165	10	5	85	5	5
Future Vol, veh/h	165	10	5	85	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	194	12	6	100	6	6

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	206	0	312	200
Stage 1	-	-	-	-	200	-
Stage 2	-	-	-	-	112	-
Critical Hdwy	-	-	4.25	-	6.55	6.35
Critical Hdwy Stg 1	-	-	-	-	5.55	-
Critical Hdwy Stg 2	-	-	-	-	5.55	-
Follow-up Hdwy	-	-	2.335	-	3.635	3.435
Pot Cap-1 Maneuver	-	-	1291	-	654	809
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	881	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1291	-	651	809
Mov Cap-2 Maneuver	-	-	-	-	651	-
Stage 1	-	-	-	-	804	-
Stage 2	-	-	-	-	877	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	10.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	721	-	-	1291	-
HCM Lane V/C Ratio	0.016	-	-	0.005	-
HCM Control Delay (s)	10.1	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-









Intersection												
Int Delay, s/veh	17.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	140	25	20	65	11	10	145	40	28	369	5
Future Vol, veh/h	5	140	25	20	65	11	10	145	40	28	369	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	100	-	-	0	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	6	165	29	24	76	13	12	171	47	33	434	6
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	89	0	0	194	0	0	543	329	180	425	330	76
Stage 1	-	-	-	-	-	-	192	192	-	124	124	-
Stage 2	-	-	-	-	-	-	351	137	-	301	206	-
Critical Hdwy	4.25	-	-	4.25	-	-	7.25	6.65	6.35	7.25	6.65	6.35
Critical Hdwy Stg 1	-	-	-	-	-	-	6.25	5.65	-	6.25	5.65	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.25	5.65	-	6.25	5.65	-
Follow-up Hdwy	2.335	-	-	2.335	-	-	3.635	4.135	3.435	3.635	4.135	3.435
Pot Cap-1 Maneuver	1428	-	-	1305	-	-	431	569	830	518	569	950
Stage 1	-	-	-	-	-	-	781	718	-	850	769	-
Stage 2	-	-	-	-	-	-	639	759	-	681	708	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1428	-	-	1305	-	-	150	556	830	367	556	950
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	556	-	367	556	-
Stage 1	-	-	-	-	-	-	778	715	-	847	755	-
Stage 2	-	-	-	-	-	-	265	745	-	487	705	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			1.6			15.7			30.1		
HCM LOS							C			D		
Minor Lane/Major Mvmt	NBLn1 NBLn2		EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2		
Capacity (veh/h)	473	830	1428	-	-	1305	-	-	367	559		
HCM Lane V/C Ratio	0.386	0.057	0.004	-	-	0.018	-	-	0.09	0.787		
HCM Control Delay (s)	17.3	9.6	7.5	-	-	7.8	-	-	15.8	31.2		
HCM Lane LOS	C	A	A	-	-	A	-	-	C	D		
HCM 95th %tile Q(veh)	1.8	0.2	0	-	-	0.1	-	-	0.3	7.4		





Intersection												
Int Delay, s/veh	0.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↱	↰	↰	↱			↱	↰
Traffic Vol, veh/h	0	0	0	40	5	61	55	159	0	0	213	206
Future Vol, veh/h	0	0	0	40	5	61	55	159	0	0	213	206
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	0	0	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15
Mvmt Flow	0	0	0	47	6	72	65	187	0	0	251	242






Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	689	810	187	493	0	-	0
Stage 1	317	317	-	-	-	-	-
Stage 2	372	493	-	-	-	-	-
Critical Hdwy	6.55	6.65	6.35	4.25	-	-	-
Critical Hdwy Stg 1	5.55	5.65	-	-	-	-	-
Critical Hdwy Stg 2	5.55	5.65	-	-	-	-	-
Follow-up Hdwy	3.635	4.135	3.435	2.335	-	-	-
Pot Cap-1 Maneuver	392	300	823	1007	-	0	-
Stage 1	710	632	-	-	-	0	-
Stage 2	669	526	-	-	-	0	-
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	367	0	823	1007	-	-	-
Mov Cap-2 Maneuver	367	0	-	-	-	-	-
Stage 1	664	0	-	-	-	-	-
Stage 2	669	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		2.3	0
HCM LOS	-		

Minor Lane/Major Mvmt	NBL	NBTWBLn1WBLn2WBLn3	SBT	SBR
Capacity (veh/h)	1007	- 367 - 823	-	-
HCM Lane V/C Ratio	0.064	- 0.128 - 0.087	-	-
HCM Control Delay (s)	8.8	- 16.2 - 9.8	-	-
HCM Lane LOS	A	- C - A	-	-
HCM 95th %tile Q(veh)	0.2	- 0.4 - 0.3	-	-

Intersection													
Int Delay, s/veh	1.8												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Vol, veh/h	136	5	150	0	0	0	0	73	55	148	105	0	
Future Vol, veh/h	136	5	150	0	0	0	0	73	55	148	105	0	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	0	-	0	-	-	-	-	-	0	0	-	-	
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85	
Heavy Vehicles, %	15	15	15	15	15	15	15	15	15	15	15	15	
Mvmt Flow	160	6	176	0	0	0	0	86	65	174	124	0	
Major/Minor	Minor2						Major1			Major2			
Conflicting Flow All	591	623	124				-	0	0	151	0	0	
Stage 1	472	472	-				-	-	-	-	-	-	
Stage 2	119	151	-				-	-	-	-	-	-	
Critical Hdwy	6.55	6.65	6.35				-	-	-	4.25	-	-	
Critical Hdwy Stg 1	5.55	5.65	-				-	-	-	-	-	-	
Critical Hdwy Stg 2	5.55	5.65	-				-	-	-	-	-	-	
Follow-up Hdwy	3.635	4.135	3.435				-	-	-	2.335	-	-	
Pot Cap-1 Maneuver	449	386	893				0	-	-	1354	-	0	
Stage 1	601	538	-				0	-	-	-	-	0	
Stage 2	875	748	-				0	-	-	-	-	0	
Platoon blocked, %								-	-				-
Mov Cap-1 Maneuver	391	0	893				-	-	-	1354	-	-	
Mov Cap-2 Maneuver	391	0	-				-	-	-	-	-	-	
Stage 1	601	0	-				-	-	-	-	-	-	
Stage 2	762	0	-				-	-	-	-	-	-	
Approach	EB						NB			SB			
HCM Control Delay, s							0			4.7			
HCM LOS	-												
Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	EBLn3	SBL	SBT						
Capacity (veh/h)	-	-	391	-	893	1354	-						
HCM Lane V/C Ratio	-	-	0.409	-	0.198	0.129	-						
HCM Control Delay (s)	-	-	20.4	-	10	8.1	-						
HCM Lane LOS	-	-	C	-	B	A	-						
HCM 95th %tile Q(veh)	-	-	1.9	-	0.7	0.4	-						





Intersection						
Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	46	5	274	19	5	473
Future Vol, veh/h	46	5	274	19	5	473
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	100	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	54	6	322	22	6	556
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	890	322	0	0	344	0
Stage 1	322	-	-	-	-	-
Stage 2	568	-	-	-	-	-
Critical Hdwy	6.55	6.35	-	-	4.25	-
Critical Hdwy Stg 1	5.55	-	-	-	-	-
Critical Hdwy Stg 2	5.55	-	-	-	-	-
Follow-up Hdwy	3.635	3.435	-	-	2.335	-
Pot Cap-1 Maneuver	297	690	-	-	1146	-
Stage 1	706	-	-	-	-	-
Stage 2	542	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	295	690	-	-	1146	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	706	-	-	-	-	-
Stage 2	538	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	19.2	0		0.1		
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	-	313	1146	-	
HCM Lane V/C Ratio	-	-	0.192	0.005	-	
HCM Control Delay (s)	-	-	19.2	8.2	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0.7	0	-	

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	5	40	121	300	5
Future Vol, veh/h	0	5	40	121	300	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	0	6	47	142	353	6

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	592	356	359	0	-	0
Stage 1	356	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.55	6.35	4.25	-	-	-
Critical Hdwy Stg 1	5.55	-	-	-	-	-
Critical Hdwy Stg 2	5.55	-	-	-	-	-
Follow-up Hdwy	3.635	3.435	2.335	-	-	-
Pot Cap-1 Maneuver	448	660	1131	-	-	-
Stage 1	681	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	429	660	1131	-	-	-
Mov Cap-2 Maneuver	429	-	-	-	-	-
Stage 1	652	-	-	-	-	-
Stage 2	774	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.5	2.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1131	-	660	-	-
HCM Lane V/C Ratio	0.042	-	0.009	-	-
HCM Control Delay (s)	8.3	-	10.5	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0	-	-

Intersection						
Int Delay, s/veh	2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	264	21	10	185	56	26
Future Vol, veh/h	264	21	10	185	56	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	311	25	12	218	66	31







Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	336
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.25
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.335
Pot Cap-1 Maneuver	-	-	1154
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1154
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	13
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	458	688	-	-	1154	-
HCM Lane V/C Ratio	0.144	0.044	-	-	0.01	-
HCM Control Delay (s)	14.2	10.5	-	-	8.2	0
HCM Lane LOS	B	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	0.1	-	-	0	-

Intersection

Int Delay, s/veh 7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	5	5	40	102	46
Future Vol, veh/h	19	5	5	40	102	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	0	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	15	15	15	15	15	15
Mvmt Flow	22	6	6	47	120	54

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	53	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.25	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.335	-	-
Pot Cap-1 Maneuver	1473	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1473	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	5.9	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1473	-	-	-	906	1040
HCM Lane V/C Ratio	0.015	-	-	-	0.132	0.052
HCM Control Delay (s)	7.5	-	-	-	9.6	8.7
HCM Lane LOS	A	-	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5	0.2