Traffic Impact Study

QuikTrip 4207
Commerce City, Colorado

Prepared for:

QuikTrip Corporation

Kimley»Horn

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

QuikTrip 4207 Commerce City

Commerce City, Colorado

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1.0 EXECUTIVE SUMMARY

The QuikTrip 4207 project is expected to contain a gas station with convenience market. The project is proposed to be located on the southwest corner of the 81st Avenue and Tower Road intersection in Commerce City, Colorado. The gas station is anticipated to provide 18 passenger vehicle fueling positions, five (5) heavy vehicle/truck fueling positions, and a convenience market with approximately 7,300 square feet of building space. It is expected that the project will be completed in 2022; therefore, analysis was completed for the 2022 short term and 2040 long term horizons.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts. The intersection of 81st Avenue and Tower Road was incorporated into this traffic study in accordance with the City of Commerce City standards and requirements. In addition, two proposed project accesses along 81st Avenue and two proposed project accesses along Tower Road were also evaluated.

Regional access to the project will be provided by Interstate 70 (I-70) and E-470 while primary access will be provided by Tower Road. Direct access to the site will be provided by four driveways, two each along 81st Avenue and Tower Road. The proposed west access along the south side of 81st Avenue will only allow right turn exiting movements. The proposed east access along the south side of 81st Avenue will align with an existing full movement access located for a property on the north side of 81st Avenue and will allow full turning movements. The north access along the west side of Tower Road is proposed to allow only right turn entering movements while the south access proposes three-quarter turning movements (left out restricted).

QuikTrip 4207 is expected to generate approximately 4,724 weekday driveway trips, with 287 of these trips occurring during the morning peak hour and 322 trips occurring during the afternoon peak hour. Accounting for pass-by, expected net new trips (non pass-by) to the surrounding street network results in approximately 2,078 new weekday daily trips, of which 109 and 142 new trips are anticipated during the weekday morning and afternoon peak hours, respectively.

Distribution of project traffic on the street system was based on the area street system characteristics, existing traffic patterns and volumes, demographic information, and the proposed access system for the project. Assignment of project traffic was based upon the trip generation described previously and the distributions developed.

Based on the analysis presented in this report, Kimley-Horn believes the QuikTrip 4207 Commerce City project will be successfully incorporated into the existing and future roadway network. The proposed project development resulted in the following recommendations and conclusions:

2022 Buildout Improvement Recommendations

- With completion of the QuikTrip 4207 Commerce City project, the site is recommended to have two accesses along the south side of 81st Avenue and two accesses along the west side of Tower Road. The west project access along 81st Avenue will allow for right turn exiting movements only and is requested to allow for improved onsite circulation with the truck fueling positions proposed on the west side of the site. The east access along 81st Avenue will allow full turning movements and align with an existing full movement access located on the north side of 81st Avenue. The north access along Tower Road will be restricted to allow for right turn entrance movements only. This access is beneficial to reduce the amount of westbound left turning traffic entering the site from the full movement access proposed along 81st Avenue. With the compressed distance of 225 feet along 81st Avenue between Tower Road and the full movement access, this reduction in westbound left turning traffic will provide a street network benefit. The south access along Tower Road will be a three-quarter access with restriction of exiting eastbound left turn movements. The three project access drives that will allow exiting movements are recommended to have R1-1 "STOP" signs installed for the exiting approaches. A single exiting lane should be sufficient for the two project driveways along 81st Avenue and the three-quarter access along Tower Road.

- A R3-2 No Left Turn Sign should be installed underneath the "STOP" sign of the west access along 81st Avenue to identify the restriction to right turn exiting movements only from the driveway. To restrict entrance movements as well, a R3-1 No Right Turn sign should be installed facing drivers traveling eastbound along 81st Street as well as a R3-2 No Left Turn

sign facing westbound drivers along 81st Street. Further, the curb returns at the west access are proposed to be channelized to restrict entering movements and force exiting vehicles to right turn movements only.

- To provide additional support to restrict the north access along Tower Road to right-in movements only, it is recommended the curb be constructed to channelize traffic entering so that it is obvious to the driver onsite that it is an entrance only access to restrict exiting movements. Likewise, R5-1 DO NOT ENTER signs shall be installed internal to the site at the access, with the signs facing west internal to the site.

- To provide additional support to restrict the south access along Tower Road to three-quarter movements, it is recommended that a R3-2 No Left Turn sign be placed underneath the STOP sign at this access. Likewise, R6-1(R) "ONE WAY" signs should be installed within the raised median of Tower Road, visible to drivers exiting the project site.

- A northbound left turn lane has already been constructed for the future Tower Road South Access alignment with a length of 325 feet. This left turn lane will just need to be designated with pavement legend turn arrows.

- To meet City of Commerce City standards it is recommended that a continuous southbound right turn lane be constructed for the north right-in only access along Tower Road from 81st Avenue to the driveway.

- It is recommended that an eastbound right turn to southbound acceleration lane be constructed at the three-quarter access along Tower Road to a length of 510 feet with a 220-foot taper.

- The existing 125-foot eastbound left turn lane at the 81st Avenue and Tower Road intersection is recommended to be restriped to a length of 150 feet. To the west of this left turn lane, it is recommended that 81st Avenue be restriped to include a 25-foot bay taper and westbound left turn lane of 50 feet for the 81st Avenue eastern full movement access.

2040 Buildout Improvement Recommendations

- The Commerce City Transportation Plan identifies improving Tower Road within the project limits to be a six-lane facility as a high priority. Construction has recently been completed improving Tower Road from a two-lane roadway to a four-lane roadway while other areas have been improved to a six-lane facility. It is assumed that all of Tower Road will be improved to be a six-lane facility within the project limits by the long-term 2040 horizon.

- To accommodate future vehicle queueing demands, the eastbound approach of 81st Avenue and Tower Road intersection may need to provide dual left turn lanes. The outside left turn lane of the dual lefts could be the eastbound through lane converted to a forced left turn lane due to very little through traffic. When this occurs, the existing eastbound right turn lane could be converted to a shared through/right turn lane. This will allow for the back-to-back left turn configuration recommended to remain with the TWLTL striped at the access into the east driveway along 81st Avenue.

- 81st Avenue may need to be improved to be a five-lane section adjacent to Tower Road if the DIA Tech Center project is fully developed. Northbound and eastbound (as identified previously) dual left turn lanes may be needed in the future at the intersection of 81st Avenue and Tower Road if these future traffic volumes are realized. The westbound approach should be reconfigured with a designated westbound left turn lane and shared through/right turn lane if and when dual left turn lanes are incorporated on the eastbound approach of this intersection. If future traffic volumes are realized, a southbound right turn lane may also be needed operationally in additional to three southbound through lanes at this intersection.

General Improvements

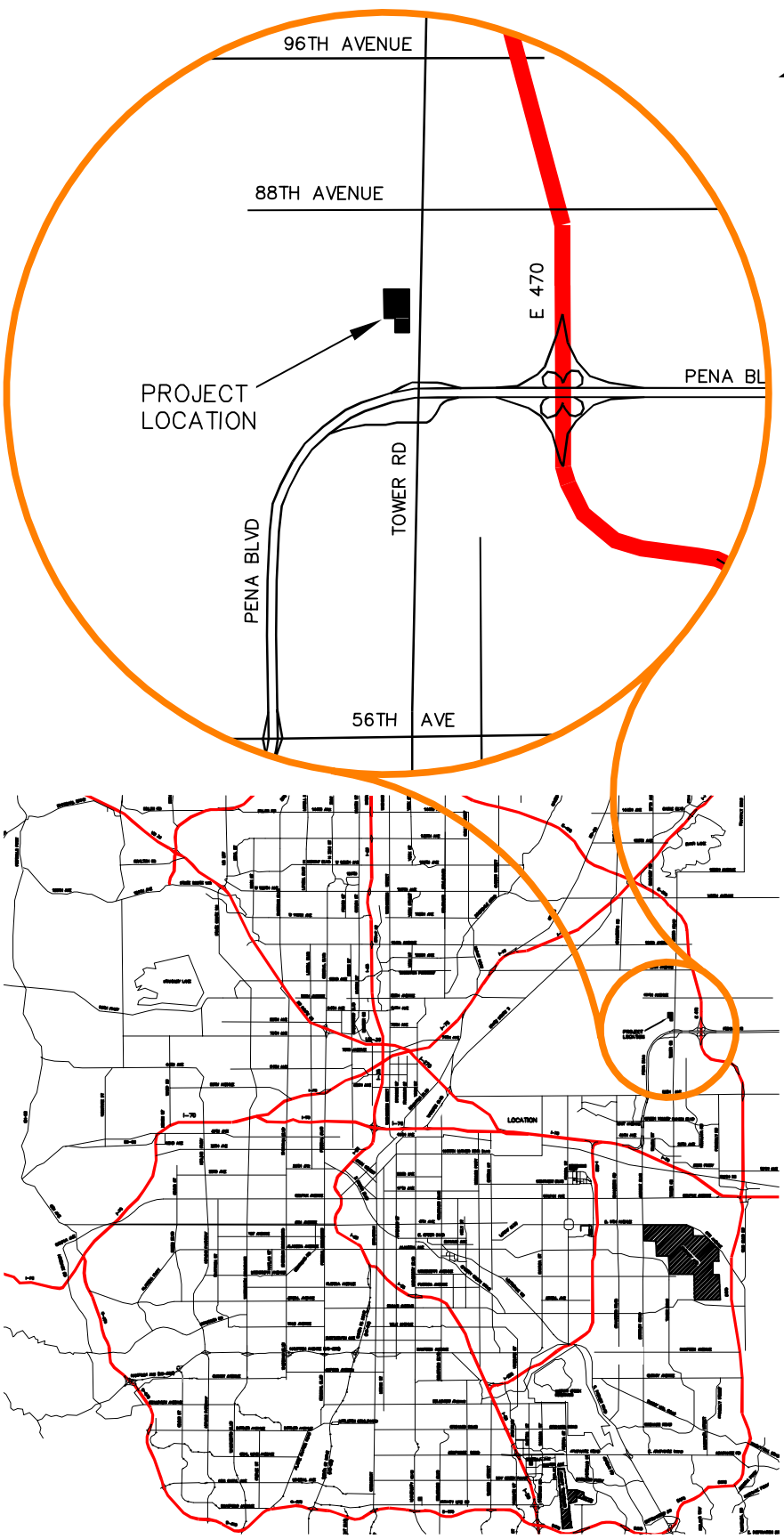
- Any on-site or off-site improvements should be incorporated into the Civil Drawings and conform to standards of Commerce City and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this report to document the results of a Traffic Impact Study of future traffic conditions associated with the QuikTrip 4207 project proposed on the southwest corner of the 81st Avenue and Tower Road intersection in Commerce City, Colorado. A vicinity map illustrating the project site location is shown in **Figure 1**. The gas station is anticipated to provide 18 passenger vehicle fueling positions, five (5) heavy vehicle/truck fueling positions, and a convenience market with approximately 7,300 square feet of building space. A conceptual site plan illustrating the project and access locations is shown in **Appendix F**. It is expected that the project will be completed by 2022; therefore, analysis was completed for the 2022 short term and 2040 long term horizons.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts. The intersection of 81st Avenue and Tower Road was incorporated into this traffic study in accordance with the City of Commerce City standards and requirements. In addition, two proposed project accesses along 81st Avenue and two proposed project accesses along Tower Road were also evaluated.

Regional access to the project will be provided by Interstate 70 (I-70) and E-470 while primary access will be provided by Tower Road. Direct access to the site will be provided by four driveways, two each along 81st Avenue and Tower Road. The proposed west access along the south side of 81st Avenue will only allow right turn exiting movements. The proposed east access along the south side of 81st Avenue will align with an existing full movement access located for a property on the north side of 81st Avenue and will allow full turning movements. The north access along the west side of Tower Road is proposed to allow only right turn entering movements while the south access proposes three-quarter turning movements (left out restricted). The west access along 81st Avenue is proposed to be located approximately 450 feet (measured center to center) west of Tower Road while the east access along 81st Avenue is located approximately 325 feet west of Tower Road and 125 feet east of the west project access. The south access along Tower Road is proposed to be located approximately 700 feet south of 81st Avenue. The north right-in access along Tower Road is proposed to be located approximately 375 feet south of 81st Avenue and 325 feet north of the south project access.



QUIKTRIP 4207 COMMERCE CITY
VICINITY MAP

FIGURE 1

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area

The existing site is vacant land, with the surrounding area primarily vacant as well. USAirport Parking center is located west of the site, while Canopy Airport Parking is located east of the site on the east side of Tower Road. A Conoco gas station is located on the northwest corner of the 81st Avenue and Tower Road intersection. Pena Boulevard is located south of the site while E-470 is located to the east. Denver International Airport is located further east of the site. Single family residences are located in the extended area to the north. The land uses and roadway network surrounding the site in the project study area vicinity are shown in **Figure 2**.

3.2 Existing Roadway Network

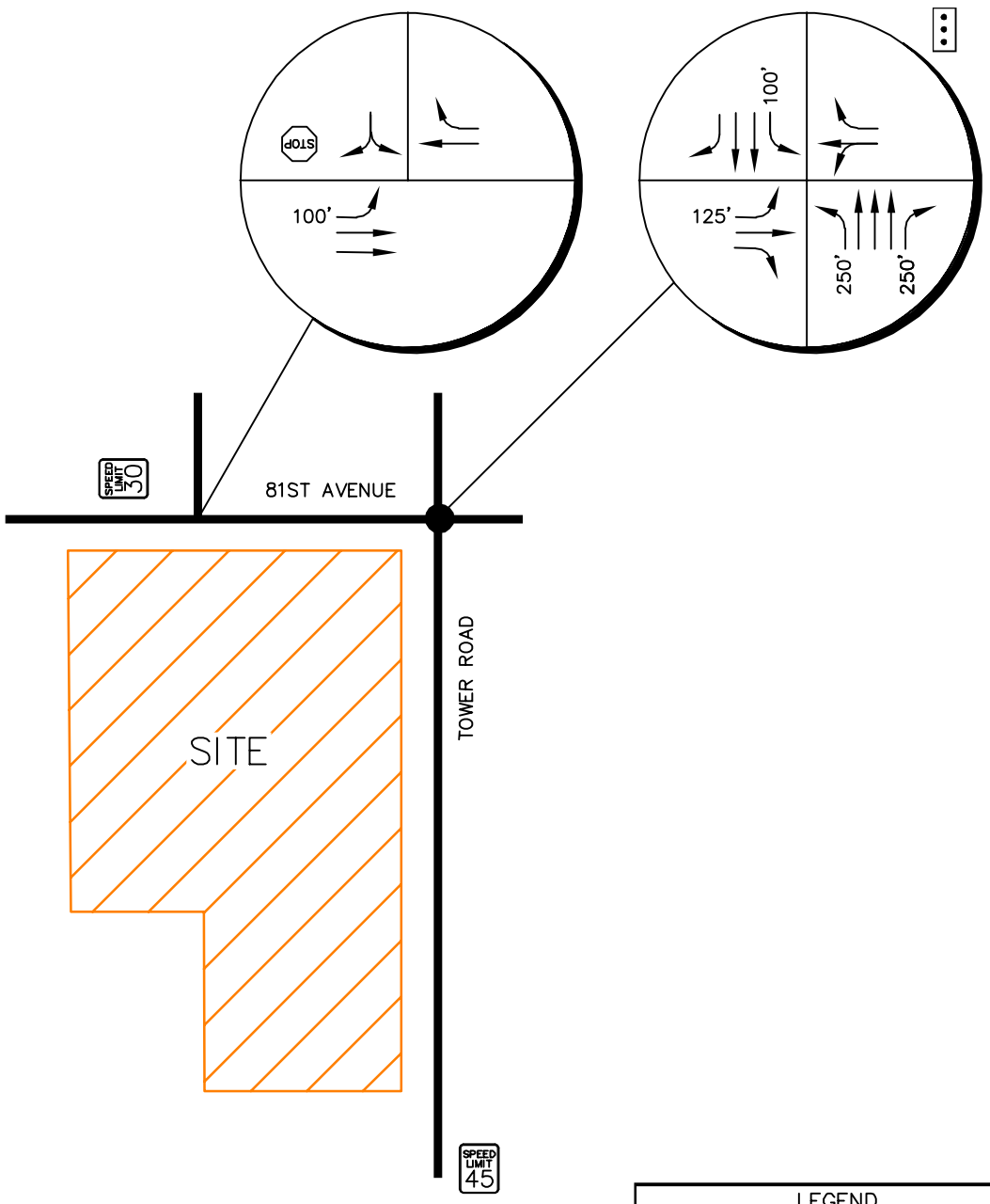
Tower Road is classified as a Principal Arterial extending north-south with areas of four-lane and six-lane sections within the project limits. Four-lane sections are located north of the 84th Avenue alignment and south of 81st Avenue while a six-lane section is provided from between the 84th Avenue alignment and 81st Avenue. Tower Road provides a raised median and has a speed limit of 45 miles per hour within the study area. 81st Avenue extends east-west with one through lane in each direction with a center two-way left turn lane (TWLTL). 81st Avenue has a speed limit of 30 miles per hour.

The signalized intersection of 81st Avenue and Tower Road operates with permissive left turn phasing on the eastbound and westbound approaches and protected-permitted left turn phasing on the northbound and southbound approaches. The eastbound approach of this intersection provides a left turn lane, one through lane, and a right turn lane while the westbound approach includes a shared left turn/through lane and a right turn lane. The northbound approach provides a left turn lane, three through lanes, and a right turn lane while the southbound approach includes a left turn lane, two through lanes, and a right turn lane.

The intersection lane configuration and control for the study area intersections are shown in **Figure 3**.

QUIKTRIP 4207 COMMERCE CITY
SITE AREA

FIGURE 2



QUIKTRIP 4207 COMMERCE CITY
EXISTING LANE CONFIGURATIONS

FIGURE 3

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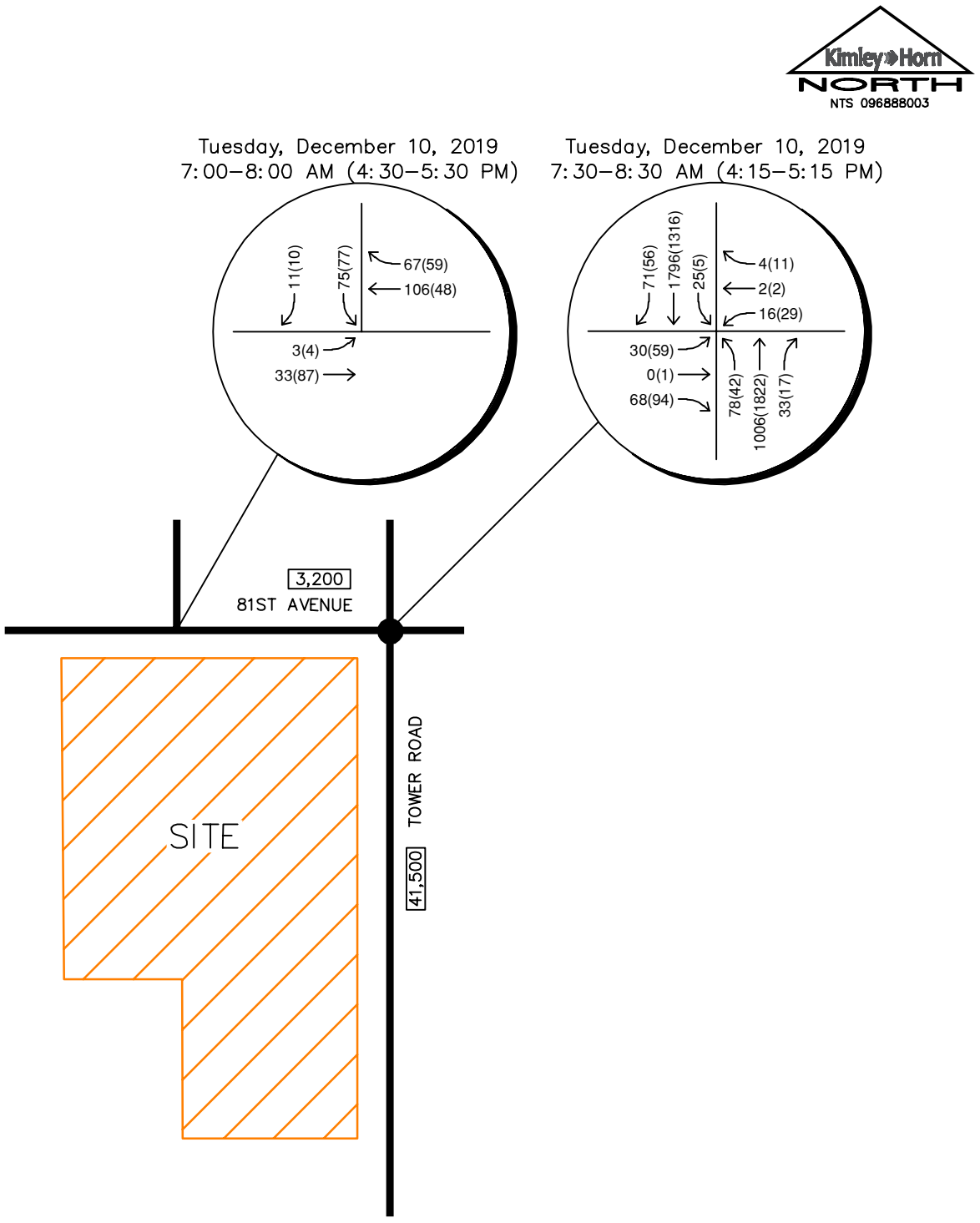
3.3 Existing Traffic Volumes

Existing peak hour turning movement counts were conducted at the intersection of 81st Avenue and Tower Road, as well as at the existing access which will align with the 81st Avenue East Access on Tuesday, December 10, 2019. The counts were conducted during the morning and afternoon peak hours of adjacent street traffic in 15-minute intervals from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. The turning movement counts are shown in **Figure 4** with count sheets provided in **Appendix A**.

3.4 Unspecified Development Traffic Growth

According to traffic projections provided by Denver Regional Council of Governments (DRCOG), Tower Road is expected to have an average daily traffic (ADT) volume of 75,000 vehicles in 2040. This equates an annual growth rate of approximately 2.86 percent compared to the estimated existing average daily volumes along Tower Road. A directional hourly volume percentage of eight (8) percent was utilized to convert peak hour traffic volumes to daily traffic volumes. An annual growth rate of 2.86 percent was used to calculate short term 2022 background traffic projections. Likewise, an annual growth rate of 2.86 percent was used as a basis for determining future traffic volume projections in 2040. Additionally, traffic volumes from the *DIA Tech Center Traffic Impact Analysis* completed in September 2011 and *Telluride Industrial – DIA Tech Filing 10 Traffic Impact Study* completed by Kimley-Horn and Associates in October 2019 were used to estimate 2040 traffic volumes for the study area. The through movements along Tower Road were adjusted to develop a future ADT of 75,000 vehicles per day in 2040. DRCOG traffic information and applicable documents from the DIA Tech Center and Telluride Industrial – DIA Tech Filing 10 traffic studies are included in **Appendix B**. Background traffic volumes for 2022 and 2040 are shown in **Figure 5** and **Figure 6**, respectively.



QUIKTRIP 4207 COMMERCE CITY
2019 EXISTING TRAFFIC VOLUMES

FIGURE 4

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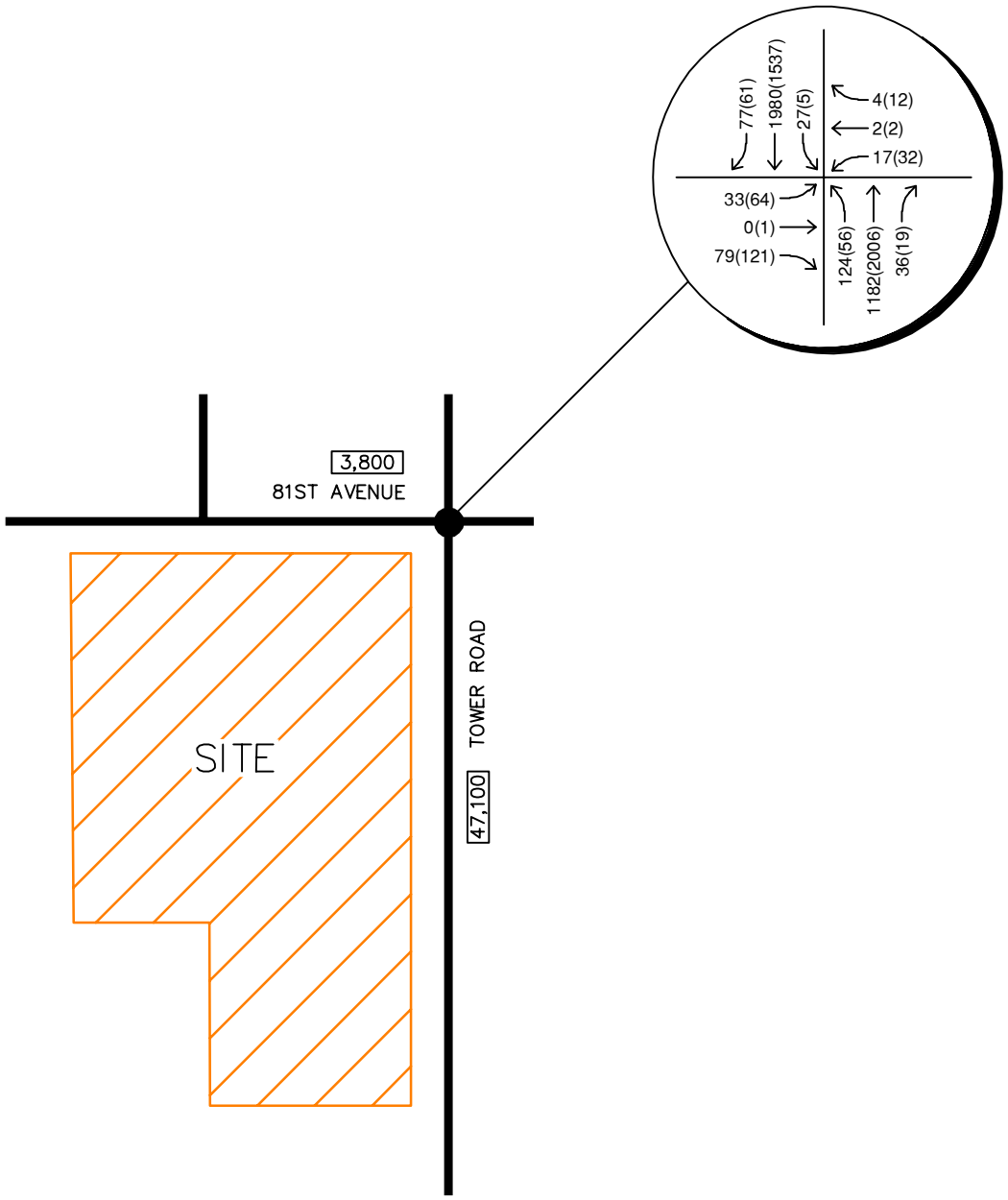

QUIKTRIP 4207 COMMERCE CITY
2022 BACKGROUND TRAFFIC VOLUMES

FIGURE 5

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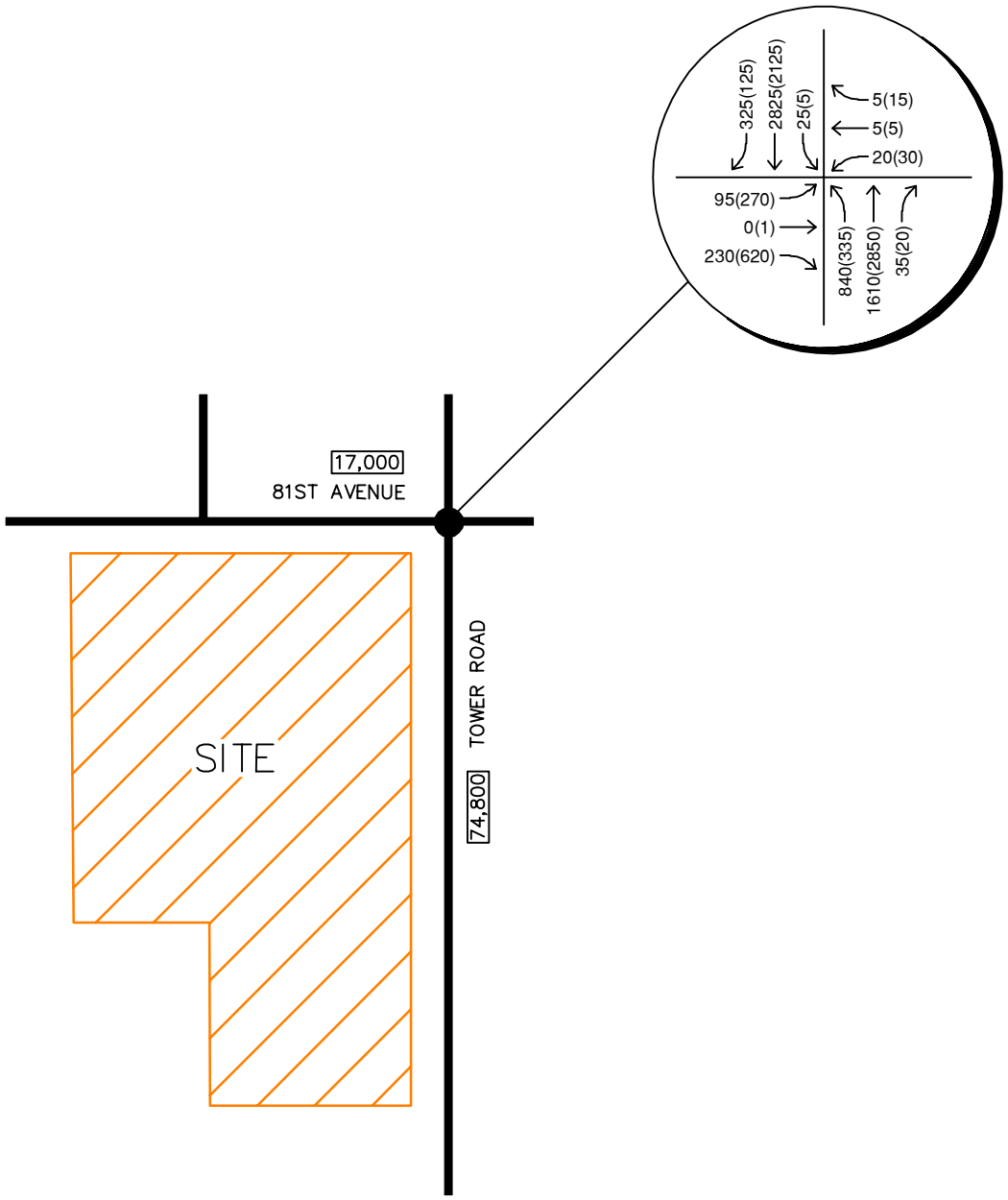


QUIKTRIP 4207 COMMERCE CITY
2040 BACKGROUND TRAFFIC VOLUMES

FIGURE 6

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*[1] published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn used the ITE Trip Generation Report average rates that apply to Gasoline Station with Convenience Market land use (ITE Code 945) for traffic associated with the development.

Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the gas station. The pass-by percentages were obtained from the ITE "Trip Generation Handbook", Third Edition.

QuikTrip 4207 Commerce City is expected to generate approximately 4,724 daily weekday driveway trips, with 287 of these trips occurring during the morning peak hour and 322 trips occurring during the afternoon peak hour. Accounting for pass-by, expected net new trips (non pass-by) to the surrounding street network results in approximately 2,078 weekday daily trips, of which 109 and 142 trips are anticipated during the weekday morning and afternoon peak hours, respectively. Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 10th Edition – Volume 1: User's Guide and Handbook*, 2017. **Table 1** summarizes the estimated trip generation for the proposed development. The trip generation worksheet is included in **Appendix C**.

Table 1 – QuikTrip 4207 Commerce City Project Traffic Generation

Gas Station with Convenience Market (ITE 945) – 23 Fueling Positions Trip Scenario	Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Non Pass-By	2,078	55	54	109	72	70	142
Pass-By	2,646	91	87	178	92	88	180
Total	4,724	146	141	287	164	158	322

[1] Institute of Transportation Engineers, *Trip Generation Manual*, Tenth Edition, Washington DC, 2017.

4.2 Trip Distribution

Distribution of site traffic was based on the area street system characteristics, existing traffic patterns and volumes, existing demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project non pass-by trip distribution is illustrated in **Figure 7.**

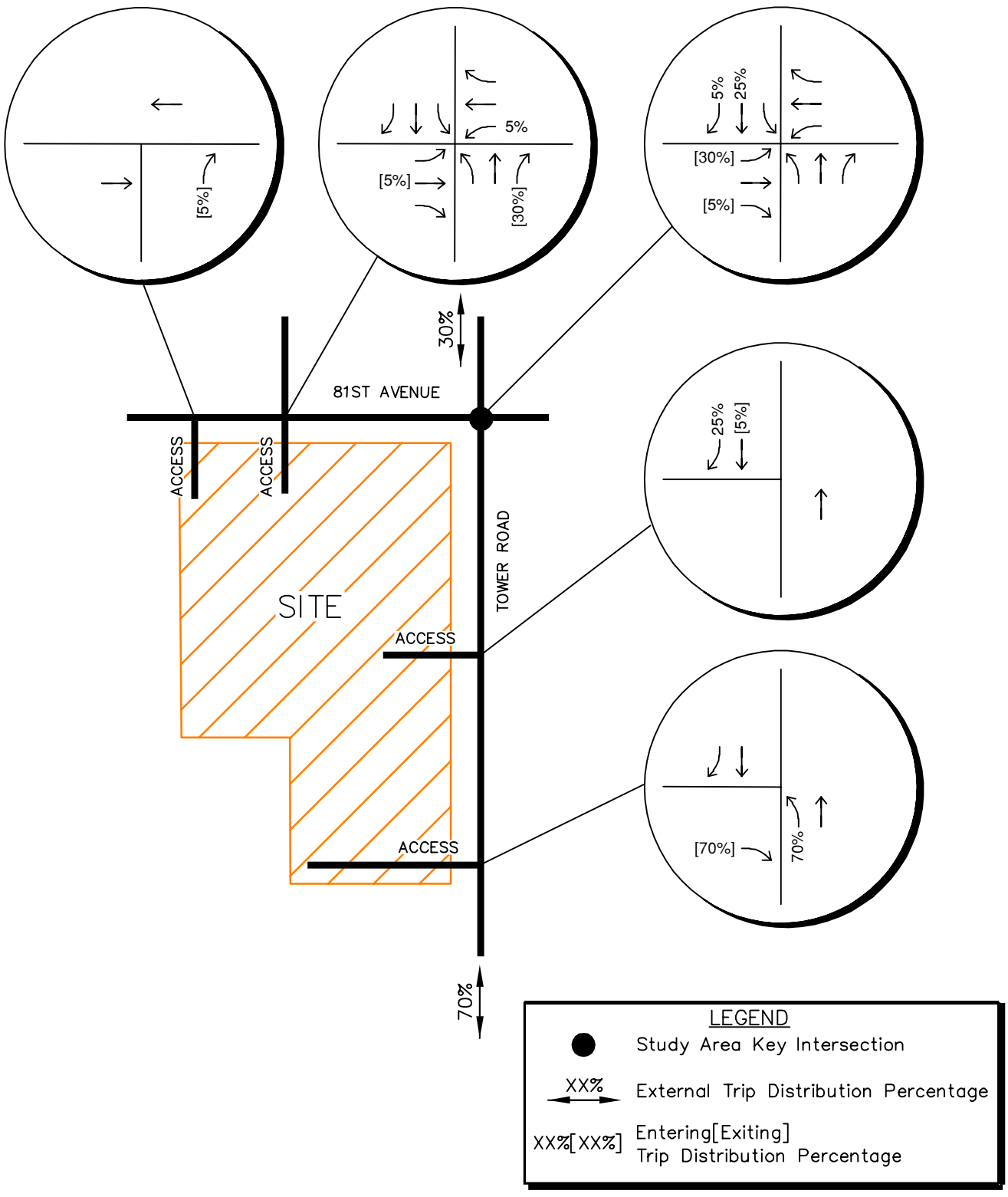
Since the project is a commercial development, a certain amount of traffic attracted to the gas station will already be passing by the site. This pass-by distribution is a means to quantify the amount of traffic arriving to the site from a given direction and then leaving the site in the same original direction of travel, continuing the driver's trip. The expected weekday morning and afternoon peak hour pass-by trip distributions were calculated based on actual traffic volumes. Directional differences in the morning and afternoon peak hours were accounted for in the pass-by distributions as shown in **Figures 8** and **9**, respectively.

4.3 Traffic Assignment

Project traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Project non pass-by traffic assignment is shown in **Figure 10**, while **Figure 11** illustrates the expected pass-by traffic assignment for the QuikTrip 4207 Commerce City development.

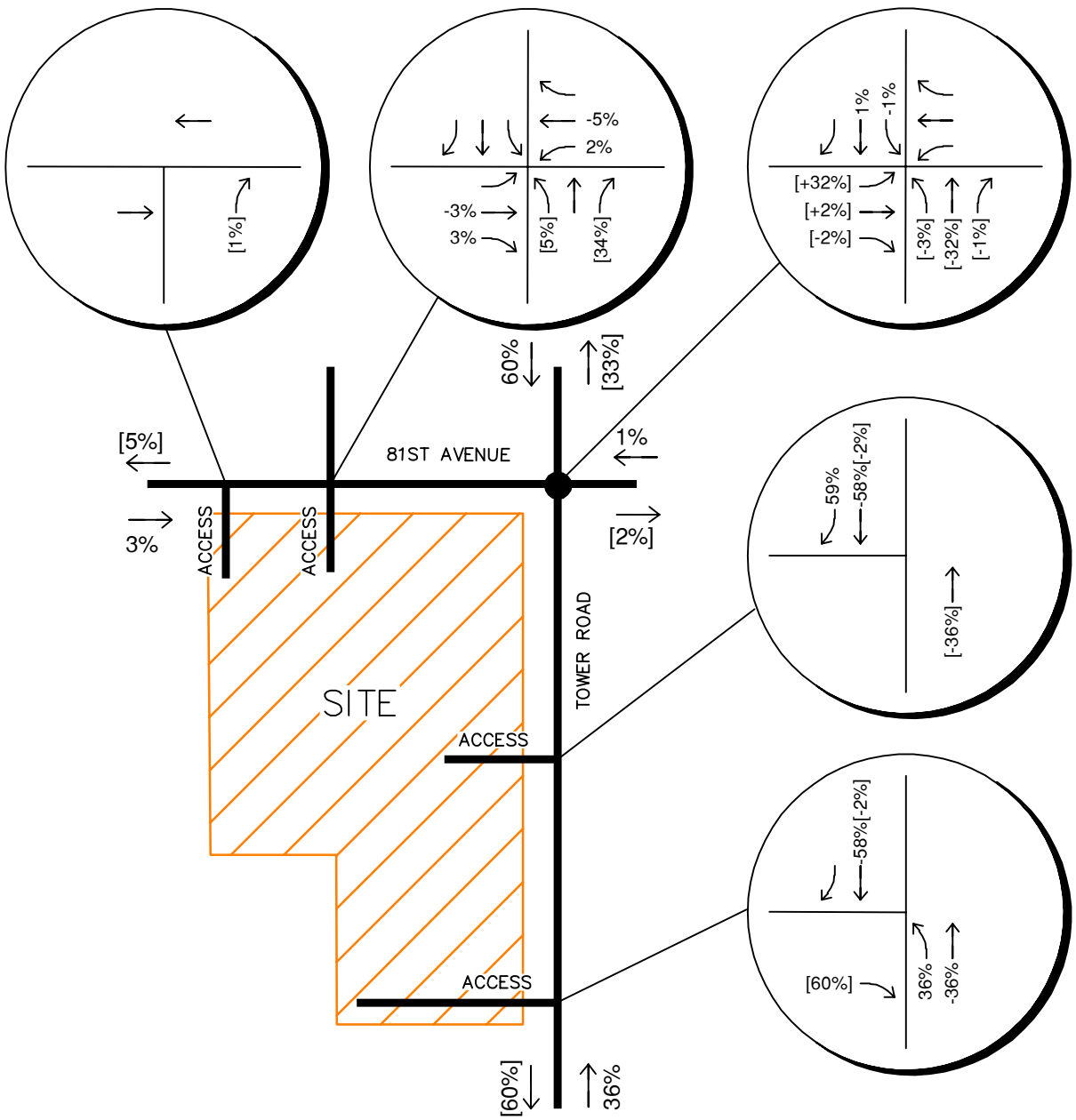
4.4 Total (Background Plus Project) Traffic

Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short term 2022 horizon and long term 2040 horizon. These total traffic volumes for the site are illustrated for the 2022 and 2040 horizon years in **Figures 12** and **13**, respectively.



QUIKTRIP 4207 COMMERCE CITY
NON PASS-BY TRIP DISTRIBUTION

FIGURE 7



LEGEND

● Study Area Key Intersection

XX%[XX%] Entering[Exiting] Trip Distribution Percentage

QUIKTRIP 4207 COMMERCE CITY
AM PASS-BY TRIP DISTRIBUTION

FIGURE 8

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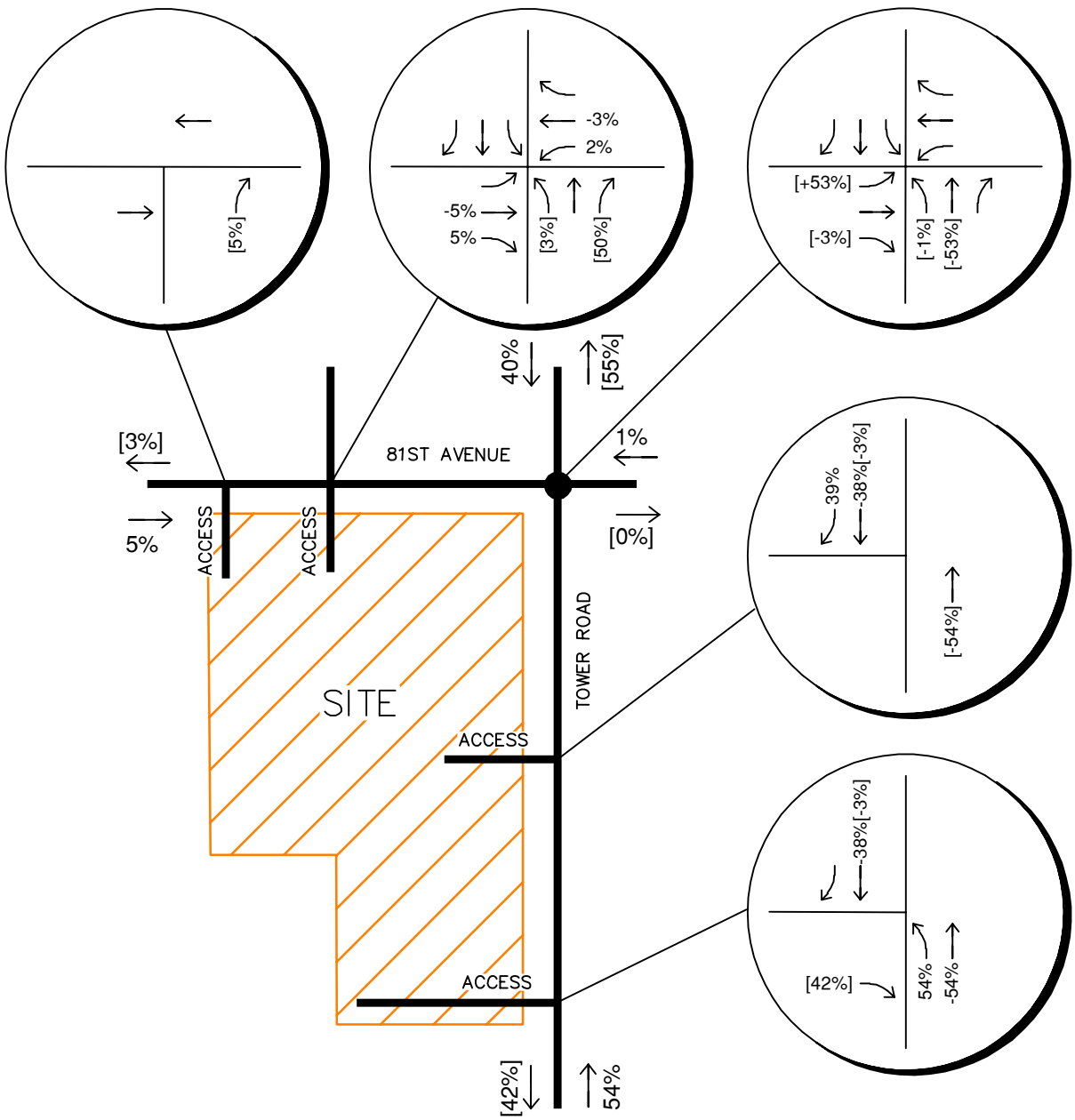

LEGEND

● Study Area Key Intersection

XX%[XX%] Entering[Exiting] Trip Distribution Percentage

QUIKTRIP 4207 COMMERCE CITY
PM PASS-BY TRIP DISTRIBUTION

FIGURE 9

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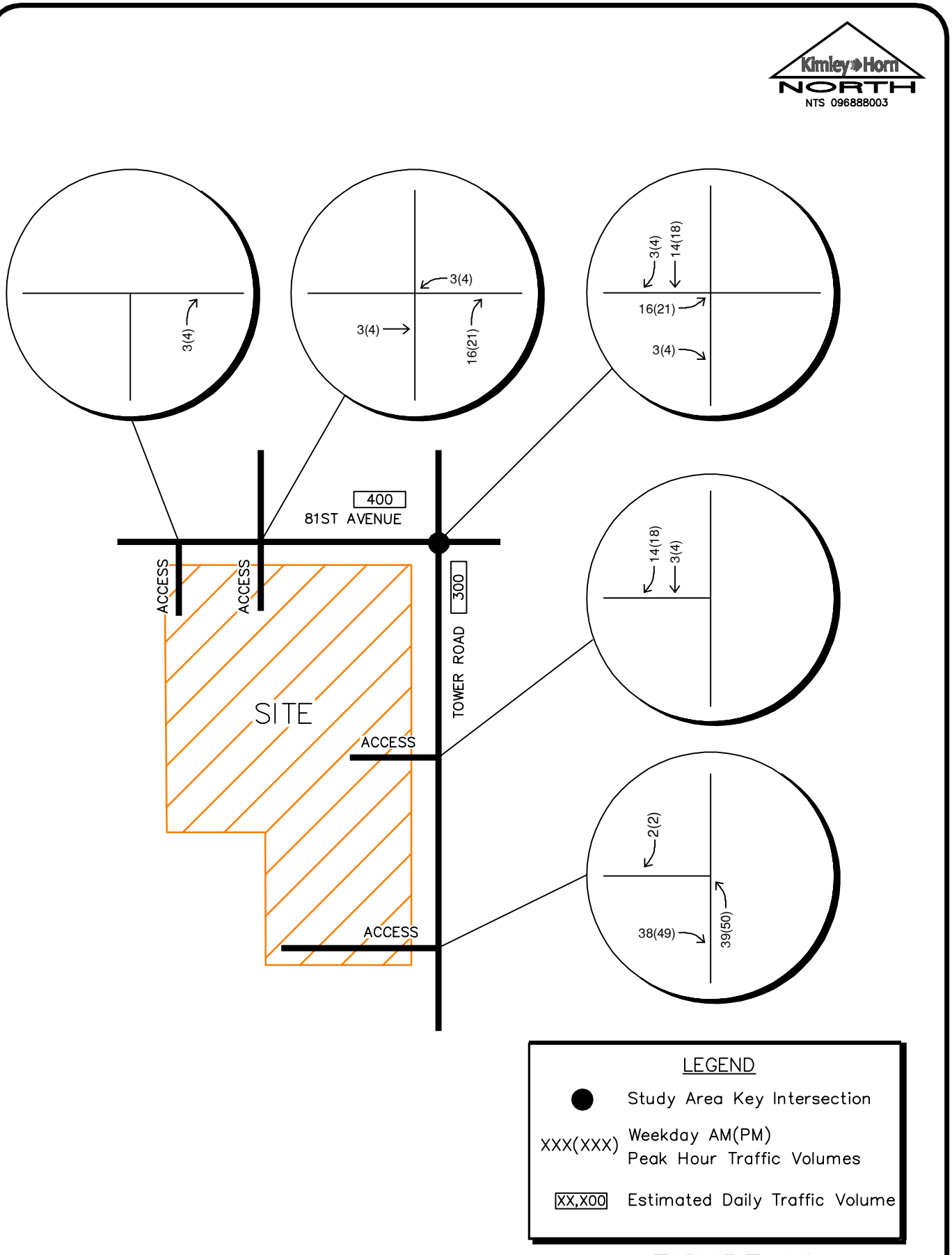

QUIKTRIP 4207 COMMERCE CITY
NON PASS-BY TRAFFIC ASSIGNMENT

FIGURE 10

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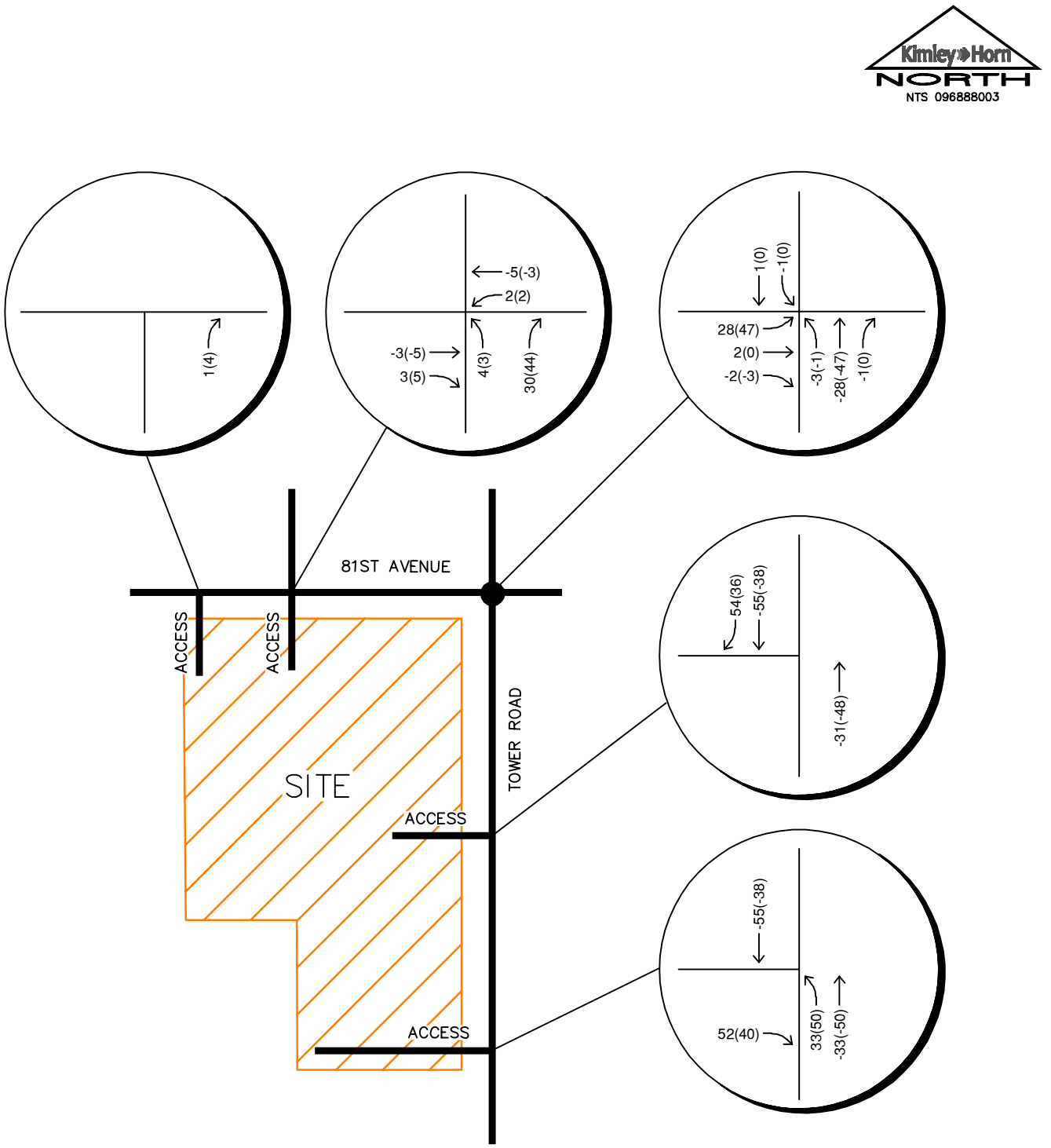

QUIKTRIP 4207 COMMERCE CITY
PASS-BY TRAFFIC ASSIGNMENT

FIGURE 11

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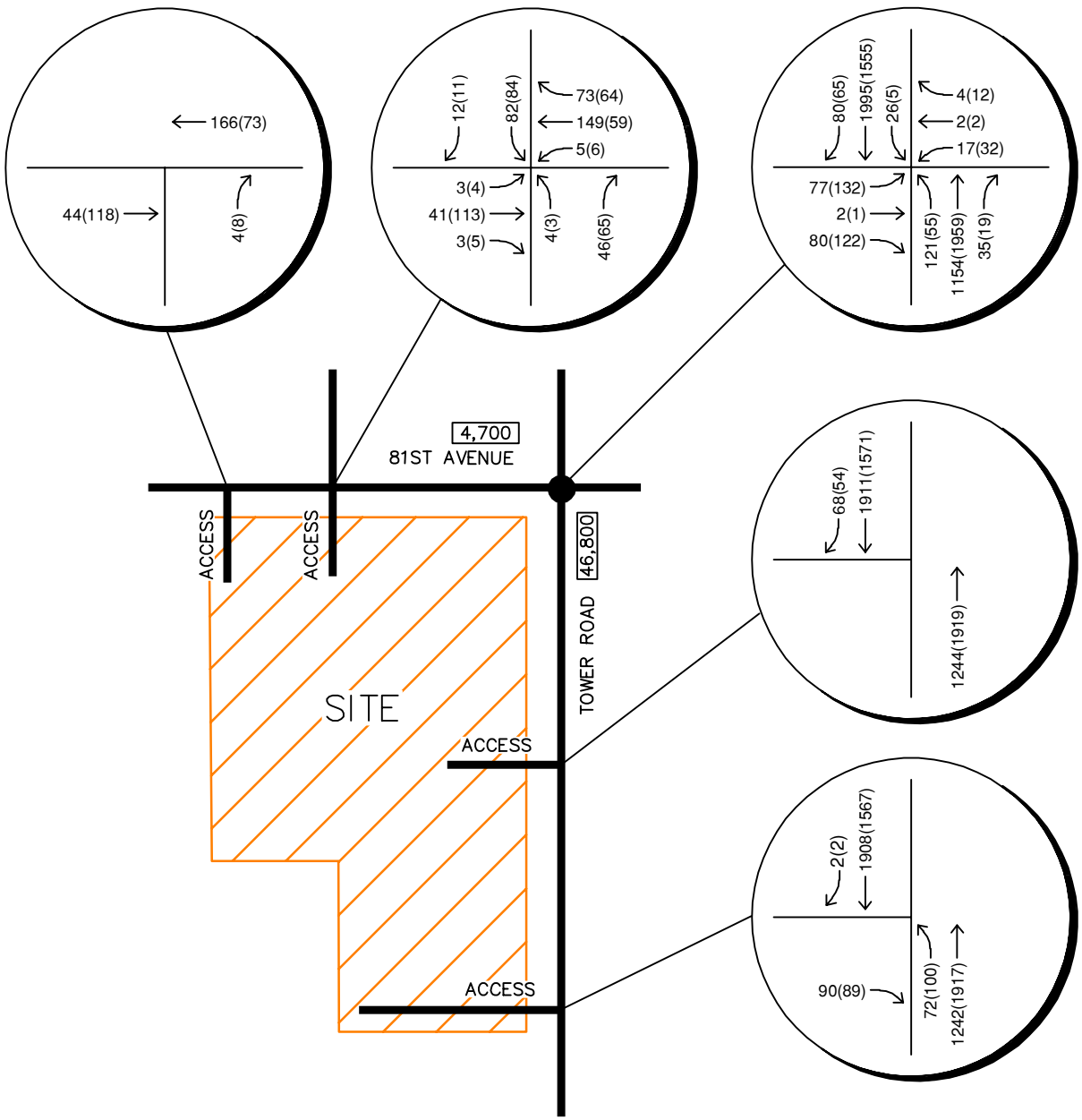

QUIKTRIP 4207 COMMERCE CITY
2022 BACKGROUND PLUS
PROJECT TRAFFIC VOLUMES

FIGURE 12

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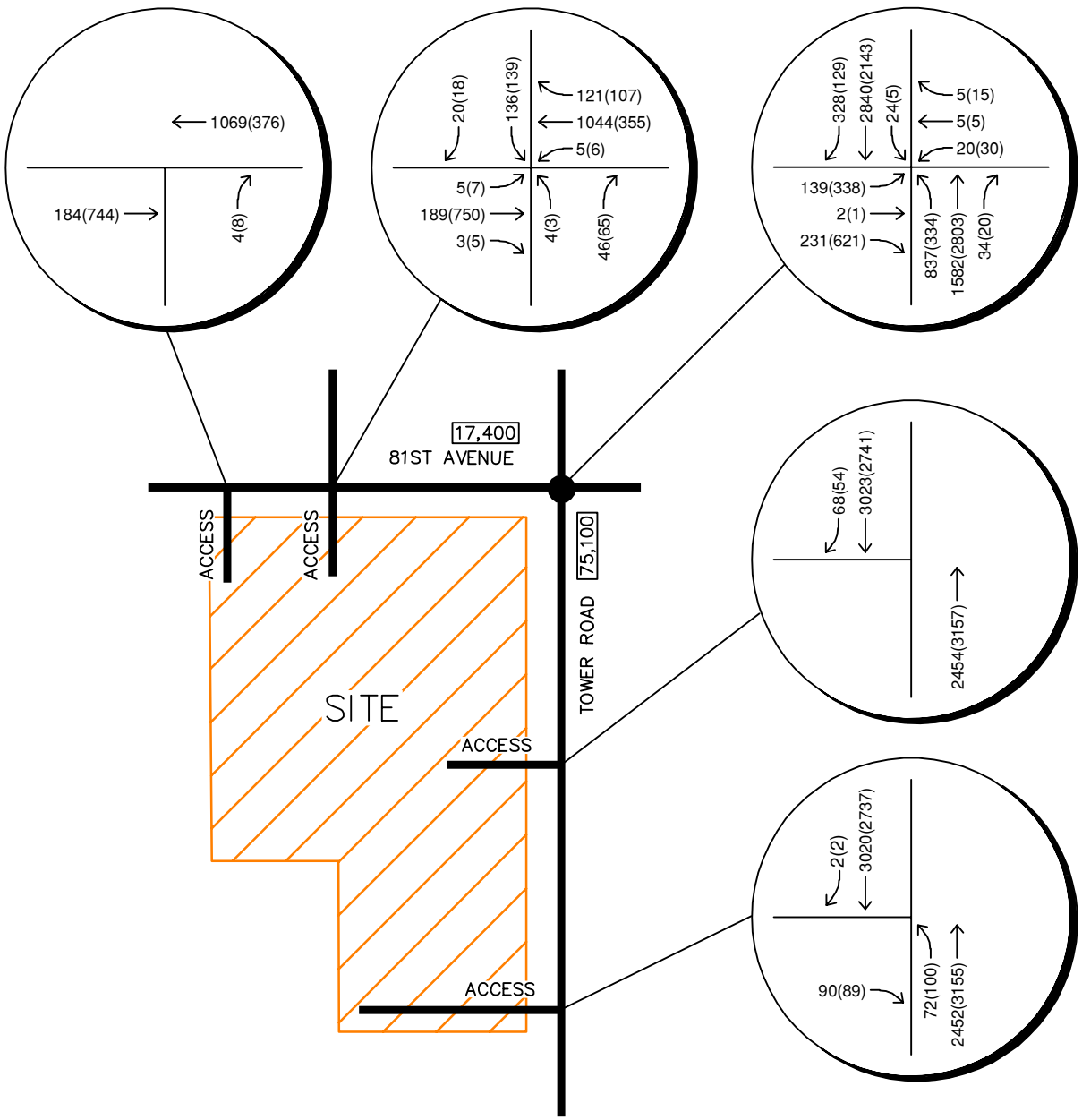

QUIKTRIP 4207 COMMERCE CITY
2040 BACKGROUND PLUS
PROJECT TRAFFIC VOLUMES

FIGURE 13

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5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2022 and 2040 development horizons at the identified key intersections and access driveways. The acknowledged source for determining overall capacity is the current edition of the *Highway Capacity Manual (HCM)*[2].

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, standard traffic engineering practice identifies overall LOS D for signalized intersections and LOS E for movements and approaches of unsignalized intersections as the minimum threshold for acceptable operations. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

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

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

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the level of service (LOS) for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Level of service for a two-way stop-controlled intersection is not defined for the intersection as a whole. Level of service for a signalized and four-way stop controlled intersection is defined for each approach and for the intersection.

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

5.2 Key Intersection Operational Analysis

Calculations for the level of service at the key intersections for the study area are provided in **Appendix D**. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 3.** The existing peak hour factors were utilized in the existing and short-term horizon (2022) analysis while the existing signalized intersection analyses used the observed cycle lengths. The recommended HCM urban area peak hour factor of 0.92 was used for the 2040 horizon analysis. Synchro traffic analysis software was used to analyze the study intersections and access driveway for level of service.

81st Avenue and Tower Road

The signalized intersection of 81st Avenue and Tower Road operates with protected-permitted left turn phasing on the northbound and southbound approaches. This intersection currently operates acceptably with LOS A during the morning and afternoon peaks. With the existing lane configurations and control, this intersection is expected to continue to operate acceptably with LOS A during the peak hours in 2022 with or without the addition of project traffic. As mentioned previously, Tower Road is expected to provide three through lanes in each direction by 2040. With development of the surrounding area, eastbound and northbound dual left turn lanes may also be needed at this intersection in the future. It is recommended that the outside left turn lane of the dual lefts on the eastbound approach of this intersection be a forced left turn lane to accommodate future vehicles queues. When this occurs, the existing eastbound right turn lane should become a shared through/right turn lane. The westbound approach is recommended to be restriped with a left turn lane and shared through/right turn lane. The southbound approach is recommended to include a right turn lane. With these recommended improvements by 2040, this intersection is expected to operate acceptably with LOS D in the morning peak hour and LOS C in the afternoon peak hour. **Table 3** provides the results of the level of service.

Table 3 – 81st Avenue and Tower Road LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2019 Existing	4.7	A	7.5	A
2022 Background	6.0	A	7.8	A
2022 Background Plus Project	7.6	A	10.3	B
2040 Background #	51.1	D	24.1	C
2040 Background Plus Project #	53.7	D	24.1	C

= Includes Three SB Through Lanes and a Right Turn Lane; EB and NB Dual Left Turn Lanes

5.3 Project Accesses Operational Analysis

With completion of the QuikTrip 4207 Commerce City project, the site is recommended to have two accesses along the south side of 81st Avenue and two accesses along the west side of Tower Road. The west project access along 81st Avenue will allow for right turn exiting movements only and is requested to allow for improved onsite circulation with the truck fueling positions proposed on the west side of the site. The east access along 81st Avenue will allow full turning movements and align with an existing full movement access located on the north side of 81st Avenue. The north access along Tower Road will be restricted to right-in movements only. This access is beneficial to reduce the amount of westbound left turning traffic entering the site from the full movement access proposed along 81st Avenue. With the compressed distance of 225 feet along 81st Avenue between Tower Road and the full movement access, this reduction in westbound left turning traffic will provide a street network benefit. The south access along Tower Road will be a three-quarter access with restriction of exiting eastbound left turn movements. The three project access drives that will allow exiting movements are recommended to have R1-1 "STOP" signs installed for the exiting approaches. A single exiting lane should be sufficient for the two project driveways along 81st Avenue and the three-quarter access along Tower Road.

A R3-2 No Left Turn Sign should be installed underneath the "STOP" sign of the west access along 81st Avenue to identify the restriction to right turn exiting movements only from the driveway. To restrict entrance movements as well, a R3-1 No Right Turn sign should be installed facing drivers traveling eastbound along 81st Street as well as a R3-2 No Left Turn sign facing westbound drivers along 81st Street. Further, the curb returns at the west access are proposed to be channelized to restrict entering movements and force exiting vehicles to right turn movements only.

To provide additional support to restrict the north access along Tower Road to right-in movements only, it is recommended the curb be constructed to channelize traffic entering so that it is obvious to the driver onsite that it is an entrance only access to restrict exiting movements. Likewise, R5-1 DO NOT ENTER signs shall be installed internal to the site at the access, with the signs facing west internal to the site.

To provide additional support to restrict the south access along Tower Road to three-quarter movements, it is recommended that a R3-2 No Left Turn sign be placed underneath the STOP sign at this access. Likewise, R6-1(R) "ONE WAY" signs should be installed within the raised median of Tower Road, visible to drivers exiting the project site.

As required per City standards, a southbound right turn deceleration lane is recommended at the northern right-in access along Tower Road. To meet City standards, this right turn deceleration lane would require a length of 185 feet plus 220-foot taper. There is approximately 340 feet between the access and 81st Avenue, therefore this southbound right turn deceleration lane is recommended as a continuous lane. An eastbound right turn to southbound acceleration lane is also recommended for the proposed southern three-quarter access along Tower Road. To meet City standards, this acceleration lane would require a length of 510 feet plus 220-foot taper.

With the recommended configuration of the project accesses in the opening year of 2022, all movements at the access intersections are anticipated to operate acceptably with LOS B or better during the weekday peak hours. By 2040, all movements at the access intersections are expected to continue to operate acceptably with LOS E or better during the peak hours. Of note, the LOS E is projected for the eastbound right turn movement exiting the three-quarter access, which is anticipated to operate better than predicted with an acceleration lane proposed along southbound Tower Road. The operational analysis at the proposed project accesses is summarized in **Table 4** for the short-term 2022 and long-term 2040 horizons. Detailed results of the operational analysis are also provided in **Appendix D**.

Table 4 – Project Access LOS Results

Access and Movement	2022 Total Traffic				2040 Total Traffic			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS
81st Avenue West Access								
Northbound Approach	8.5	A	8.9	A	8.9	A	11.1	B
81st Avenue East Access								
Northbound Approach	8.7	A	9.0	A	9.3	A	12.4	B
Eastbound Left	7.5	A	7.4	A	9.2	A	7.9	A
Westbound Left	7.3	A	7.5	A	7.7	A	9.5	A
Southbound Approach	9.6	A	9.8	A	19.6	C	26.9	D
Tower Road South Access								
Northbound Left	12.0	B	11.1	B	28.5	D	20.4	C
Eastbound Right	14.7	B	12.8	B	45.2	E	25.5	D

5.4 Vehicle Queuing Analysis

Queuing analysis was conducted for the study area intersections per Commerce City standards and requirements. Results were obtained from the 95th percentile queue lengths obtained from the Synchro analysis. Queue analysis worksheets at the signalized intersections are provided in **Appendix E**. Queue length calculations for unsignalized intersections are provided within the level of service operational sheets provided in **Appendix D**. Results of the queuing analysis and recommendations at the study area intersections are provided in **Table 5.** Of note, any queue lengths calculated at less than one vehicle were rounded up to 25 feet for passenger cars and 50 feet for trucks to account for one vehicle of storage needed.

Table 5 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2022 Calculated Queue (feet)	2022 Recommended Length (feet)	2040 Calculated Queue (feet)	2040 Recommended Length (feet)
81st Avenue & Tower Road					
Eastbound Left	125’	**136’**	**150’**	185’ DL	**125’ & C**
Eastbound Right	C	64’	C	694’	C
Westbound Left	DNE	DNE	DNE	75’	**C**
Westbound Right	C	25’	C	29’	C
Northbound Left	250’	95’	250’	527’ DL	**525’ DL**
Northbound Right	250’	25’	250’	25’	250’
Southbound Left	100’	25’	100’	25’	100’
Southbound Right	C	25’	C	119’	**150’**
81st Avenue West RO Access					
Northbound Right	DNE	50’	**50’**	50’	50’
81st Avenue East Access					
Northbound Approach	DNE	25’	**25’**	25’	25’
Eastbound Left	100’	25’	**TWLTL**	25’	TWLTL
Westbound Left	DNE	25’	**TWLTL**	25’	TWLTL
Southbound Approach	C	25’	C	75’	C
Tower Rd North RI Access					
Southbound Right	DNE	25’	**C**	25’	C
Tower Road South 3/4 Access					
Northbound Left	325’	25’	325’	50’	325’
Eastbound Right	DNE	25’	**25’**	75’	**75’**

DNE = Does Not Exist; C = Continuous Lane; DL = Dual Left Turns; TWLTL = Two-Way Left Turn Lane

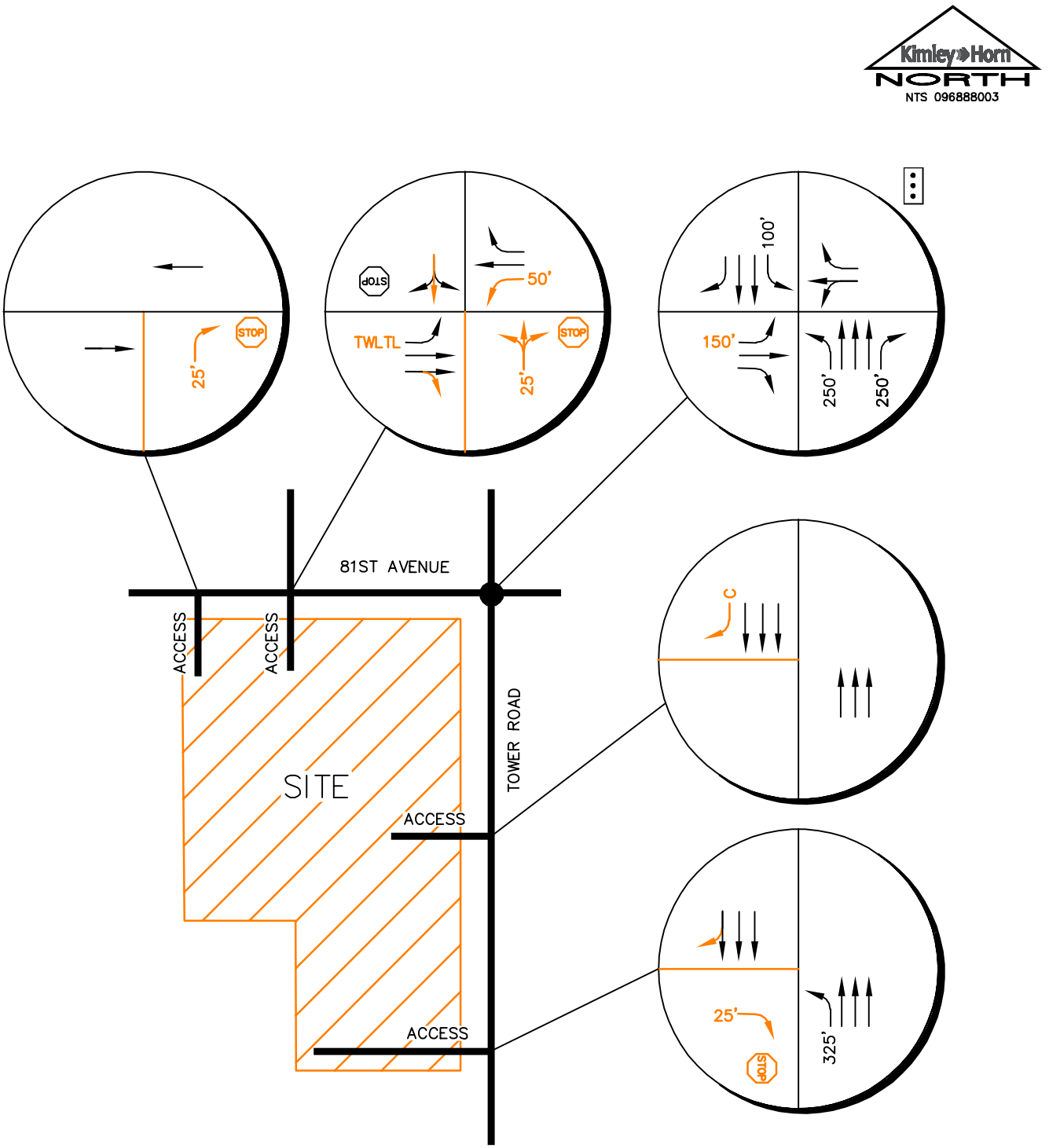
As shown in the table representing the queuing results, all anticipated queues are accommodated or managed within existing turn bay lengths with project traffic in the 2022 project build out year with exception of the eastbound left turn at 81st Avenue and Tower Road. The existing 125-foot eastbound left turn lane at the 81st Avenue and Tower Road intersection is recommended to be restriped to a length of 150 feet. To the west of this left turn lane, it is recommended that 81st Avenue be restriped to include a 25-foot bay taper and westbound left turn lane of 50 feet for the 81st Avenue eastern full movement access.

A northbound left turn lane has already been constructed for the future Tower Road South Access alignment with a length of 325 feet. This left turn lane will just need to be designated with left turn arrow pavement legends.

Vehicle queues are expected to extend past several auxiliary turn lanes by 2040 if future traffic volumes are realized. It is recommended that Commerce City continue to monitor the intersection of 81st Avenue and Tower Road in more detail as the surrounding DIA Tech Center

project and other developments in the area are constructed. Eastbound and northbound dual left turn lanes may need to be incorporated at the 81st Avenue and Tower Road intersection with development of the entire DIA Tech Center. Eastbound dual left turn lanes would be needed to prevent vehicles from extending beyond the existing full movement access along 81st Avenue located approximately 225 feet west of Tower Road.

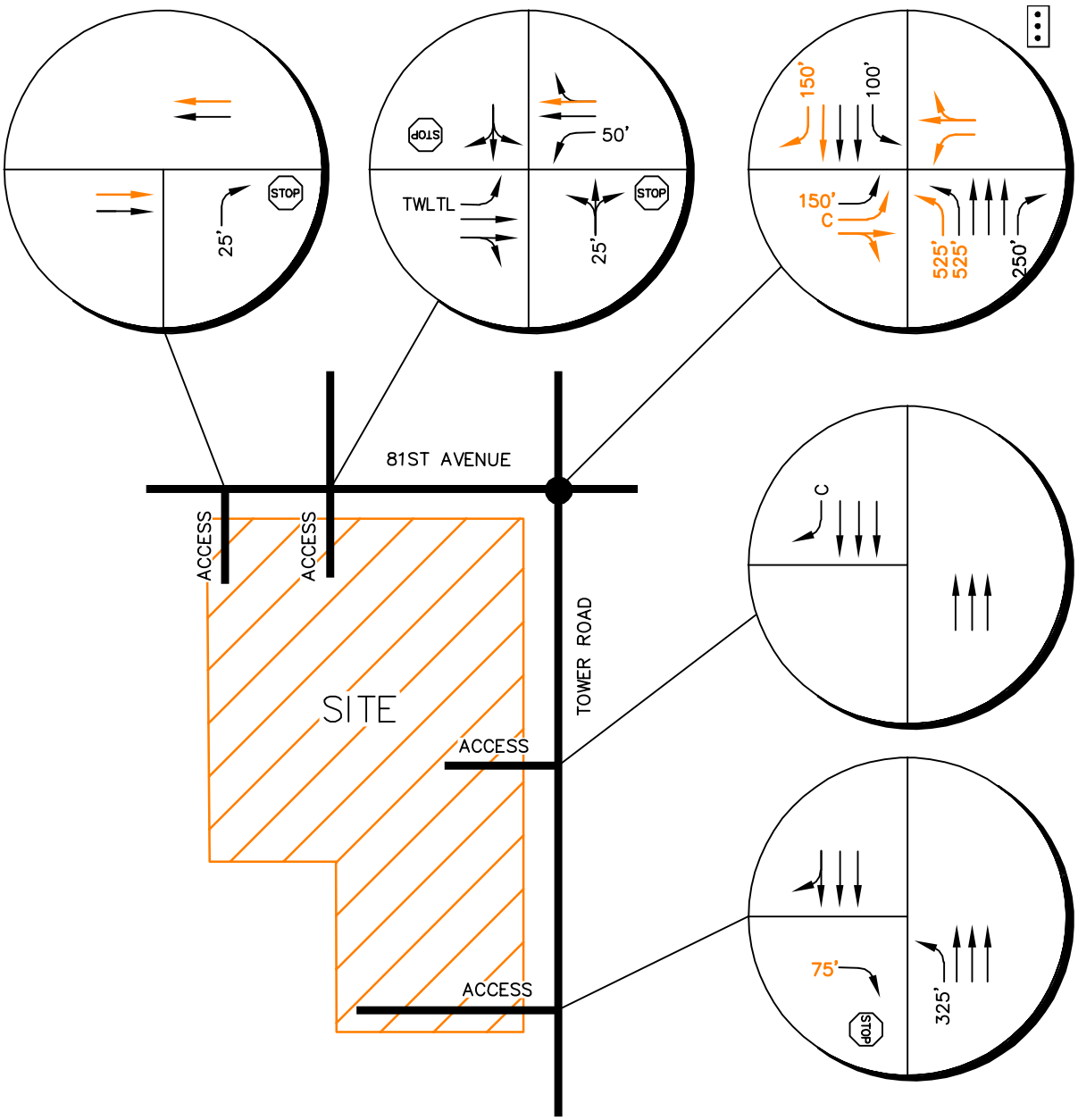
Based on the results of the intersection operational and vehicle queuing analysis, the key intersection recommended improvements and control are shown in **Figure 14** for the 2022 horizon and **Figure 15** for the 2040 horizon.



QUIKTRIP 4207 COMMERCE CITY
2022 RECOMMENDED
LANE CONFIGURATIONS AND CONTROL

FIGURE 14

Kimley»Horn



QUIKTRIP 4207 COMMERCE CITY
2040 RECOMMENDED
LANE CONFIGURATIONS AND CONTROL

FIGURE 15

Kimley»Horn

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes the QuikTrip 4207 Commerce City project will be successfully incorporated into the existing and future roadway network. The proposed project development resulted in the following recommendations and conclusions:

2022 Buildout Improvement Recommendations

- With completion of the QuikTrip 4207 Commerce City project, the site is recommended to have two accesses along the south side of 81st Avenue and two accesses along the west side of Tower Road. The west project access along 81st Avenue will allow for right turn exiting movements only and is requested to allow for improved onsite circulation with the truck fueling positions proposed on the west side of the site. The east access along 81st Avenue will allow full turning movements and align with an existing full movement access located on the north side of 81st Avenue. The north access along Tower Road will be restricted to allow for right turn entrance movements only. This access is beneficial to reduce the amount of westbound left turning traffic entering the site from the full movement access proposed along 81st Avenue. With the compressed distance of 225 feet along 81st Avenue between Tower Road and the full movement access, this reduction in westbound left turning traffic will provide a street network benefit. The south access along Tower Road will be a three-quarter access with restriction of exiting eastbound left turn movements. The three project access drives that will allow exiting movements are recommended to have R1-1 "STOP" signs installed for the exiting approaches. A single exiting lane should be sufficient for the two project driveways along 81st Avenue and the three-quarter access along Tower Road.

- A R3-2 No Left Turn Sign should be installed underneath the "STOP" sign of the west access along 81st Avenue to identify the restriction to right turn exiting movements only from the driveway. To restrict entrance movements as well, a R3-1 No Right Turn sign should be installed facing drivers traveling eastbound along 81st Street as well as a R3-2 No Left Turn sign facing westbound drivers along 81st Street. Further, the curb returns at the west access are proposed to be channelized to restrict entering movements and force exiting vehicles to right turn movements only.

- To provide additional support to restrict the north access along Tower Road to right-in movements only, it is recommended the curb be constructed to channelize traffic entering so that it is obvious to the driver onsite that it is an entrance only access to restrict exiting movements. Likewise, R5-1 DO NOT ENTER signs shall be installed internal to the site at the access, with the signs facing west internal to the site.

- To provide additional support to restrict the south access along Tower Road to three-quarter movements, it is recommended that a R3-2 No Left Turn sign be placed underneath the STOP sign at this access. Likewise, R6-1(R) "ONE WAY" signs should be installed within the raised median of Tower Road, visible to drivers exiting the project site.

- A northbound left turn lane has already been constructed for the future Tower Road South Access alignment with a length of 325 feet. This left turn lane will just need to be designated with pavement legend turn arrows.

- To meet City of Commerce City standards it is recommended that a continuous southbound right turn lane be constructed for the north right-in only access along Tower Road from 81st Avenue to the driveway.

- It is recommended that an eastbound right turn to southbound acceleration lane be constructed at the three-quarter access along Tower Road to a length of 510 feet with a 220-foot taper.

- The existing 125-foot eastbound left turn lane at the 81st Avenue and Tower Road intersection is recommended to be restriped to a length of 150 feet. To the west of this left turn lane, it is recommended that 81st Avenue be restriped to include a 25-foot bay taper and westbound left turn lane of 50 feet for the 81st Avenue eastern full movement access.

2040 Buildout Improvement Recommendations

- The Commerce City Transportation Plan identifies improving Tower Road within the project limits to be a six-lane facility as a high priority. Construction has recently been completed improving Tower Road from a two-lane roadway to a four-lane roadway while other areas

have been improved to a six-lane facility. It is assumed that all of Tower Road will be improved to be a six-lane facility within the project limits by the long-term 2040 horizon.

- To accommodate future vehicle queueing demands, the eastbound approach of 81st Avenue and Tower Road intersection may need to provide dual left turn lanes. The outside left turn lane of the dual lefts could be the eastbound through lane converted to a forced left turn lane due to very little through traffic. When this occurs, the existing eastbound right turn lane could be converted to a shared through/right turn lane. This will allow for the back-to-back left turn configuration recommended to remain with the TWLTL striped at the access into the east driveway along 81st Avenue.

- 81st Avenue may need to be improved to be a five-lane section adjacent to Tower Road if the DIA Tech Center project is fully developed. Northbound and eastbound (as identified previously) dual left turn lanes may be needed in the future at the intersection of 81st Avenue and Tower Road if these future traffic volumes are realized. The westbound approach should be reconfigured with a designated westbound left turn lane and shared through/right turn lane if and when dual left turn lanes are incorporated on the eastbound approach of this intersection. If future traffic volumes are realized, a southbound right turn lane may also be needed operationally in additional to three southbound through lanes at this intersection.

General Improvements

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

APPENDICES

APPENDIX A

Intersection Count Sheets

Ridgeview Data Collection

Commerce City, CO
QT 4207
AM Peak
81st Ave and Tower Road

File Name : 81st and Tower AM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 1

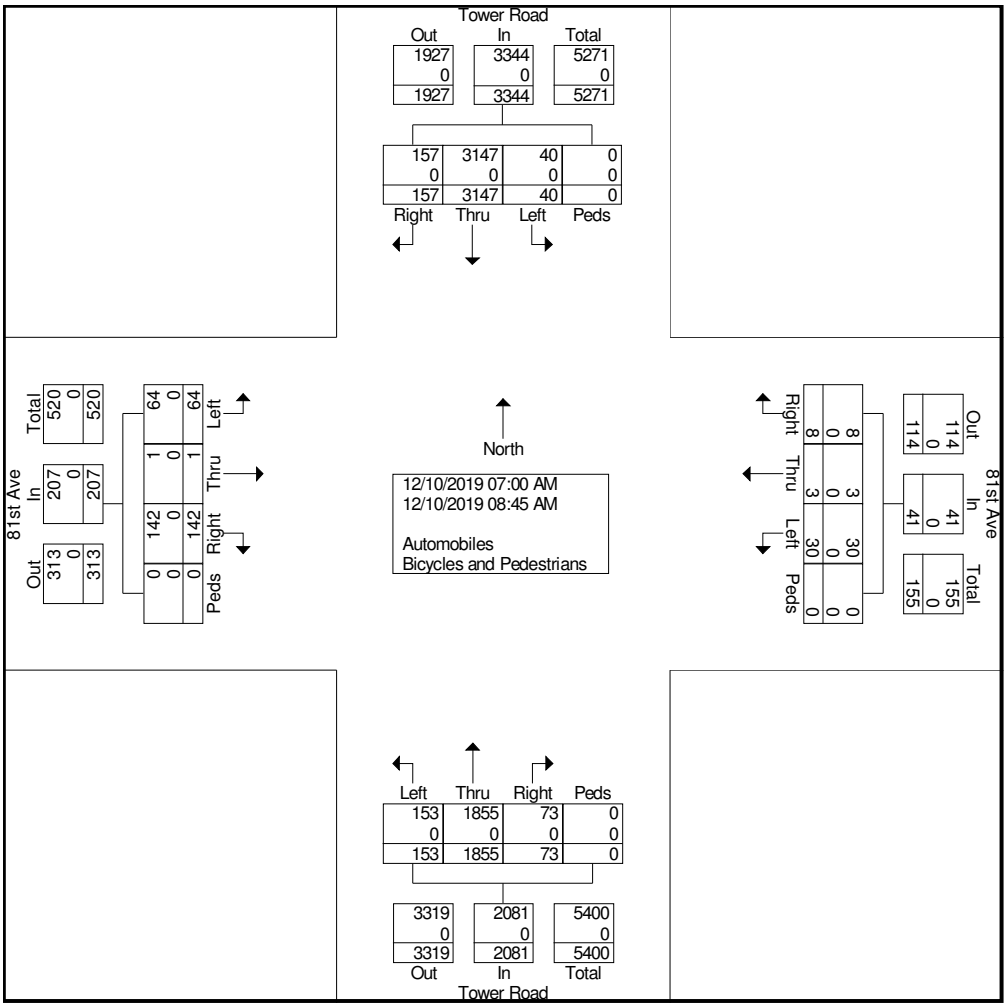
Groups Printed- Automobiles - Bicycles and Pedestrians

	81st Ave Eastbound					81st Ave Westbound					Tower Road Northbound					Tower Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	4	0	18	0	22	6	0	1	0	7	21	231	5	0	257	4	434	16	0	454	740
07:15 AM	7	0	17	0	24	4	0	1	0	5	19	265	10	0	294	7	470	18	0	495	818
07:30 AM	8	0	20	0	28	2	1	0	0	3	14	246	11	0	271	8	475	25	0	508	810
07:45 AM	11	0	13	0	24	4	1	2	0	7	24	264	7	0	295	6	417	12	0	435	761
Total	30	0	68	0	98	16	2	4	0	22	78	1006	33	0	1117	25	1796	71	0	1892	3129
08:00 AM	6	0	20	0	26	3	1	1	0	5	21	257	4	0	282	3	398	25	0	426	739
08:15 AM	12	1	21	0	34	3	0	1	0	4	26	202	15	0	243	4	326	22	0	352	633
08:30 AM	9	0	17	0	26	3	0	1	0	4	14	206	9	0	229	4	356	21	0	381	640
08:45 AM	7	0	16	0	23	5	0	1	0	6	14	184	12	0	210	4	271	18	0	293	532
Total	34	1	74	0	109	14	1	4	0	19	75	849	40	0	964	15	1351	86	0	1452	2544
Grand Total	64	1	142	0	207	30	3	8	0	41	153	1855	73	0	2081	40	3147	157	0	3344	5673
Apprch %	30.9	0.5	68.6	0		73.2	7.3	19.5	0		7.4	89.1	3.5	0		1.2	94.1	4.7	0		
Total %	1.1	0	2.5	0	3.6	0.5	0.1	0.1	0	0.7	2.7	32.7	1.3	0	36.7	0.7	55.5	2.8	0	58.9	
Automobiles	64	1	142	0	207	30	3	8	0	41	153	1855	73	0	2081	40	3147	157	0	3344	5673
% Automobiles	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100
Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ridgeview Data Collection

Commerce City, CO
QT 4207
AM Peak
81st Ave and Tower Road

File Name : 81st and Tower AM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 2

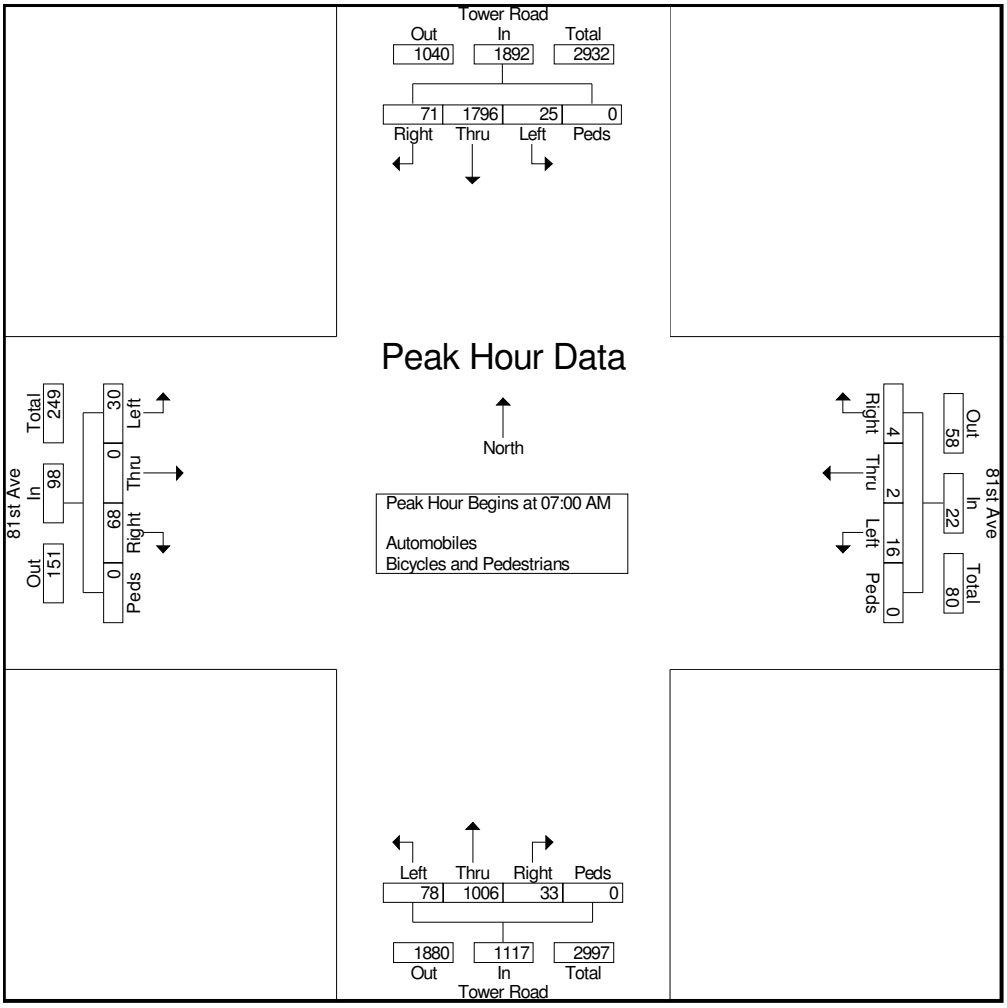


Ridgeview Data Collection

Commerce City, CO
QT 4207
AM Peak
81st Ave and Tower Road

File Name : 81st and Tower AM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 3

	81st Ave Eastbound					81st Ave Westbound					Tower Road Northbound					Tower Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	4	0	18	0	22	**6**	0	1	0	**7**	21	231	5	0	257	4	434	16	0	454	740
07:15 AM	7	0	17	0	24	4	0	1	0	5	19	**265**	10	0	294	7	470	18	0	495	**818**
07:30 AM	8	0	**20**	0	**28**	2	**1**	0	0	3	14	246	**11**	0	271	**8**	**475**	**25**	0	**508**	810
07:45 AM	**11**	0	13	0	24	4	1	**2**	0	7	**24**	264	7	0	**295**	6	417	12	0	435	761
Total Volume	30	0	68	0	98	16	2	4	0	22	78	1006	33	0	1117	25	1796	71	0	1892	3129
% App. Total	30.6	0	69.4	0		72.7	9.1	18.2	0		7	90.1	3	0		1.3	94.9	3.8	0		
PHF	.682	.000	.850	.000	.875	.667	.500	.500	.000	.786	.813	.949	.750	.000	.947	.781	.945	.710	.000	.931	.956



Ridgeview Data Collection

Commerce City, CO
QT 4207
PM Peak
81st Ave and Tower Road

File Name : 81st and Tower PM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 1

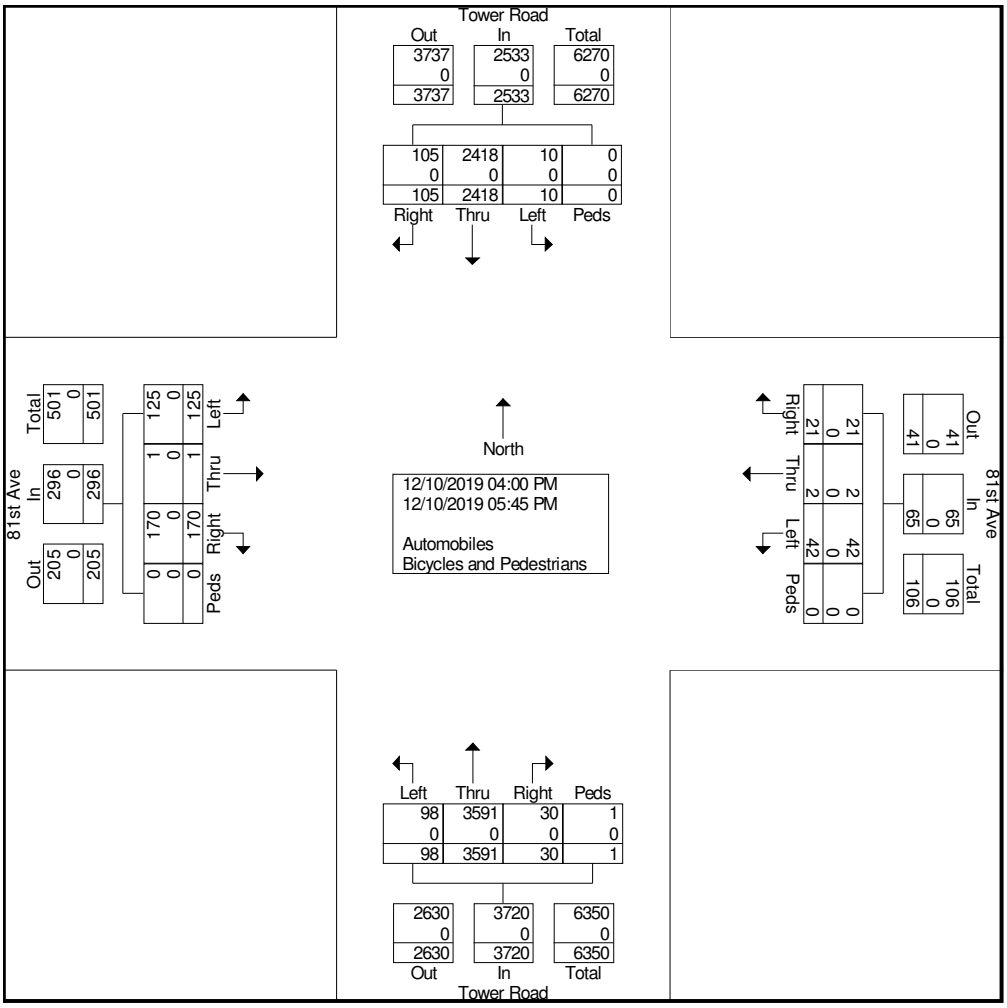
Groups Printed- Automobiles - Bicycles and Pedestrians

	81st Ave Eastbound					81st Ave Westbound					Tower Road Northbound					Tower Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	17	0	19	0	36	2	0	0	0	2	18	493	3	0	514	0	291	9	0	300	852
04:15 PM	19	0	18	0	37	3	0	4	0	7	15	475	4	0	494	4	241	11	0	256	794
04:30 PM	14	1	17	0	32	9	1	3	0	13	8	475	4	0	487	2	281	13	0	296	828
04:45 PM	13	0	23	0	36	2	0	4	0	6	12	456	6	0	474	0	340	12	0	352	868
Total	63	1	77	0	141	16	1	11	0	28	53	1899	17	0	1969	6	1153	45	0	1204	3342
05:00 PM	23	0	33	0	56	7	1	3	0	11	13	441	5	1	460	2	337	21	0	360	887
05:15 PM	9	0	21	0	30	11	0	1	0	12	9	450	2	0	461	1	358	10	0	369	872
05:30 PM	14	0	19	0	33	2	0	4	0	6	14	436	3	0	453	1	307	14	0	322	814
05:45 PM	16	0	20	0	36	6	0	2	0	8	9	365	3	0	377	0	263	15	0	278	699
Total	62	0	93	0	155	26	1	10	0	37	45	1692	13	1	1751	4	1265	60	0	1329	3272
Grand Total	125	1	170	0	296	42	2	21	0	65	98	3591	30	1	3720	10	2418	105	0	2533	6614
Apprch %	42.2	0.3	57.4	0		64.6	3.1	32.3	0		2.6	96.5	0.8	0		0.4	95.5	4.1	0		
Total %	1.9	0	2.6	0	4.5	0.6	0	0.3	0	1	1.5	54.3	0.5	0	56.2	0.2	36.6	1.6	0	38.3	
Automobiles	125	1	170	0	296	42	2	21	0	65	98	3591	30	1	3720	10	2418	105	0	2533	6614
% Automobiles	100	100	100	0	100	100	100	100	0	100	100	100	100	100	100	100	100	100	0	100	100
Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Ridgeview Data Collection

Commerce City, CO
QT 4207
PM Peak
81st Ave and Tower Road

File Name : 81st and Tower PM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 2

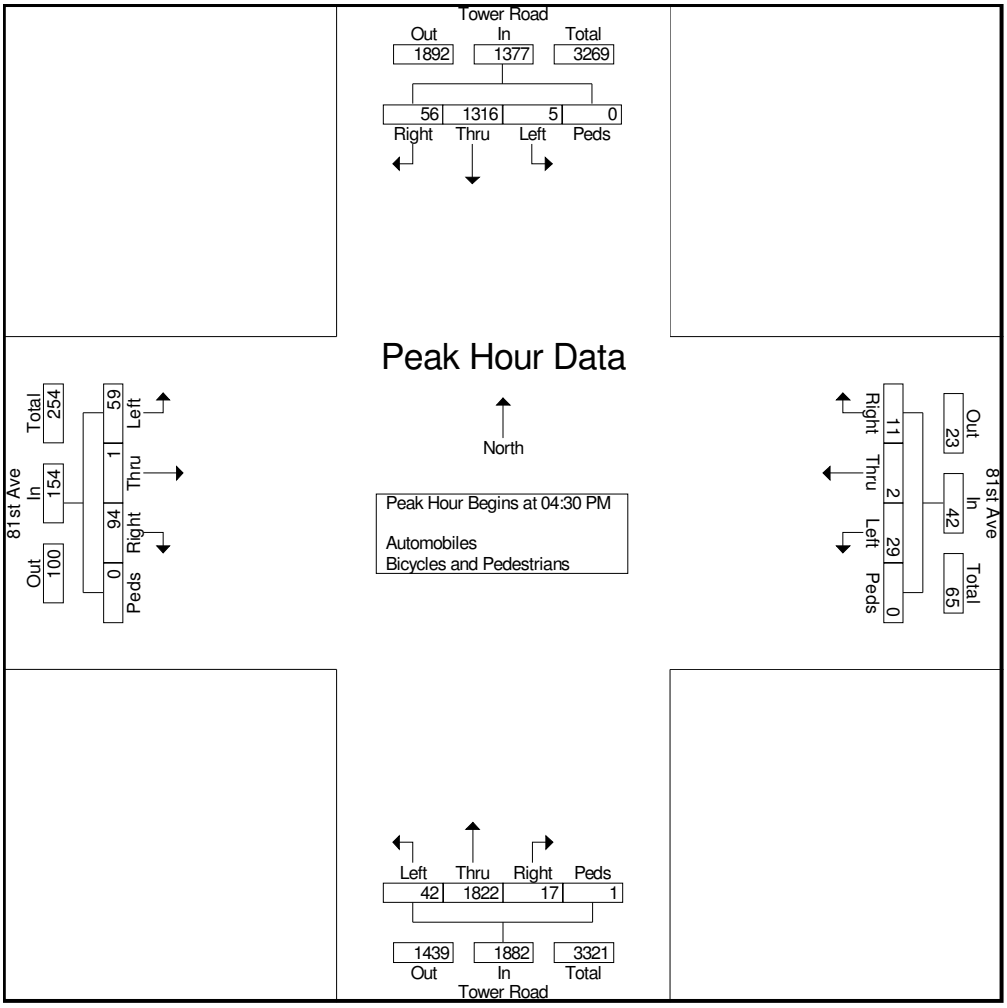


Ridgeview Data Collection

Commerce City, CO
QT 4207
PM Peak
81st Ave and Tower Road

File Name : 81st and Tower PM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 3

	81st Ave Eastbound					81st Ave Westbound					Tower Road Northbound					Tower Road Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	14	**1**	17	0	32	9	**1**	3	0	**13**	8	**475**	4	0	**487**	**2**	281	13	0	296	828
04:45 PM	13	0	23	0	36	2	0	**4**	0	6	12	456	**6**	0	474	0	340	12	0	352	868
05:00 PM	**23**	0	**33**	0	**56**	7	1	3	0	11	**13**	441	5	**1**	460	2	337	**21**	0	360	**887**
05:15 PM	9	0	21	0	30	**11**	0	1	0	12	9	450	2	0	461	1	**358**	10	0	**369**	872
Total Volume	59	1	94	0	154	29	2	11	0	42	42	1822	17	1	1882	5	1316	56	0	1377	3455
% App. Total	38.3	0.6	61	0		69	4.8	26.2	0		2.2	96.8	0.9	0.1		0.4	95.6	4.1	0		
PHF	.641	.250	.712	.000	.688	.659	.500	.688	.000	.808	.808	.959	.708	.250	.966	.625	.919	.667	.000	.933	.974



Ridgeview Data Collection

Commerce City, CO
QT 4207
AM Peak
81st Ave Access

File Name : 81st Ave Access AM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 1

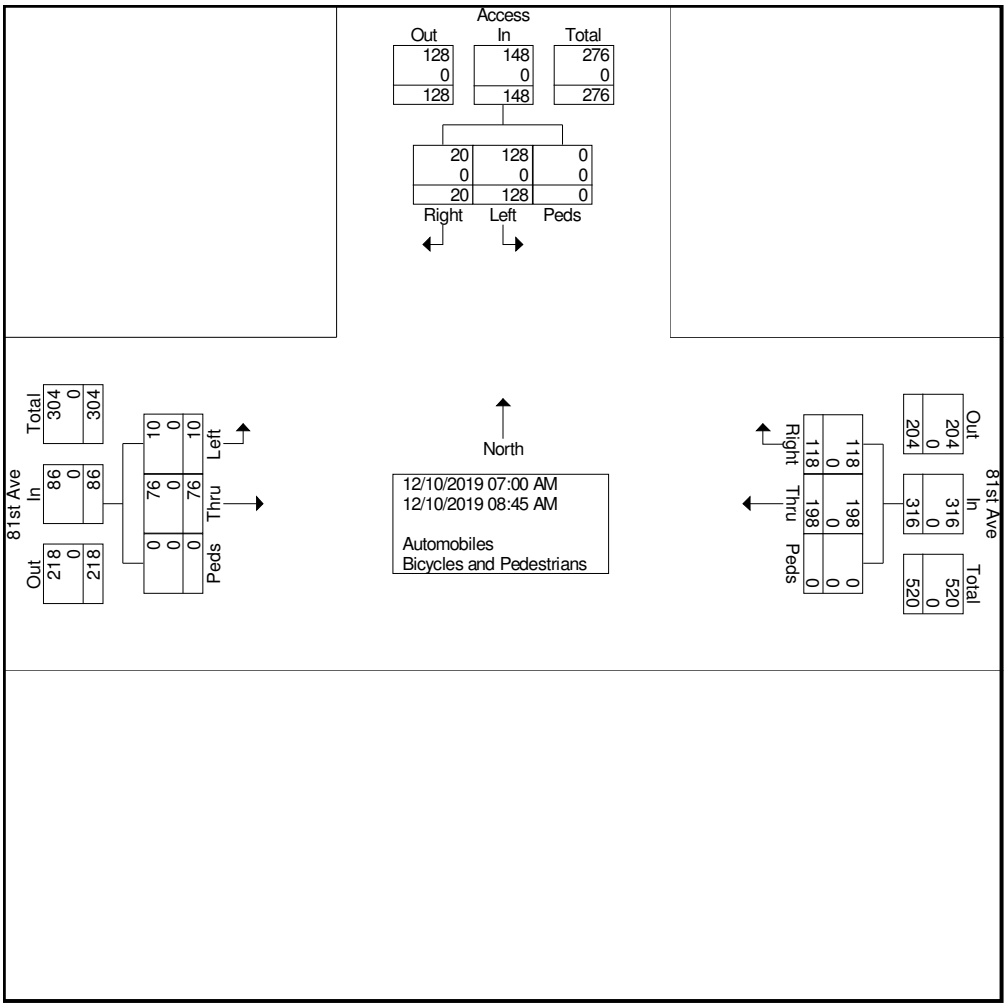
Groups Printed- Automobiles - Bicycles and Pedestrians

	81st Ave Eastbound				81st Ave Westbound				Access Southbound				
Start Time	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	2	10	0	12	28	12	0	40	12	2	0	14	66
07:15 AM	2	12	0	14	22	17	0	39	15	2	0	17	70
07:30 AM	3	9	0	12	29	10	0	39	17	4	0	21	72
07:45 AM	0	7	0	7	22	18	0	40	17	2	0	19	66
Total	7	38	0	45	101	57	0	158	61	10	0	71	274
08:00 AM	0	8	0	8	25	18	0	43	16	2	0	18	69
08:15 AM	0	9	0	9	30	21	0	51	25	3	0	28	88
08:30 AM	1	12	0	13	25	11	0	36	12	2	0	14	63
08:45 AM	2	9	0	11	17	11	0	28	14	3	0	17	56
Total	3	38	0	41	97	61	0	158	67	10	0	77	276
Grand Total	10	76	0	86	198	118	0	316	128	20	0	148	550
Apprch %	11.6	88.4	0		62.7	37.3	0		86.5	13.5	0		
Total %	1.8	13.8	0	15.6	36	21.5	0	57.5	23.3	3.6	0	26.9	
Automobiles	10	76	0	86	198	118	0	316	128	20	0	148	550
% Automobiles	100	100	0	100	100	100	0	100	100	100	0	100	100
Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Ridgeview Data Collection

Commerce City, CO
QT 4207
AM Peak
81st Ave Access

File Name : 81st Ave Access AM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 2

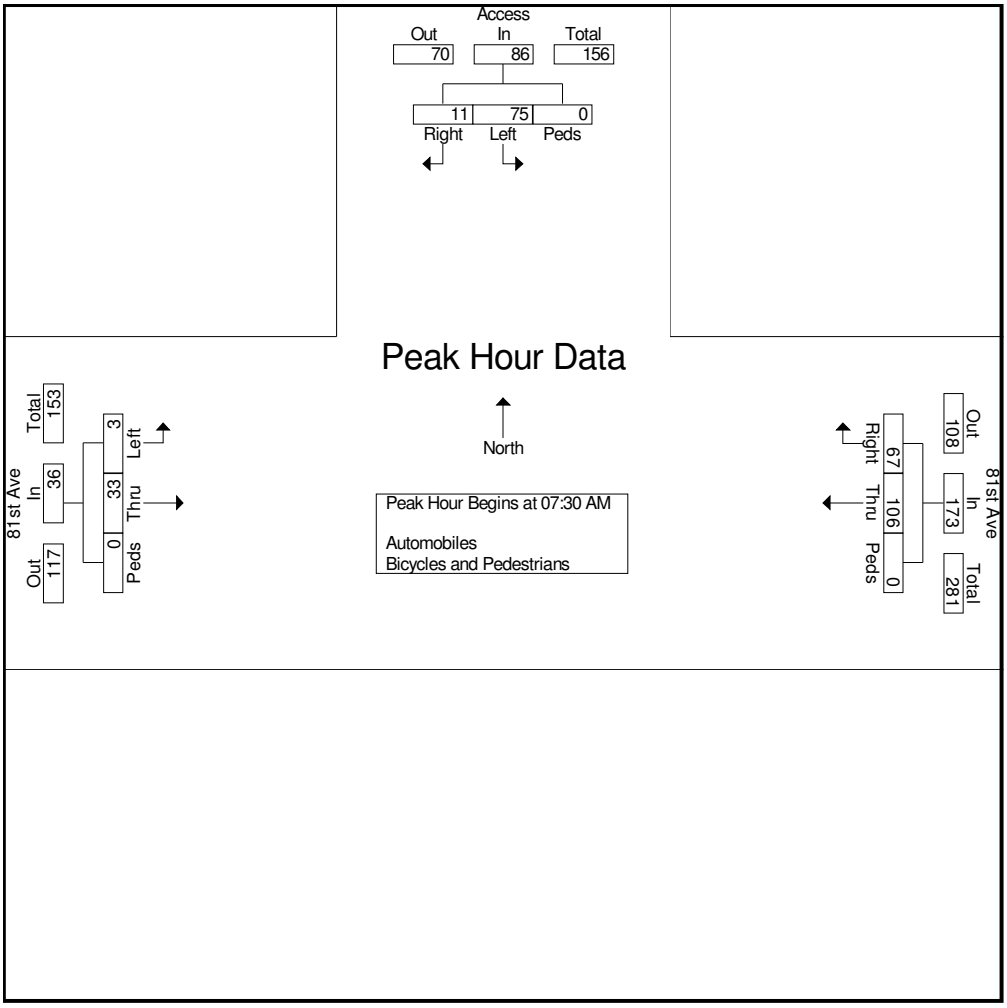


Ridgeview Data Collection

Commerce City, CO
QT 4207
AM Peak
81st Ave Access

File Name : 81st Ave Access AM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 3

	81st Ave Eastbound				81st Ave Westbound				Access Southbound				
Start Time	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	**3**	**9**	0	**12**	29	10	0	39	17	**4**	0	21	72
07:45 AM	0	7	0	7	22	18	0	40	17	2	0	19	66
08:00 AM	0	8	0	8	25	18	0	43	16	2	0	18	69
08:15 AM	0	9	0	9	**30**	**21**	0	**51**	**25**	3	0	**28**	**88**
Total Volume	3	33	0	36	106	67	0	173	75	11	0	86	295
% App. Total	8.3	91.7	0		61.3	38.7	0		87.2	12.8	0		
PHF	.250	.917	.000	.750	.883	.798	.000	.848	.750	.688	.000	.768	.838



Ridgeview Data Collection

Commerce City, CO
QT 4207
PM Peak
81st Ave Access

File Name : 81st Ave Access PM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 1

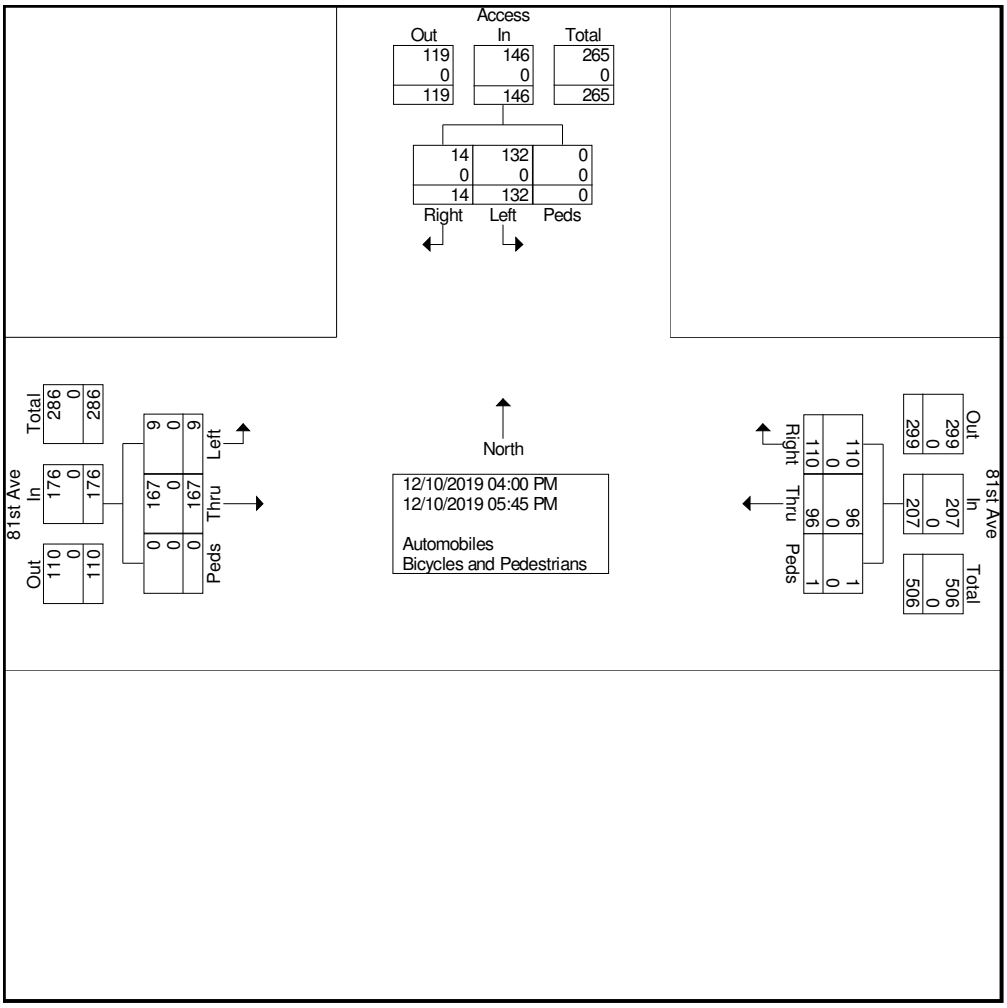
Groups Printed- Automobiles - Bicycles and Pedestrians

	81st Ave Eastbound				81st Ave Westbound				Access Southbound				
Start Time	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	2	21	0	23	11	16	0	27	14	0	0	14	64
04:15 PM	0	13	0	13	12	17	0	29	23	3	0	26	68
04:30 PM	0	17	0	17	12	12	0	24	15	0	0	15	56
04:45 PM	3	21	0	24	13	10	0	23	15	3	0	18	65
Total	5	72	0	77	48	55	0	103	67	6	0	73	253
05:00 PM	1	36	0	37	11	20	0	31	24	4	0	28	96
05:15 PM	0	12	0	12	11	10	0	21	18	1	0	19	52
05:30 PM	2	19	0	21	11	15	1	27	12	2	0	14	62
05:45 PM	1	28	0	29	15	10	0	25	11	1	0	12	66
Total	4	95	0	99	48	55	1	104	65	8	0	73	276
Grand Total	9	167	0	176	96	110	1	207	132	14	0	146	529
Apprch %	5.1	94.9	0		46.4	53.1	0.5		90.4	9.6	0		
Total %	1.7	31.6	0	33.3	18.1	20.8	0.2	39.1	25	2.6	0	27.6	
Automobiles	9	167	0	176	96	110	1	207	132	14	0	146	529
% Automobiles	100	100	0	100	100	100	100	100	100	100	0	100	100
Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles and Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0

Ridgeview Data Collection

Commerce City, CO
QT 4207
PM Peak
81st Ave Access

File Name : 81st Ave Access PM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 2

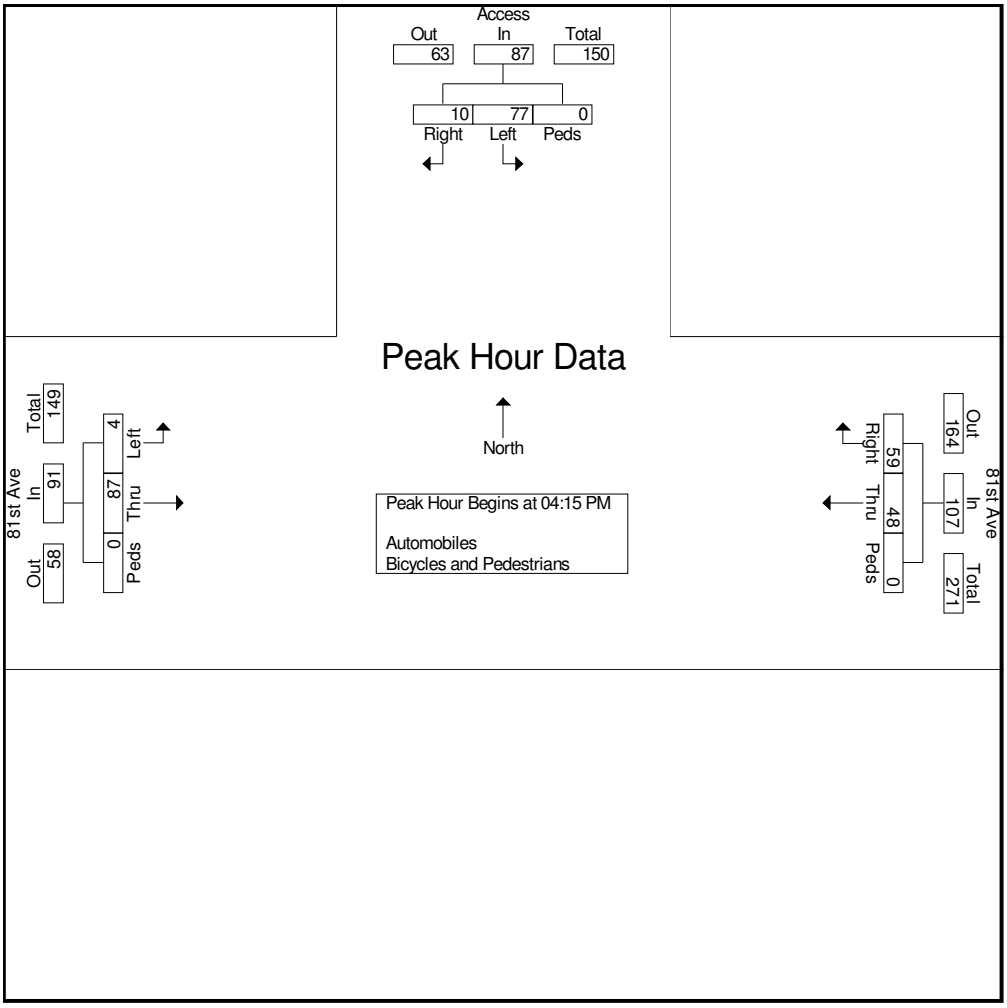


Ridgeview Data Collection

Commerce City, CO
QT 4207
PM Peak
81st Ave Access

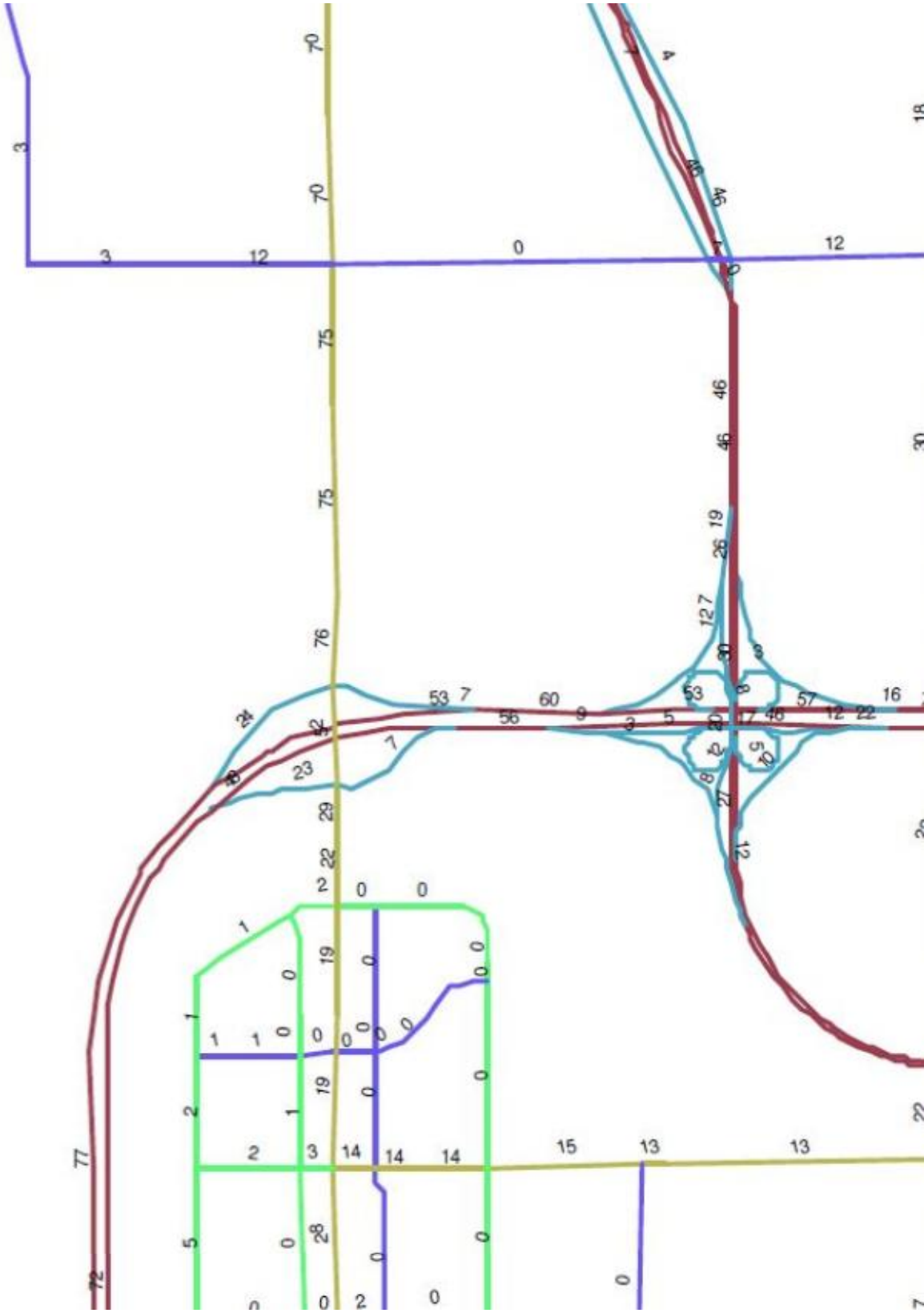
File Name : 81st Ave Access PM
Site Code : IPO 475
Start Date : 12/10/2019
Page No : 3

	81st Ave Eastbound				81st Ave Westbound				Access Southbound				
Start Time	Left	Thru	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	0	13	0	13	12	17	0	29	23	3	0	26	68
04:30 PM	0	17	0	17	12	12	0	24	15	0	0	15	56
04:45 PM	**3**	21	0	24	**13**	10	0	23	15	3	0	18	65
05:00 PM	1	**36**	0	**37**	11	**20**	0	**31**	**24**	**4**	0	**28**	**96**
Total Volume	4	87	0	91	48	59	0	107	77	10	0	87	285
% App. Total	4.4	95.6	0		44.9	55.1	0		88.5	11.5	0		
PHF	.333	.604	.000	.615	.923	.738	.000	.863	.802	.625	.000	.777	.742



APPENDIX B

DRCOG and Adjacent Traffic Study Documents



Traffic Impact Analysis

DIA Tech Center

Commerce City, Colorado

Prepared for

CH Thompson Company
c/o Vogel & Associates
475 W. 12th Avenue, Suite E
Denver, Colorado 80204

Prepared by

DB Enterprise, LLC
2429 So. Lima Street
Aurora, CO 80014
(720) 231-1947

September 16, 2011
(DBE #110070)

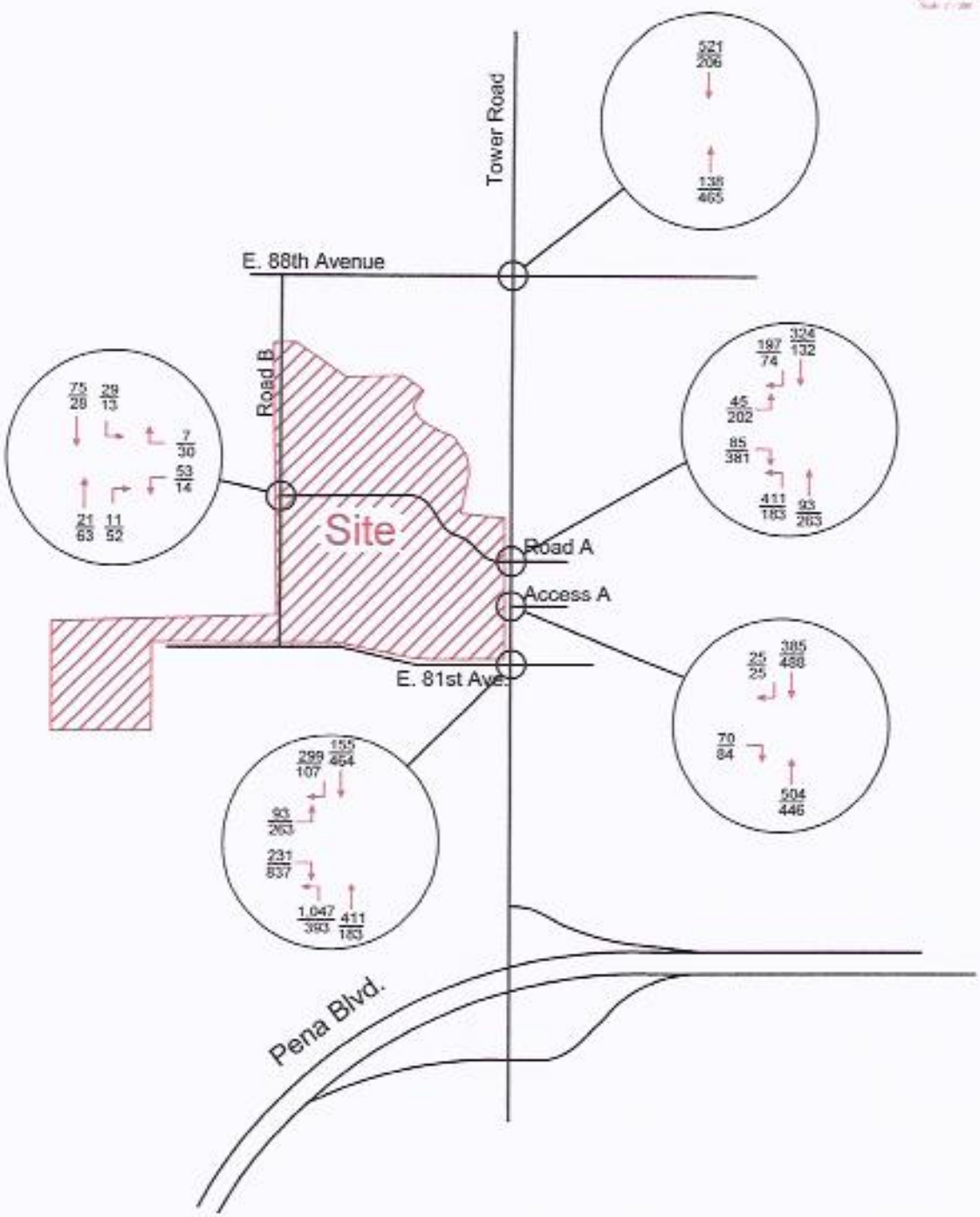


Figure 9
Year 2017 and 2032 Assignment of Site-Generated Traffic

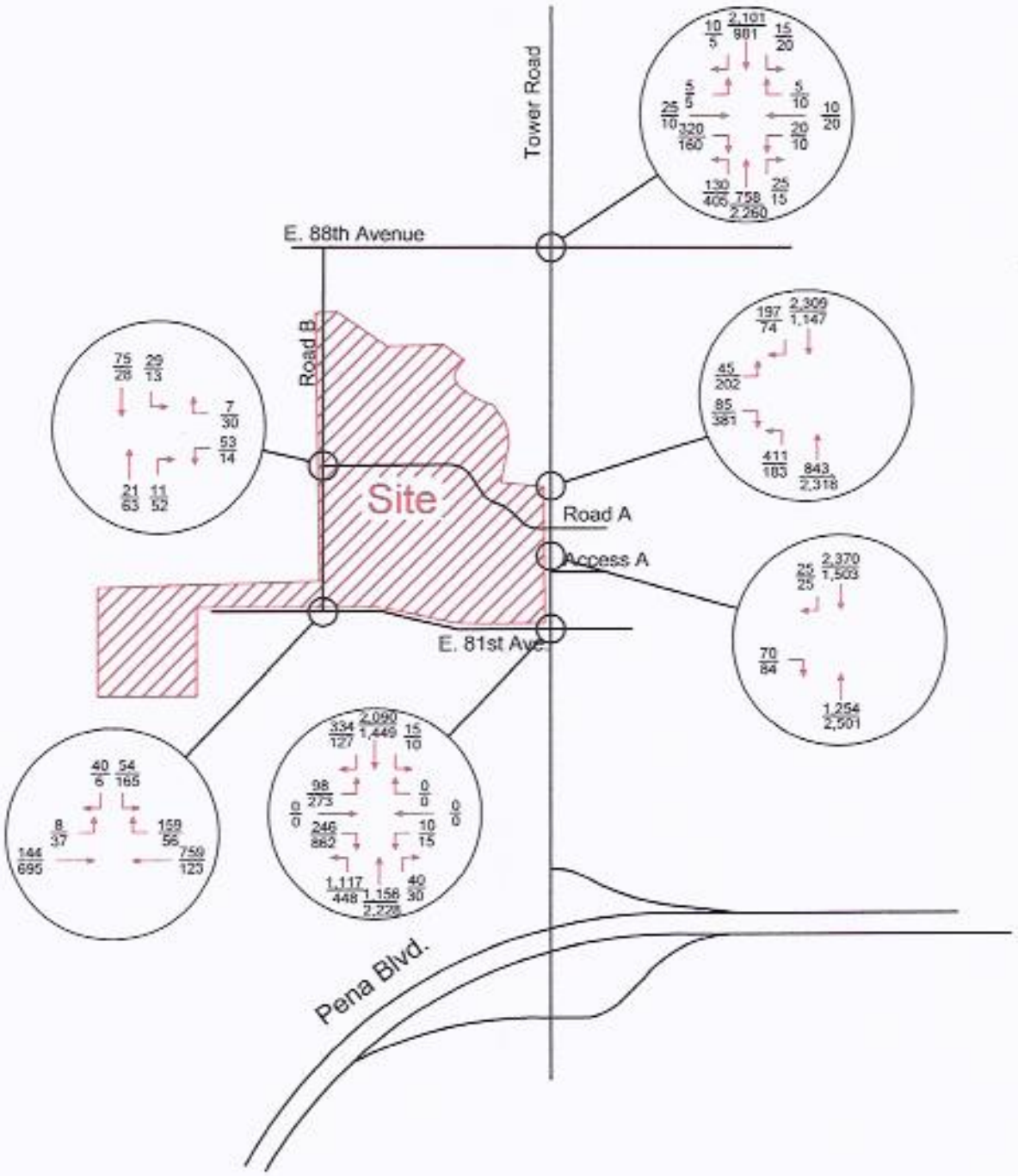


Figure 12
Year 2032 Total
Peak-Hour Traffic Volumes

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

Telluride Industrial – DIA Tech Filing 10

Commerce City, Colorado

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Prepared by
Kimley-Horn and Associates, Inc.
Curtis D. Rowe, P.E., PTOE
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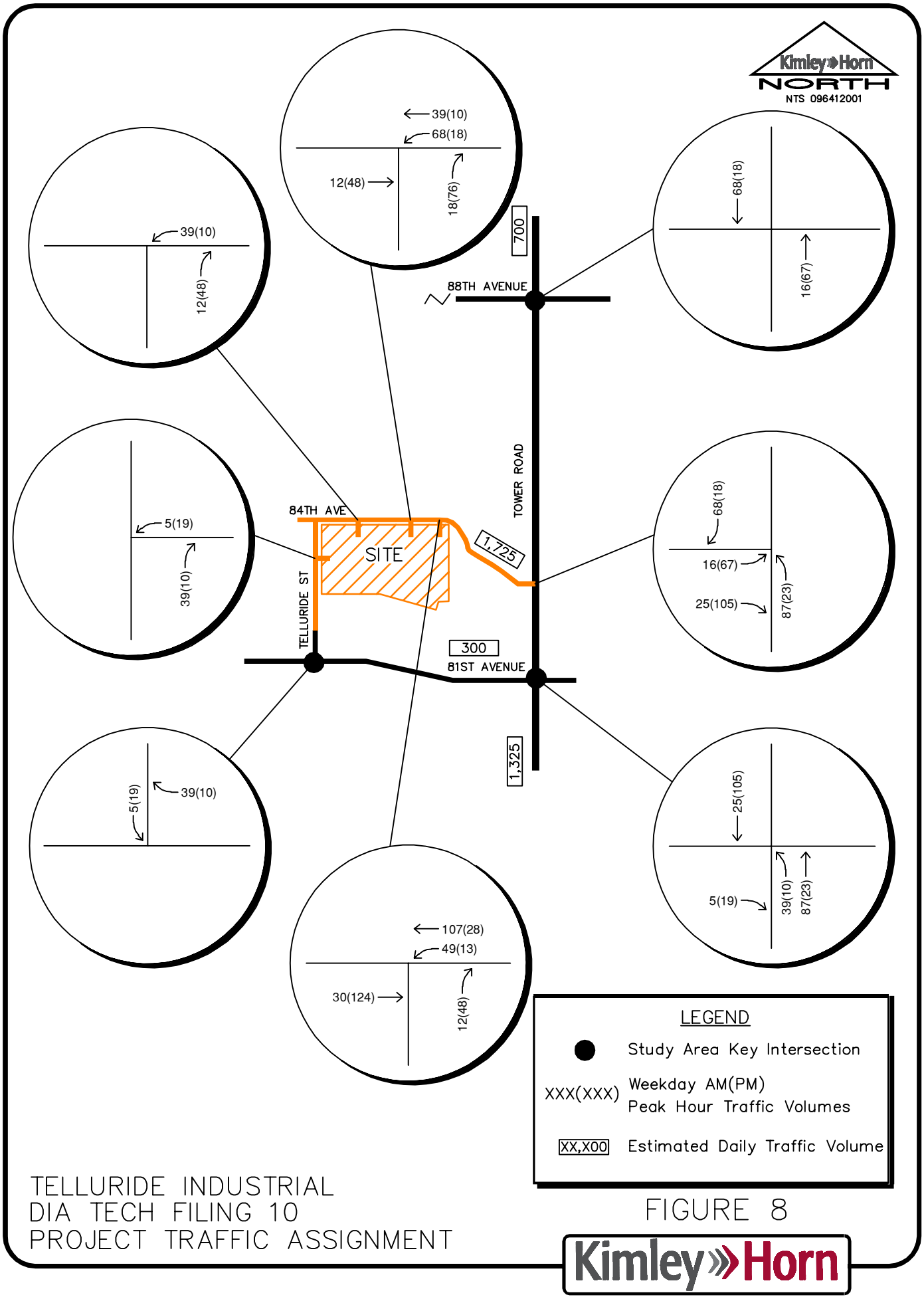
Denver, Colorado 80237
(303) 228-2300

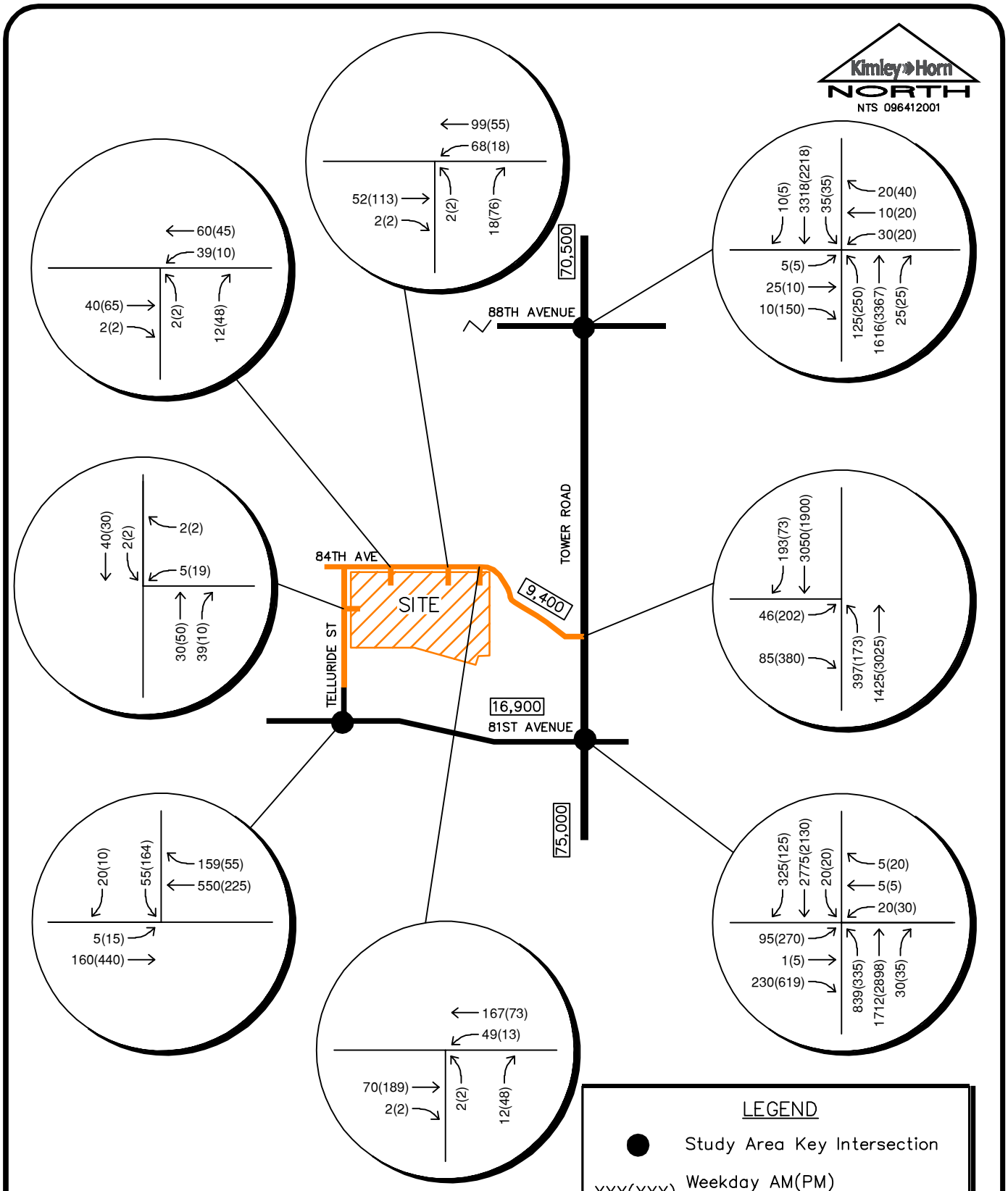
October 2019



TELLURIDE INDUSTRIAL
DIA TECH FILING 10
PROJECT TRAFFIC ASSIGNMENT

FIGURE 8

Kimley»Horn



TELLURIDE INDUSTRIAL
DIA TECH FILING 10
2040 BACKGROUND PLUS
PROJECT TRAFFIC VOLUMES

FIGURE 10

Kimley»Horn

APPENDIX C

Trip Generation Worksheets

Kimley»Horn

Project	Quik Trip 4207 Commerce City				
Subject	Trip Generation for Gasoline/Service Station with Convenience Market				
Designed by	JRP	*Date*	December 20, 2019	*Job No.*	096888003
Checked by		*Date*		*Sheet No.*	1 of 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 10th Edition, Average Rate Equations

Land Use Code - Gasoline/Service Station with Convenience Market (945)

Independant Variable - Vehicle Fueling Positions (X)

Vehicle Fueling Positions= 23 Positions
X = 23
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (900 Series page 369)

Average Weekday
T = 12.47 (X)
T = 12.47 * 23

Directional Distribution: 51% ent. 49% exit.
T = 287 Average Vehicle Trip Ends
146 entering 141 exiting

146 + 141 = 287

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (900 Series page 370)

Average Weekday
T = 13.99 (X)
T = 13.99 * 23.000

Directional Distribution: 51% ent. 49% exit.
T = 322 Average Vehicle Trip Ends
164 entering 158 exiting

164 + 158 = 322

Weekday (900 Series page 368)

Average Weekday
T = 205.36 (X)
T = 205.36 * 23.000

Directional Distribution: 50% entering, 50% exiting
T = 4724 Average Vehicle Trip Ends
2362 entering 2362 exiting

2362 + 2362 = 4724

Non Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017)

PM Peak Hour = 44% Non-Pass By AM Peak Hour = 38% Non-Pass By

	IN	Out	Total
AM Peak	55	54	109
PM Peak	72	70	142
Daily	1039	1039	2078

PM Peak Hour Rate Applied to Daily

Pass-By Trip Volumes (Per ITE Trip Generation Handbook, 3rd Edition September 2017)

PM Peak Hour = 56% Pass By AM Peak Hour = 62% Pass By

	IN	Out	Total
AM Peak	91	87	178
PM Peak	92	88	180
Daily	1323	1323	2646

PM Peak Hour Rate Applied to Daily

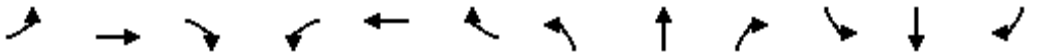
APPENDIX D

Intersection Analysis Worksheets

Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	30	68	16	2	4	78	1006	33	25	1796	71
Future Volume (vph)	30	68	16	2	4	78	1006	33	25	1796	71
Turn Type	Perm	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases				8		5	2		1	6	
Permitted Phases	4	4	8		8	2		2	6		6
Detector Phase	4	4	8	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	23.0	23.0	23.0	23.0	23.0	13.0	87.0	87.0	10.0	84.0	84.0
Total Split (%)	19.2%	19.2%	19.2%	19.2%	19.2%	10.8%	72.5%	72.5%	8.3%	70.0%	70.0%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	9.3	9.3		9.3	9.3	102.8	98.3	98.3	97.1	91.3	91.3
Actuated g/C Ratio	0.08	0.08		0.08	0.08	0.86	0.82	0.82	0.81	0.76	0.76
v/c Ratio	0.42	0.39		0.26	0.05	0.44	0.25	0.03	0.07	0.71	0.08
Control Delay	63.5	13.7		56.7	0.5	14.1	3.4	0.6	1.6	7.9	1.4
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.5	13.7		56.7	0.5	14.1	3.4	0.6	1.6	7.9	1.4
LOS	E	B		E	A	B	A	A	A	A	A
Approach Delay				44.2			4.1			7.5	
Approach LOS				D			A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 7.6	Intersection LOS: A
Intersection Capacity Utilization 73.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	0	68	16	2	4	78	1006	33	25	1796	71
Future Volume (veh/h)	30	0	68	16	2	4	78	1006	33	25	1796	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	44	0	80	24	4	8	96	1059	44	32	1911	100
Peak Hour Factor	0.68	0.92	0.85	0.67	0.50	0.50	0.81	0.95	0.75	0.78	0.94	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	127	107	132	18	107	297	4046	1256	486	2771	1236
Arrive On Green	0.07	0.00	0.07	0.07	0.07	0.07	0.04	0.79	0.79	0.05	1.00	1.00
Sat Flow, veh/h	1402	1870	1585	1132	265	1585	1781	5106	1585	1781	3554	1585
Grp Volume(v), veh/h	44	0	80	28	0	8	96	1059	44	32	1911	100
Grp Sat Flow(s),veh/h/ln	1402	1870	1585	1397	0	1585	1781	1702	1585	1781	1777	1585
Q Serve(g_s), s	3.7	0.0	5.9	1.9	0.0	0.6	1.2	6.5	0.7	0.4	0.0	0.0
Cycle Q Clear(g_c), s	5.9	0.0	5.9	2.2	0.0	0.6	1.2	6.5	0.7	0.4	0.0	0.0
Prop In Lane	1.00		1.00	0.86		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	129	127	107	150	0	107	297	4046	1256	486	2771	1236
V/C Ratio(X)	0.34	0.00	0.75	0.19	0.00	0.07	0.32	0.26	0.04	0.07	0.69	0.08
Avail Cap(c_a), veh/h	250	288	244	269	0	244	352	4046	1256	519	2771	1236
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	56.0	0.0	54.9	53.1	0.0	52.4	2.1	3.3	2.7	2.3	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	9.8	0.6	0.0	0.3	0.6	0.2	0.1	0.0	1.2	0.1
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	1.4	0.0	2.7	0.8	0.0	0.2	0.4	1.9	0.2	0.1	0.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.5	0.0	64.7	53.7	0.0	52.7	2.7	3.4	2.7	2.4	1.2	0.1
LnGrp LOS	E	A	E	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		124			36			1199			2043	
Approach Delay, s/veh		62.2			53.5			3.3			1.1	
Approach LOS		E			D			A			A	

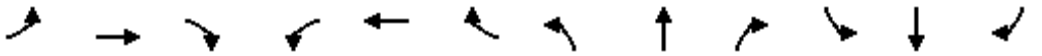
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.8	99.6		12.6	9.3	98.1		12.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	82.5		18.5	8.5	79.5		18.5				
Max Q Clear Time (g_c+I1), s	2.4	8.5		7.9	3.2	2.0		4.2				
Green Ext Time (p_c), s	0.0	10.4		0.2	0.1	34.5		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		4.7	
HCM 6th LOS		A	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	1	94	29	2	11	42	1822	17	5	1316	56
Future Volume (vph)	59	1	94	29	2	11	42	1822	17	5	1316	56
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	12.0	84.0	84.0	10.0	82.0	82.0
Total Split (%)	21.7%	21.7%	21.7%	21.7%	21.7%	21.7%	10.0%	70.0%	70.0%	8.3%	68.3%	68.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	13.5	13.5	13.5		13.5	13.5	96.9	95.5	95.5	93.4	88.8	88.8
Actuated g/C Ratio	0.11	0.11	0.11		0.11	0.11	0.81	0.80	0.80	0.78	0.74	0.74
v/c Ratio	0.61	0.02	0.46		0.31	0.07	0.18	0.47	0.02	0.04	0.55	0.07
Control Delay	66.6	44.0	14.5		52.5	0.6	5.4	8.1	1.7	3.4	8.6	3.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.6	44.0	14.5		52.5	0.6	5.4	8.1	1.7	3.4	8.6	3.1
LOS	E	D	B		D	A	A	A	A	A	A	A
Approach Delay		36.0			39.5			8.0			8.3	
Approach LOS		D			D			A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 10.3	Intersection LOS: B
Intersection Capacity Utilization 57.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	1	94	29	2	11	42	1822	17	5	1316	56
Future Volume (veh/h)	59	1	94	29	2	11	42	1822	17	5	1316	56
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	92	4	132	44	4	16	52	1898	24	8	1430	84
Peak Hour Factor	0.64	0.25	0.71	0.66	0.50	0.69	0.81	0.96	0.71	0.62	0.92	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	178	222	188	195	15	188	375	3877	1203	221	2611	1164
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.03	0.76	0.76	0.02	1.00	1.00
Sat Flow, veh/h	1392	1870	1585	1163	130	1585	1781	5106	1585	1781	3554	1585
Grp Volume(v), veh/h	92	4	132	48	0	16	52	1898	24	8	1430	84
Grp Sat Flow(s),veh/h/ln	1392	1870	1585	1292	0	1585	1781	1702	1585	1781	1777	1585
Q Serve(g_s), s	7.8	0.2	9.6	3.8	0.0	1.1	0.8	17.1	0.4	0.1	0.0	0.0
Cycle Q Clear(g_c), s	11.8	0.2	9.6	4.1	0.0	1.1	0.8	17.1	0.4	0.1	0.0	0.0
Prop In Lane	1.00		1.00	0.92		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	178	222	188	211	0	188	375	3877	1203	221	2611	1164
V/C Ratio(X)	0.52	0.02	0.70	0.23	0.00	0.09	0.14	0.49	0.02	0.04	0.55	0.07
Avail Cap(c_a), veh/h	262	335	284	289	0	284	425	3877	1203	285	2611	1164
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	53.8	46.7	50.9	48.4	0.0	47.1	3.2	5.5	3.5	4.8	0.0	0.0
Incr Delay (d2), s/veh	2.3	0.0	4.7	0.5	0.0	0.2	0.2	0.4	0.0	0.1	0.8	0.1
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	2.8	0.1	4.1	1.4	0.0	0.4	0.3	5.3	0.1	0.0	0.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.1	46.8	55.6	48.9	0.0	47.3	3.4	6.0	3.6	4.8	0.8	0.1
LnGrp LOS	E	D	E	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		228			64			1974			1522	
Approach Delay, s/veh		55.6			48.5			5.9			0.8	
Approach LOS		E			D			A			A	

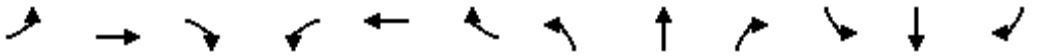
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.7	95.6		18.7	8.6	92.7		18.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	79.5		21.5	7.5	77.5		21.5				
Max Q Clear Time (g_c+I1), s	2.1	19.1		13.8	2.8	2.0		6.1				
Green Ext Time (p_c), s	0.0	27.1		0.4	0.0	18.7		0.2				

Intersection Summary			
HCM 6th Ctrl Delay		7.5	
HCM 6th LOS		A	

Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	33	79	17	2	4	124	1182	36	27	1980	77
Future Volume (vph)	33	79	17	2	4	124	1182	36	27	1980	77
Turn Type	Perm	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases				8		5	2		1	6	
Permitted Phases	4	4	8		8	2		2	6		6
Detector Phase	4	4	8	8	8	5	2	2	1	6	6
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	26.0	26.0	26.0	26.0	26.0	12.0	84.0	84.0	10.0	82.0	82.0
Total Split (%)	21.7%	21.7%	21.7%	21.7%	21.7%	10.0%	70.0%	70.0%	8.3%	68.3%	68.3%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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	Lag
Lead-Lag Optimize?						Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	9.9	9.9		9.9	9.9	101.1	92.6	92.6	90.5	84.5	84.5
Actuated g/C Ratio	0.08	0.08		0.08	0.08	0.84	0.77	0.77	0.75	0.70	0.70
v/c Ratio	0.46	0.54		0.26	0.03	0.63	0.31	0.04	0.12	0.86	0.10
Control Delay	64.4	26.8		55.6	0.2	23.9	7.6	3.4	2.9	19.6	3.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.4	26.8		55.6	0.2	23.9	7.6	3.4	2.9	19.6	3.0
LOS	E	C		E	A	C	A	A	A	B	A
Approach Delay				46.4			9.2			18.5	
Approach LOS				D			A			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 16.2	Intersection LOS: B
Intersection Capacity Utilization 81.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	0	79	17	2	4	124	1182	36	27	1980	77
Future Volume (veh/h)	33	0	79	17	2	4	124	1182	36	27	1980	77
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	52	0	111	26	4	6	153	1231	51	44	2152	115
Peak Hour Factor	0.64	0.25	0.71	0.66	0.50	0.69	0.81	0.96	0.71	0.62	0.92	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	156	165	139	155	20	139	259	3919	1216	416	2694	1202
Arrive On Green	0.09	0.00	0.09	0.09	0.09	0.09	0.04	0.77	0.77	0.06	1.00	1.00
Sat Flow, veh/h	1405	1870	1585	1126	228	1585	1781	5106	1585	1781	3554	1585
Grp Volume(v), veh/h	52	0	111	30	0	6	153	1231	51	44	2152	115
Grp Sat Flow(s),veh/h/ln	1405	1870	1585	1354	0	1585	1781	1702	1585	1781	1777	1585
Q Serve(g_s), s	4.3	0.0	8.2	2.1	0.0	0.4	2.3	8.9	0.9	0.6	0.0	0.0
Cycle Q Clear(g_c), s	6.7	0.0	8.2	2.4	0.0	0.4	2.3	8.9	0.9	0.6	0.0	0.0
Prop In Lane	1.00		1.00	0.87		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	156	165	139	175	0	139	259	3919	1216	416	2694	1202
V/C Ratio(X)	0.33	0.00	0.80	0.17	0.00	0.04	0.59	0.31	0.04	0.11	0.80	0.10
Avail Cap(c_a), veh/h	284	335	284	297	0	284	297	3919	1216	441	2694	1202
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	54.1	0.0	53.7	50.9	0.0	50.1	2.6	4.3	3.4	2.9	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	9.8	0.5	0.0	0.1	2.4	0.2	0.1	0.1	2.4	0.1
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	1.6	0.0	3.7	0.9	0.0	0.2	0.8	2.7	0.3	0.2	0.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.4	0.0	63.5	51.4	0.0	50.2	5.0	4.5	3.4	3.0	2.4	0.1
LnGrp LOS	E	A	E	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		163			36			1435			2311	
Approach Delay, s/veh		60.9			51.2			4.5			2.3	
Approach LOS		E			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.3	96.6		15.1	9.5	95.5		15.1				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	79.5		21.5	7.5	77.5		21.5				
Max Q Clear Time (g_c+I1), s	2.6	10.9		10.2	4.3	2.0		4.4				
Green Ext Time (p_c), s	0.0	13.2		0.3	0.1	43.4		0.1				

Intersection Summary	
HCM 6th Ctrl Delay	6.0
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	1	121	32	2	12	56	2006	19	5	1537	61
Future Volume (vph)	64	1	121	32	2	12	56	2006	19	5	1537	61
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	12.0	85.0	85.0	10.0	83.0	83.0
Total Split (%)	20.8%	20.8%	20.8%	20.8%	20.8%	20.8%	10.0%	70.8%	70.8%	8.3%	69.2%	69.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	13.6	13.6	13.6		13.6	13.6	96.9	95.3	95.3	92.9	88.4	88.4
Actuated g/C Ratio	0.11	0.11	0.11		0.11	0.11	0.81	0.79	0.79	0.77	0.74	0.74
v/c Ratio	0.62	0.00	0.52		0.33	0.11	0.29	0.52	0.02	0.03	0.63	0.07
Control Delay	67.0	44.0	21.6		53.0	1.9	5.9	5.3	0.1	2.6	6.4	1.4
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	44.0	21.6		53.0	1.9	5.9	5.3	0.1	2.6	6.4	1.4
LOS	E	D	C		D	A	A	A	A	A	A	A
Approach Delay		39.7			36.8			5.3			6.1	
Approach LOS		D			D			A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 65.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	1	121	32	2	12	56	2006	19	5	1537	61
Future Volume (veh/h)	64	1	121	32	2	12	56	2006	19	5	1537	61
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	94	1	142	48	4	24	69	2112	25	6	1635	86
Peak Hour Factor	0.68	0.92	0.85	0.67	0.50	0.50	0.81	0.95	0.75	0.78	0.94	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	179	230	195	201	15	195	332	3865	1200	184	2584	1152
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.04	0.76	0.76	0.02	1.00	1.00
Sat Flow, veh/h	1382	1870	1585	1167	118	1585	1781	5106	1585	1781	3554	1585
Grp Volume(v), veh/h	94	1	142	52	0	24	69	2112	25	6	1635	86
Grp Sat Flow(s),veh/h/ln	1382	1870	1585	1285	0	1585	1781	1702	1585	1781	1777	1585
Q Serve(g_s), s	8.0	0.1	10.4	4.2	0.0	1.6	1.1	20.6	0.5	0.1	0.0	0.0
Cycle Q Clear(g_c), s	12.4	0.1	10.4	4.4	0.0	1.6	1.1	20.6	0.5	0.1	0.0	0.0
Prop In Lane	1.00		1.00	0.92		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	230	195	216	0	195	332	3865	1200	184	2584	1152
V/C Ratio(X)	0.52	0.00	0.73	0.24	0.00	0.12	0.21	0.55	0.02	0.03	0.63	0.07
Avail Cap(c_a), veh/h	246	320	271	277	0	271	377	3865	1200	252	2584	1152
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	53.7	46.2	50.7	48.0	0.0	46.9	3.2	6.0	3.6	5.4	0.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	6.0	0.6	0.0	0.3	0.3	0.6	0.0	0.1	1.0	0.1
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	2.9	0.0	4.4	1.5	0.0	0.7	0.4	6.5	0.1	0.0	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.1	46.2	56.7	48.6	0.0	47.1	3.5	6.6	3.6	5.5	1.0	0.1
LnGrp LOS	E	D	E	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		237			76			2206			1727	
Approach Delay, s/veh		56.4			48.2			6.5			1.0	
Approach LOS		E			D			A			A	

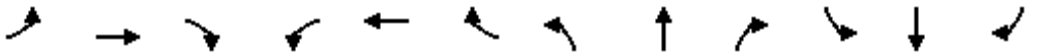
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	95.3		19.3	9.0	91.8		19.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	80.5		20.5	7.5	78.5		20.5				
Max Q Clear Time (g_c+I1), s	2.1	22.6		14.4	3.1	2.0		6.4				
Green Ext Time (p_c), s	0.0	32.0		0.4	0.0	24.6		0.2				

Intersection Summary		
HCM 6th Ctrl Delay		7.8
HCM 6th LOS		A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	2	80	17	2	4	121	1154	35	26	1995	80
Future Volume (vph)	77	2	80	17	2	4	121	1154	35	26	1995	80
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	14.0	87.5	87.5	10.0	83.5	83.5
Total Split (%)	18.8%	18.8%	18.8%	18.8%	18.8%	18.8%	11.7%	72.9%	72.9%	8.3%	69.6%	69.6%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	14.8	14.8	14.8		14.8	14.8	95.8	88.1	88.1	88.1	82.5	82.5
Actuated g/C Ratio	0.12	0.12	0.12		0.12	0.12	0.80	0.73	0.73	0.73	0.69	0.69
v/c Ratio	0.71	0.03	0.42		0.17	0.02	0.75	0.32	0.04	0.12	0.89	0.11
Control Delay	72.6	44.5	21.1		47.6	0.2	34.6	9.1	3.9	4.2	23.0	3.1
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	44.5	21.1		47.6	0.2	34.6	9.1	3.9	4.2	23.0	3.1
LOS	E	D	C		D	A	C	A	A	A	C	A
Approach Delay		47.5			39.7			11.6			21.6	
Approach LOS		D			D			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 19.8	Intersection LOS: B
Intersection Capacity Utilization 84.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	2	80	17	2	4	121	1154	35	26	1995	80
Future Volume (veh/h)	77	2	80	17	2	4	121	1154	35	26	1995	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	120	8	113	26	4	6	149	1202	49	42	2168	119
Peak Hour Factor	0.64	0.25	0.71	0.66	0.50	0.69	0.81	0.96	0.71	0.62	0.92	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	204	230	195	193	26	195	251	3744	1162	405	2570	1146
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.04	0.73	0.73	0.06	1.00	1.00
Sat Flow, veh/h	1405	1870	1585	1115	211	1585	1781	5106	1585	1781	3554	1585
Grp Volume(v), veh/h	120	8	113	30	0	6	149	1202	49	42	2168	119
Grp Sat Flow(s),veh/h/ln	1405	1870	1585	1326	0	1585	1781	1702	1585	1781	1777	1585
Q Serve(g_s), s	10.1	0.5	8.1	2.0	0.0	0.4	2.6	9.9	1.0	0.7	0.0	0.0
Cycle Q Clear(g_c), s	12.5	0.5	8.1	2.5	0.0	0.4	2.6	9.9	1.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	0.87		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	204	230	195	219	0	195	251	3744	1162	405	2570	1146
V/C Ratio(X)	0.59	0.03	0.58	0.14	0.00	0.03	0.59	0.32	0.04	0.10	0.84	0.10
Avail Cap(c_a), veh/h	242	281	238	255	0	238	318	3744	1162	431	2570	1146
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	52.8	46.4	49.7	47.2	0.0	46.3	3.6	5.6	4.4	3.9	0.0	0.0
Incr Delay (d2), s/veh	2.7	0.1	2.7	0.3	0.0	0.1	2.2	0.2	0.1	0.1	3.4	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	3.7	0.2	3.4	0.8	0.0	0.2	1.0	3.2	0.3	0.2	1.2	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.5	46.4	52.4	47.5	0.0	46.4	5.9	5.8	4.5	4.0	3.4	0.2
LnGrp LOS	E	D	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		241			36			1400			2329	
Approach Delay, s/veh		53.8			47.3			5.8			3.2	
Approach LOS		D			D			A			A	

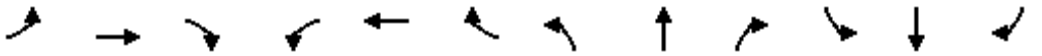
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.3	92.5		19.2	9.5	91.3		19.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	83.0		18.0	9.5	79.0		18.0				
Max Q Clear Time (g_c+I1), s	2.7	11.9		14.5	4.6	2.0		4.5				
Green Ext Time (p_c), s	0.0	12.7		0.2	0.2	44.6		0.1				

Intersection Summary	
HCM 6th Ctrl Delay	7.6
HCM 6th LOS	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	132	1	122	32	2	12	55	1959	19	5	1555	65
Future Volume (vph)	132	1	122	32	2	12	55	1959	19	5	1555	65
Turn Type	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	12.0	85.0	85.0	10.0	83.0	83.0
Total Split (%)	20.8%	20.8%	20.8%	20.8%	20.8%	20.8%	10.0%	70.8%	70.8%	8.3%	69.2%	69.2%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	19.6	19.6	19.6		19.6	19.6	90.9	89.4	89.4	86.8	82.4	82.4
Actuated g/C Ratio	0.16	0.16	0.16		0.16	0.16	0.76	0.74	0.74	0.72	0.69	0.69
v/c Ratio	0.89	0.00	0.42		0.22	0.08	0.33	0.54	0.02	0.04	0.68	0.08
Control Delay	86.2	41.0	18.3		45.8	1.5	8.7	7.2	0.1	3.2	9.3	1.4
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.2	41.0	18.3		45.8	1.5	8.7	7.2	0.1	3.2	9.3	1.4
LOS	F	D	B		D	A	A	A	A	A	A	A
Approach Delay		57.3			31.8			7.1			8.8	
Approach LOS		E			C			A			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 67.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	1	122	32	2	12	55	1959	19	5	1555	65
Future Volume (veh/h)	132	1	122	32	2	12	55	1959	19	5	1555	65
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	194	1	144	48	4	24	68	2062	25	6	1654	92
Peak Hour Factor	0.68	0.92	0.85	0.67	0.50	0.50	0.81	0.95	0.75	0.78	0.94	0.71
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	248	320	271	257	19	271	314	3621	1124	175	2414	1077
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.04	0.71	0.71	0.02	1.00	1.00
Sat Flow, veh/h	1382	1870	1585	1168	113	1585	1781	5106	1585	1781	3554	1585
Grp Volume(v), veh/h	194	1	144	52	0	24	68	2062	25	6	1654	92
Grp Sat Flow(s),veh/h/ln	1382	1870	1585	1281	0	1585	1781	1702	1585	1781	1777	1585
Q Serve(g_s), s	16.4	0.1	9.9	4.0	0.0	1.5	1.3	23.6	0.6	0.1	0.0	0.0
Cycle Q Clear(g_c), s	20.5	0.1	9.9	4.1	0.0	1.5	1.3	23.6	0.6	0.1	0.0	0.0
Prop In Lane	1.00		1.00	0.92		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	248	320	271	277	0	271	314	3621	1124	175	2414	1077
V/C Ratio(X)	0.78	0.00	0.53	0.19	0.00	0.09	0.22	0.57	0.02	0.03	0.69	0.09
Avail Cap(c_a), veh/h	248	320	271	277	0	271	359	3621	1124	243	2414	1077
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	52.1	41.3	45.4	42.9	0.0	41.9	4.7	8.5	5.2	7.6	0.0	0.0
Incr Delay (d2), s/veh	14.8	0.0	2.0	0.3	0.0	0.1	0.3	0.7	0.0	0.1	1.3	0.1
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	6.9	0.0	4.1	1.4	0.0	0.6	0.5	8.1	0.2	0.0	0.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.8	41.3	47.4	43.3	0.0	42.0	5.0	9.2	5.2	7.6	1.3	0.1
LnGrp LOS	E	D	D	D	A	D	A	A	A	A	A	A
Approach Vol, veh/h		339			76			2155			1752	
Approach Delay, s/veh		58.5			42.9			9.0			1.3	
Approach LOS		E			D			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	89.6		25.0	9.0	86.0		25.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	80.5		20.5	7.5	78.5		20.5				
Max Q Clear Time (g_c+I1), s	2.1	25.6		22.5	3.3	2.0		6.1				
Green Ext Time (p_c), s	0.0	29.9		0.0	0.0	25.2		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	95	0	20	5	840	1610	35	25	2825	325
Future Volume (vph)	95	0	20	5	840	1610	35	25	2825	325
Turn Type	Prot	NA	Perm	NA	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		8	5	2		1	6	
Permitted Phases			8				2	6		6
Detector Phase	7	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	10.0	32.5	22.5	22.5	28.0	78.0	78.0	9.5	59.5	59.5
Total Split (%)	8.3%	27.1%	18.8%	18.8%	23.3%	65.0%	65.0%	7.9%	49.6%	49.6%
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	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	5.5	13.9	8.0	8.0	37.6	90.7	90.7	60.9	55.0	55.0
Actuated g/C Ratio	0.05	0.12	0.07	0.07	0.31	0.76	0.76	0.51	0.46	0.46
v/c Ratio	0.66	0.58	0.25	0.08	0.85	0.44	0.03	0.13	1.32	0.43
Control Delay	76.1	9.0	59.1	39.0	41.2	11.4	0.5	9.6	174.7	9.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.1	9.0	59.1	39.0	41.2	11.4	0.5	9.6	174.7	9.6
LOS	E	A	E	D	D	B	A	A	F	A
Approach Delay		28.6		52.8		21.6			156.6	
Approach LOS		C		D		C			F	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.32	
Intersection Signal Delay: 94.2	Intersection LOS: F
Intersection Capacity Utilization 106.4%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	0	230	20	5	5	840	1610	35	25	2825	325
Future Volume (veh/h)	95	0	230	20	5	5	840	1610	35	25	2825	325
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	103	0	54	22	5	5	913	1677	38	27	3071	353
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	154	0	192	113	34	34	677	3786	1175	266	2912	904
Arrive On Green	0.04	0.00	0.12	0.04	0.04	0.04	0.20	0.74	0.74	0.05	1.00	1.00
Sat Flow, veh/h	3456	0	1585	1350	858	858	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	103	0	54	22	0	10	913	1677	38	27	3071	353
Grp Sat Flow(s),veh/h/ln	1728	0	1585	1350	0	1716	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	3.5	0.0	3.7	1.9	0.0	0.7	23.5	15.2	0.8	0.7	68.4	0.0
Cycle Q Clear(g_c), s	3.5	0.0	3.7	1.9	0.0	0.7	23.5	15.2	0.8	0.7	68.4	0.0
Prop In Lane	1.00		1.00	1.00		0.50	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	154	0	192	113	0	67	677	3786	1175	266	2912	904
V/C Ratio(X)	0.67	0.00	0.28	0.19	0.00	0.15	1.35	0.44	0.03	0.10	1.05	0.39
Avail Cap(c_a), veh/h	158	0	370	263	0	257	677	3786	1175	296	2912	904
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	56.5	0.0	48.0	56.3	0.0	55.7	48.2	6.0	4.1	9.7	0.0	0.0
Incr Delay (d2), s/veh	10.0	0.0	0.8	0.8	0.0	1.0	166.8	0.4	0.1	0.2	32.9	1.2
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	1.8	0.0	1.5	0.7	0.0	0.3	25.7	4.9	0.2	0.3	8.9	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.5	0.0	48.7	57.1	0.0	56.7	215.0	6.4	4.2	9.9	32.9	1.2
LnGrp LOS	E	A	D	E	A	E	F	A	A	A	F	A
Approach Vol, veh/h		157			32			2628			3451	
Approach Delay, s/veh		60.4			57.0			78.8			29.5	
Approach LOS		E			E			E			C	

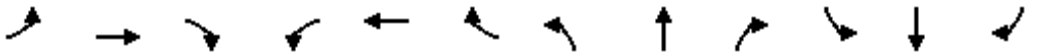
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.5	93.5		19.1	28.0	72.9	9.8	9.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	73.5		28.0	23.5	55.0	5.5	18.0				
Max Q Clear Time (g_c+I1), s	2.7	17.2		5.7	25.5	70.4	5.5	3.9				
Green Ext Time (p_c), s	0.0	21.4		0.2	0.0	0.0	0.0	0.0				

Intersection Summary												
HCM 6th Ctrl Delay			51.1									
HCM 6th LOS			D									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	270	1	30	5	335	2850	20	5	2125	125
Future Volume (vph)	270	1	30	5	335	2850	20	5	2125	125
Turn Type	Prot	NA	Perm	NA	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		8	5	2		1	6	
Permitted Phases			8				2	6		6
Detector Phase	7	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	21.0	44.0	23.0	23.0	20.0	66.0	66.0	10.0	56.0	56.0
Total Split (%)	17.5%	36.7%	19.2%	19.2%	16.7%	55.0%	55.0%	8.3%	46.7%	46.7%
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	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	20.4	39.5	16.8	16.8	15.2	69.5	69.5	57.3	51.8	51.8
Actuated g/C Ratio	0.17	0.33	0.14	0.14	0.13	0.58	0.58	0.48	0.43	0.43
v/c Ratio	0.50	1.04	0.49	0.09	0.84	1.02	0.02	0.03	1.03	0.18
Control Delay	50.7	74.4	71.6	23.3	68.4	49.8	0.1	9.8	54.0	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.7	74.4	71.6	23.3	68.4	49.8	0.1	9.8	54.0	3.0
LOS	D	E	E	C	E	D	A	A	D	A
Approach Delay		67.3		52.8		51.4			51.1	
Approach LOS		E		D		D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 53.6	Intersection LOS: D
Intersection Capacity Utilization 108.9%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	270	1	620	30	5	15	335	2850	20	5	2125	125
Future Volume (veh/h)	270	1	620	30	5	15	335	2850	20	5	2125	125
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	293	1	348	33	5	16	364	3000	22	5	2261	136
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.94	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	357	1	408	110	46	147	420	3182	988	78	2594	805
Arrive On Green	0.10	0.26	0.26	0.12	0.12	0.12	0.12	0.62	0.62	0.01	1.00	1.00
Sat Flow, veh/h	3456	5	1581	1032	392	1253	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	293	0	349	33	0	21	364	3000	22	5	2261	136
Grp Sat Flow(s),veh/h/ln	1728	0	1586	1032	0	1645	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	10.0	0.0	25.1	3.8	0.0	1.4	12.4	64.4	0.6	0.2	0.0	0.0
Cycle Q Clear(g_c), s	10.0	0.0	25.1	12.0	0.0	1.4	12.4	64.4	0.6	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.76	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	357	0	409	110	0	193	420	3182	988	78	2594	805
V/C Ratio(X)	0.82	0.00	0.85	0.30	0.00	0.11	0.87	0.94	0.02	0.06	0.87	0.17
Avail Cap(c_a), veh/h	475	0	522	148	0	254	446	3182	988	148	2594	805
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	52.7	0.0	42.4	56.1	0.0	47.4	51.8	20.7	8.6	25.4	0.0	0.0
Incr Delay (d2), s/veh	8.4	0.0	10.6	1.5	0.0	0.2	15.7	7.3	0.0	0.3	3.6	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	11.0	1.0	0.0	0.6	6.3	25.6	0.2	0.1	0.9	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.1	0.0	53.0	57.6	0.0	47.6	67.5	27.9	8.7	25.7	3.6	0.4
LnGrp LOS	E	A	D	E	A	D	E	C	A	C	A	A
Approach Vol, veh/h		642			54			3386			2402	
Approach Delay, s/veh		56.7			53.7			32.1			3.5	
Approach LOS		E			D			C			A	

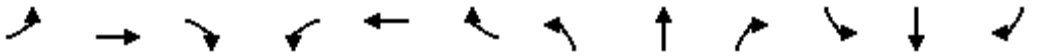
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.3	79.3		35.5	19.1	65.5	16.9	18.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	61.5		39.5	15.5	51.5	16.5	18.5				
Max Q Clear Time (g_c+I1), s	2.2	66.4		27.1	14.4	2.0	12.0	14.0				
Green Ext Time (p_c), s	0.0	0.0		1.8	0.2	33.2	0.4	0.0				

Intersection Summary												
HCM 6th Ctrl Delay			24.1									
HCM 6th LOS			C									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	139	2	20	5	837	1582	34	24	2840	328
Future Volume (vph)	139	2	20	5	837	1582	34	24	2840	328
Turn Type	Prot	NA	Perm	NA	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		8	5	2		1	6	
Permitted Phases			8				2	6		6
Detector Phase	7	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	10.0	32.5	22.5	22.5	28.0	78.0	78.0	9.5	59.5	59.5
Total Split (%)	8.3%	27.1%	18.8%	18.8%	23.3%	65.0%	65.0%	7.9%	49.6%	49.6%
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	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	5.5	13.9	8.1	8.1	37.6	90.7	90.7	60.9	55.0	55.0
Actuated g/C Ratio	0.05	0.12	0.07	0.07	0.31	0.76	0.76	0.51	0.46	0.46
v/c Ratio	0.96	0.62	0.25	0.08	0.85	0.43	0.03	0.13	1.32	0.43
Control Delay	119.7	12.8	59.0	39.0	41.2	11.2	0.5	9.5	177.7	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	119.7	12.8	59.0	39.0	41.2	11.2	0.5	9.5	177.7	9.7
LOS	F	B	E	D	D	B	A	A	F	A
Approach Delay		52.8		52.8		21.6			159.2	
Approach LOS		D		D		C			F	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.32	
Intersection Signal Delay: 97.1	Intersection LOS: F
Intersection Capacity Utilization 106.6%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	139	2	231	20	5	5	837	1582	34	24	2840	328
Future Volume (veh/h)	139	2	231	20	5	5	837	1582	34	24	2840	328
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	151	2	55	22	5	5	910	1648	37	26	3087	357
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	7	189	113	34	34	677	3781	1174	270	2904	902
Arrive On Green	0.05	0.12	0.12	0.04	0.04	0.04	0.20	0.74	0.74	0.05	1.00	1.00
Sat Flow, veh/h	3456	56	1538	1346	858	858	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	151	0	57	22	0	10	910	1648	37	26	3087	357
Grp Sat Flow(s),veh/h/ln	1728	0	1594	1346	0	1716	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	5.2	0.0	3.9	1.9	0.0	0.7	23.5	14.8	0.7	0.7	68.3	0.0
Cycle Q Clear(g_c), s	5.2	0.0	3.9	1.9	0.0	0.7	23.5	14.8	0.7	0.7	68.3	0.0
Prop In Lane	1.00		0.96	1.00		0.50	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	158	0	196	113	0	68	677	3781	1174	270	2904	902
V/C Ratio(X)	0.95	0.00	0.29	0.19	0.00	0.15	1.34	0.44	0.03	0.10	1.06	0.40
Avail Cap(c_a), veh/h	158	0	372	262	0	257	677	3781	1174	301	2904	902
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94
Uniform Delay (d), s/veh	57.1	0.0	47.9	56.3	0.0	55.7	48.2	6.0	4.1	9.8	0.0	0.0
Incr Delay (d2), s/veh	57.5	0.0	0.8	0.8	0.0	1.0	164.9	0.4	0.0	0.1	36.0	1.2
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	3.5	0.0	1.6	0.7	0.0	0.3	25.6	4.8	0.2	0.3	9.7	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	114.7	0.0	48.7	57.1	0.0	56.7	213.1	6.3	4.2	10.0	36.0	1.2
LnGrp LOS	F	A	D	E	A	E	F	A	A	A	F	A
Approach Vol, veh/h		208			32			2595			3470	
Approach Delay, s/veh		96.6			57.0			78.8			32.3	
Approach LOS		F			E			E			C	

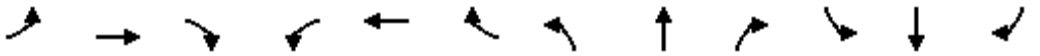
Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.4	93.4		19.2	28.0	72.8	10.0	9.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	73.5		28.0	23.5	55.0	5.5	18.0				
Max Q Clear Time (g_c+I1), s	2.7	16.8		5.9	25.5	70.3	7.2	3.9				
Green Ext Time (p_c), s	0.0	20.8		0.2	0.0	0.0	0.0	0.0				

Intersection Summary			
HCM 6th Ctrl Delay		53.7	
HCM 6th LOS		D	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	338	1	30	5	334	2803	20	5	2143	129
Future Volume (vph)	338	1	30	5	334	2803	20	5	2143	129
Turn Type	Prot	NA	Perm	NA	Prot	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		8	5	2		1	6	
Permitted Phases			8				2	6		6
Detector Phase	7	4	8	8	5	2	2	1	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	22.5	22.5	22.5	9.5	22.5	22.5	9.5	22.5	22.5
Total Split (s)	21.0	44.0	23.0	23.0	20.0	66.0	66.0	10.0	56.0	56.0
Total Split (%)	17.5%	36.7%	19.2%	19.2%	16.7%	55.0%	55.0%	8.3%	46.7%	46.7%
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	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Act Effct Green (s)	21.1	39.5	16.1	16.1	15.1	69.5	69.5	57.4	51.9	51.9
Actuated g/C Ratio	0.18	0.33	0.13	0.13	0.13	0.58	0.58	0.48	0.43	0.43
v/c Ratio	0.61	1.04	0.49	0.09	0.84	1.00	0.02	0.03	1.04	0.18
Control Delay	52.5	75.4	71.9	23.3	68.2	45.3	0.1	10.0	56.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.5	75.4	71.9	23.3	68.2	45.3	0.1	10.0	56.7	3.2
LOS	D	E	E	C	E	D	A	A	E	A
Approach Delay		67.4		53.0		47.5			53.5	
Approach LOS		E		D		D			D	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 52.7	Intersection LOS: D
Intersection Capacity Utilization 108.1%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 1: Tower Road & 81st Avenue



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	338	1	621	30	5	15	334	2803	20	5	2143	129
Future Volume (veh/h)	338	1	621	30	5	15	334	2803	20	5	2143	129
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	367	1	349	33	5	16	363	2951	22	5	2280	140
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.94	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	426	1	409	110	38	123	419	3178	987	80	2592	805
Arrive On Green	0.12	0.26	0.26	0.10	0.10	0.10	0.12	0.62	0.62	0.01	1.00	1.00
Sat Flow, veh/h	3456	5	1581	1031	392	1253	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	367	0	350	33	0	21	363	2951	22	5	2280	140
Grp Sat Flow(s),veh/h/ln	1728	0	1586	1031	0	1645	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	12.5	0.0	25.2	3.8	0.0	1.4	12.4	62.0	0.6	0.2	0.0	0.0
Cycle Q Clear(g_c), s	12.5	0.0	25.2	9.7	0.0	1.4	12.4	62.0	0.6	0.2	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.76	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	426	0	410	110	0	161	419	3178	987	80	2592	805
V/C Ratio(X)	0.86	0.00	0.85	0.30	0.00	0.13	0.87	0.93	0.02	0.06	0.88	0.17
Avail Cap(c_a), veh/h	475	0	522	168	0	254	446	3178	987	150	2592	805
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.82	0.82	0.82
Uniform Delay (d), s/veh	51.6	0.0	42.3	56.1	0.0	49.5	51.8	20.3	8.7	24.4	0.0	0.0
Incr Delay (d2), s/veh	13.8	0.0	10.6	1.5	0.0	0.4	15.7	6.2	0.0	0.3	3.9	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	0.0	11.0	1.0	0.0	0.6	6.3	24.5	0.2	0.1	0.9	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.4	0.0	52.9	57.6	0.0	49.8	67.4	26.4	8.7	24.7	3.9	0.4
LnGrp LOS	E	A	D	E	A	D	E	C	A	C	A	A
Approach Vol, veh/h		717			54			3336			2425	
Approach Delay, s/veh		59.3			54.6			30.8			3.7	
Approach LOS		E			D			C			A	

Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.3	79.2		35.5	19.0	65.4	19.3	16.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.5	61.5		39.5	15.5	51.5	16.5	18.5				
Max Q Clear Time (g_c+I1), s	2.2	64.0		27.2	14.4	2.0	14.5	11.7				
Green Ext Time (p_c), s	0.0	0.0		1.8	0.2	33.6	0.3	0.1				

Intersection Summary												
HCM 6th Ctrl Delay			24.1									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↱
Traffic Vol, veh/h	44	0	0	166	0	4
Future Vol, veh/h	44	0	0	166	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	0	0	180	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	48
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	0	0	-	0	1021
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	1021
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	8.5
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	1021	-	-
HCM Lane V/C Ratio	0.004	-	-
HCM Control Delay (s)	8.5	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑			↑		↱
Traffic Vol, veh/h	118	0	0	73	0	8
Future Vol, veh/h	118	0	0	73	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	128	0	0	79	0	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	128
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	0	0	-	0	922
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	922
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	922	-	-
HCM Lane V/C Ratio	0.009	-	-
HCM Control Delay (s)	8.9	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↱
Traffic Vol, veh/h	184	0	0	1069	0	4
Future Vol, veh/h	184	0	0	1069	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	200	0	0	1162	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	100
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	0	-	0	936
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	936
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	8.9
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	936	-	-
HCM Lane V/C Ratio	0.005	-	-
HCM Control Delay (s)	8.9	-	-
HCM Lane LOS	A	-	-
HCM 95th %tile Q(veh)	0	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↱
Traffic Vol, veh/h	744	0	0	376	0	8
Future Vol, veh/h	744	0	0	376	0	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	809	0	0	409	0	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	-	405
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	0	0	-	0	595
Stage 1	-	0	0	-	0	-
Stage 2	-	0	0	-	0	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	-	595
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	595	-	-
HCM Lane V/C Ratio	0.015	-	-
HCM Control Delay (s)	11.1	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0	-	-

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	3	41	3	5	149	73	4	0	46	82	0	12
Future Vol, veh/h	3	41	3	5	149	73	4	0	46	82	0	12
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	-	-	50	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	45	3	5	162	79	4	0	50	89	0	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	241	0	0	48	0	0	271	304	24	201	226	162
Stage 1	-	-	-	-	-	-	53	53	-	172	172	-
Stage 2	-	-	-	-	-	-	218	251	-	29	54	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.93	7.33	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	*1454	-	-	1558	-	-	*916	*803	1047	*916	*803	*971
Stage 1	-	-	-	-	-	-	*954	*850	-	*917	*803	-
Stage 2	-	-	-	-	-	-	*917	*803	-	*984	*850	-
Platoon blocked, %	1	-	-		-	-	1	1		1	1	1
Mov Cap-1 Maneuver	*1454	-	-	1558	-	-	*900	*799	1047	*868	*799	*971
Mov Cap-2 Maneuver	-	-	-	-	-	-	*900	*799	-	*868	*799	-
Stage 1	-	-	-	-	-	-	*952	*848	-	*915	*800	-
Stage 2	-	-	-	-	-	-	*901	*800	-	*935	*848	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.2	8.7	9.6
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	1033	* 1454	-	-	1558	-	-	880
HCM Lane V/C Ratio	0.053	0.002	-	-	0.003	-	-	0.116
HCM Control Delay (s)	8.7	7.5	-	-	7.3	-	-	9.6
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.4

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

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	4	113	5	6	59	64	3	0	65	84	0	11
Future Vol, veh/h	4	113	5	6	59	64	3	0	65	84	0	11
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	-	-	50	-	0	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	4	123	5	7	64	70	3	0	71	91	0	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	134	0	0	128	0	0	253	282	64	148	214	64
Stage 1	-	-	-	-	-	-	134	134	-	78	78	-
Stage 2	-	-	-	-	-	-	119	148	-	70	136	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.33	6.53	6.93	7.33	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.53	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.53	5.53	-
Follow-up Hdwy	2.219	-	-	2.219	-	-	3.519	4.019	3.319	3.519	4.019	3.319
Pot Cap-1 Maneuver	1517	-	-	1457	-	-	766	678	988	*908	*741	*1049
Stage 1	-	-	-	-	-	-	856	785	-	*990	*867	-
Stage 2	-	-	-	-	-	-	959	821	-	*932	*783	-
Platoon blocked, %	1	-	-		-	-	1	1		1	1	1
Mov Cap-1 Maneuver	1517	-	-	1457	-	-	753	673	988	*838	*735	*1049
Mov Cap-2 Maneuver	-	-	-	-	-	-	753	673	-	*838	*735	-
Stage 1	-	-	-	-	-	-	853	783	-	*987	*863	-
Stage 2	-	-	-	-	-	-	944	817	-	*863	*781	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	9	9.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	975	1517	-	-	1457	-	-	858
HCM Lane V/C Ratio	0.076	0.003	-	-	0.004	-	-	0.12
HCM Control Delay (s)	9	7.4	-	-	7.5	-	-	9.8
HCM Lane LOS	A	A	-	-	A	-	-	A
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.4

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

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	189	3	5	1044	121	4	0	46	136	0	20
Future Vol, veh/h	5	189	3	5	1044	121	4	0	46	136	0	20
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	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	205	3	5	1135	132	4	0	50	148	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1267	0	0	208	0	0	795	1494	104	1324	1429	634
Stage 1	-	-	-	-	-	-	217	217	-	1211	1211	-
Stage 2	-	-	-	-	-	-	578	1277	-	113	218	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	868	-	-	1360	-	-	*621	278	931	419	319	*659
Stage 1	-	-	-	-	-	-	*765	722	-	575	515	-
Stage 2	-	-	-	-	-	-	*621	462	-	880	721	-
Platoon blocked, %	1	-	-		-	-	1	1		1	1	1
Mov Cap-1 Maneuver	868	-	-	1360	-	-	*596	275	931	393	316	*659
Mov Cap-2 Maneuver	-	-	-	-	-	-	*596	275	-	393	316	-
Stage 1	-	-	-	-	-	-	*760	718	-	572	512	-
Stage 2	-	-	-	-	-	-	*598	460	-	828	717	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0	9.3	19.6
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	891	868	-	-	1360	-	-	414
HCM Lane V/C Ratio	0.061	0.006	-	-	0.004	-	-	0.41
HCM Control Delay (s)	9.3	9.2	-	-	7.7	-	-	19.6
HCM Lane LOS	A	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	2

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

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	750	5	6	355	107	3	0	65	139	0	18
Future Vol, veh/h	7	750	5	6	355	107	3	0	65	139	0	18
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	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	815	5	7	386	116	3	0	71	151	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	502	0	0	820	0	0	1041	1350	410	882	1294	251
Stage 1	-	-	-	-	-	-	834	834	-	458	458	-
Stage 2	-	-	-	-	-	-	207	516	-	424	836	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.54	6.54	6.94	7.54	6.54	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	6.54	5.54	-
Follow-up Hdwy	2.22	-	-	2.22	-	-	3.52	4.02	3.32	3.52	4.02	3.32
Pot Cap-1 Maneuver	1260	-	-	805	-	-	*259	182	591	351	198	*945
Stage 1	-	-	-	-	-	-	*329	381	-	794	717	-
Stage 2	-	-	-	-	-	-	*891	671	-	578	381	-
Platoon blocked, %	1	-	-		-	-	1	1		1	1	1
Mov Cap-1 Maneuver	1260	-	-	805	-	-	*251	179	591	305	195	*945
Mov Cap-2 Maneuver	-	-	-	-	-	-	*251	179	-	305	195	-
Stage 1	-	-	-	-	-	-	*327	379	-	789	711	-
Stage 2	-	-	-	-	-	-	*865	665	-	506	379	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	12.4	26.9
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	558	1260	-	-	805	-	-	331
HCM Lane V/C Ratio	0.132	0.006	-	-	0.008	-	-	0.516
HCM Control Delay (s)	12.4	7.9	-	-	9.5	-	-	26.9
HCM Lane LOS	B	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	2.8

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	1244	1911	68
Future Vol, veh/h	0	0	0	1244	1911	68
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	-	-	-	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	1352	2077	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1039	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	*469	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %		1		-	-	-
Mov Cap-1 Maneuver	-	*469	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	0	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	1919	1571	54
Future Vol, veh/h	0	0	0	1919	1571	54
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	-	-	-	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2086	1708	59

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	854	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	*558	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %		1		-	-	-
Mov Cap-1 Maneuver	-	*558	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	0	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	2454	3023	68
Future Vol, veh/h	0	0	0	2454	3023	68
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	-	-	-	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2667	3286	74

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1643	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	*183	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %		1		-	-	-
Mov Cap-1 Maneuver	-	*183	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	0	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-

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

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	3157	2741	54
Future Vol, veh/h	0	0	0	3157	2741	54
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	-	-	-	185
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	94	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	3432	2916	59

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1458	-	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	*271	0	-	-	-
Stage 1	0	-	0	-	-	-
Stage 2	0	-	0	-	-	-
Platoon blocked, %		1		-	-	-
Mov Cap-1 Maneuver	-	*271	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	0	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-

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

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	90	72	1242	1908	2
Future Vol, veh/h	0	90	72	1242	1908	2
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	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	98	78	1350	2074	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1038	2076	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	5.34	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	3.12	-	-	-
Pot Cap-1 Maneuver	0	*469	*590	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*469	*590	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	14.7	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	* 590	-	469	-	-
HCM Lane V/C Ratio	0.133	-	0.209	-	-
HCM Control Delay (s)	12	-	14.7	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.8	-	-

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

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	89	100	1917	1567	2
Future Vol, veh/h	0	89	100	1917	1567	2
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	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	97	109	2084	1703	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	853	1705	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	5.34	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	3.12	-	-	-
Pot Cap-1 Maneuver	0	*558	*701	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*558	*701	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	* 701	-	558	-	-
HCM Lane V/C Ratio	0.155	-	0.173	-	-
HCM Control Delay (s)	11.1	-	12.8	-	-
HCM Lane LOS	B	-	B	-	-
HCM 95th %tile Q(veh)	0.5	-	0.6	-	-

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

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	90	72	2452	3020	2
Future Vol, veh/h	0	90	72	2452	3020	2
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	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	98	78	2665	3283	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1643	3285	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	5.34	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	3.12	-	-	-
Pot Cap-1 Maneuver	0	*183	*230	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*183	*230	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	45.2	0.8	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	* 230	-	183	-	-
HCM Lane V/C Ratio	0.34	-	0.535	-	-
HCM Control Delay (s)	28.5	-	45.2	-	-
HCM Lane LOS	D	-	E	-	-
HCM 95th %tile Q(veh)	1.4	-	2.7	-	-

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

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	89	100	3155	2737	2
Future Vol, veh/h	0	89	100	3155	2737	2
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	185	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	94	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	97	109	3429	2912	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	-	1457	2914	0	-	0
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	5.34	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	3.12	-	-	-
Pot Cap-1 Maneuver	0	*271	*341	-	-	-
Stage 1	0	-	-	-	-	-
Stage 2	0	-	-	-	-	-
Platoon blocked, %		1	1	-	-	-
Mov Cap-1 Maneuver	-	*271	*341	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	25.5	0.6	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	* 341	-	271	-	-
HCM Lane V/C Ratio	0.319	-	0.357	-	-
HCM Control Delay (s)	20.4	-	25.5	-	-
HCM Lane LOS	C	-	D	-	-
HCM 95th %tile Q(veh)	1.3	-	1.6	-	-

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

APPENDIX E

Queueing Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	120	8	113	30	6	149	1202	49	42	2168	119
v/c Ratio	0.71	0.03	0.42	0.17	0.02	0.75	0.32	0.04	0.12	0.89	0.11
Control Delay	72.6	44.5	21.1	47.6	0.2	34.6	9.1	3.9	4.2	23.0	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	44.5	21.1	47.6	0.2	34.6	9.1	3.9	4.2	23.0	3.1
Queue Length 50th (ft)	90	6	22	21	0	67	151	3	8	841	10
Queue Length 95th (ft)	104	5	46	27	0	m95	195	m8	11	986	12
Internal Link Dist (ft)		232		446			343			1047	
Turn Bay Length (ft)	125				325	250		250	100		
Base Capacity (vph)	206	279	307	219	284	208	3732	1176	362	2431	1119
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.03	0.37	0.14	0.02	0.72	0.32	0.04	0.12	0.89	0.11

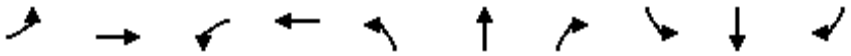
Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	228	1	144	52	24	68	2062	25	6	1654	92
v/c Ratio	0.78	0.00	0.34	0.17	0.06	0.37	0.59	0.02	0.04	0.74	0.09
Control Delay	62.1	32.0	13.8	36.4	1.0	14.9	14.1	2.3	6.0	12.9	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.1	32.0	13.8	36.4	1.0	14.9	14.1	2.3	6.0	12.9	2.6
Queue Length 50th (ft)	168	1	25	33	0	16	252	0	1	238	7
Queue Length 95th (ft)	136	5	64	33	0	42	532	m2	m2	#242	7
Internal Link Dist (ft)		232		446			343			1047	
Turn Bay Length (ft)	125				325	250		250	100		
Base Capacity (vph)	465	644	615	501	583	197	3513	1110	158	2225	1020
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.00	0.23	0.10	0.04	0.35	0.59	0.02	0.04	0.74	0.09

Intersection Summary

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



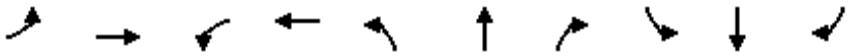
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	151	253	22	10	910	1648	37	26	3087	357
v/c Ratio	0.96	0.62	0.25	0.08	0.85	0.43	0.03	0.13	1.32	0.43
Control Delay	119.7	12.8	59.0	39.0	41.2	11.2	0.5	9.5	177.7	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	119.7	12.8	59.0	39.0	41.2	11.2	0.5	9.5	177.7	9.7
Queue Length 50th (ft)	61	1	17	4	364	308	0	5	~1142	59
Queue Length 95th (ft)	#130	74	43	21	m#527	371	m0	11	#1228	119
Internal Link Dist (ft)		232		446		343			1047	
Turn Bay Length (ft)	125				250		250	100		
Base Capacity (vph)	157	562	196	262	1076	3844	1219	204	2330	829
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.96	0.45	0.11	0.04	0.85	0.43	0.03	0.13	1.32	0.43

Intersection Summary

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

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

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



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	367	676	33	21	363	2951	22	5	2280	140
v/c Ratio	0.55	1.04	0.49	0.10	0.84	1.00	0.02	0.03	1.04	0.18
Control Delay	48.6	75.4	74.3	25.8	68.2	45.3	0.1	10.0	56.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.6	75.4	74.3	25.8	68.2	45.3	0.1	10.0	56.7	3.2
Queue Length 50th (ft)	141	~459	24	3	143	790	0	1	~703	7
Queue Length 95th (ft)	185	#694	#75	29	#217	#1071	m0	m0	#777	20
Internal Link Dist (ft)		232		446		343			1047	
Turn Bay Length (ft)	125				250		250	100		
Base Capacity (vph)	764	649	73	219	443	2944	956	143	2197	761
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	1.04	0.45	0.10	0.82	1.00	0.02	0.03	1.04	0.18

Intersection Summary

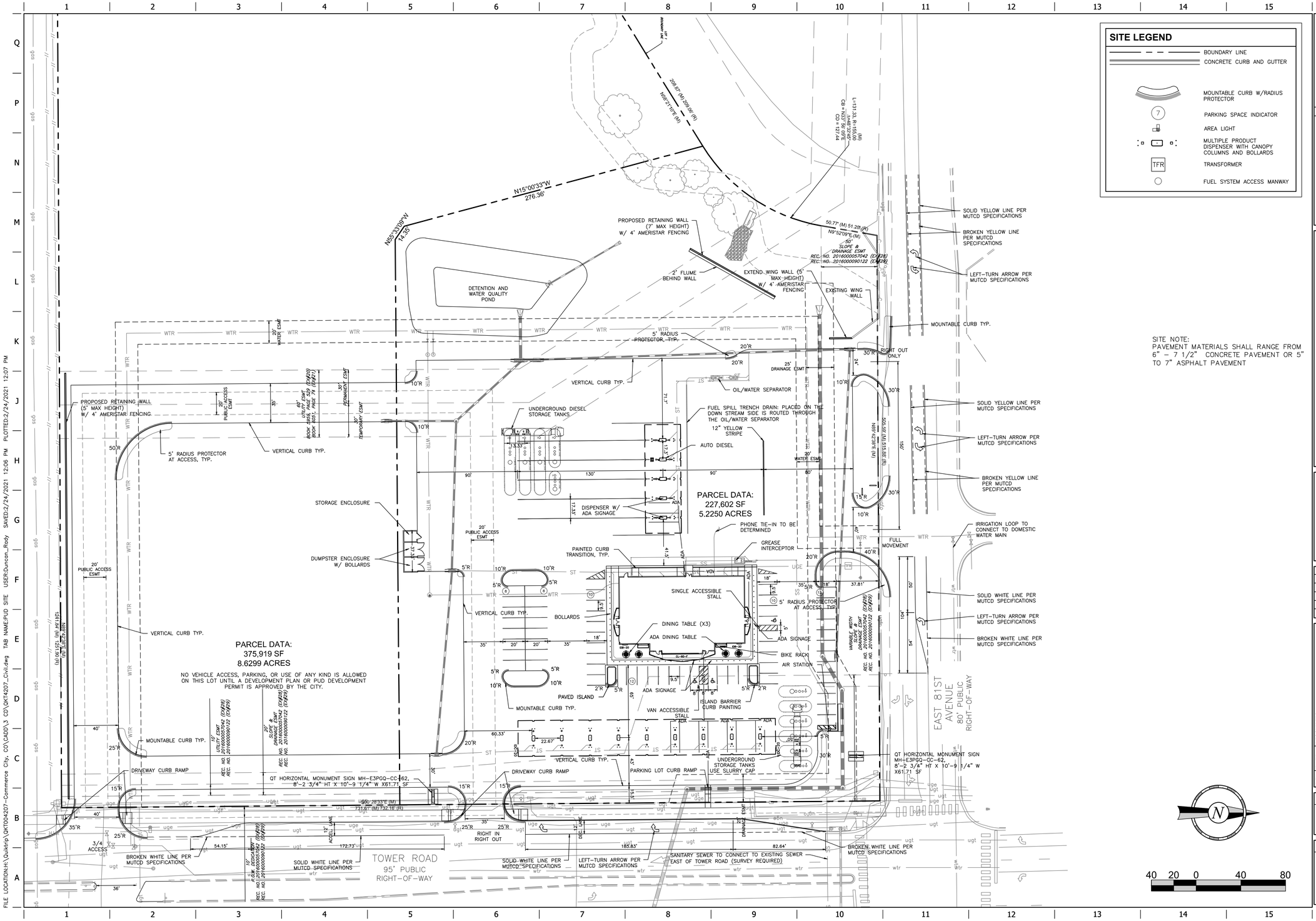
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

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

APPENDIX F

Conceptual Site Plan



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PROJECT NO.: QKT004207

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GallowayUS.com

QuikTrip No. 4207

SWC 81st & TOWER RD
COMMERCE CITY, CO

PROTOTYPE:	P-104 (11/09/20)
DIVISION:	83
VERSION:	001
DESIGNED BY:	ACJ
DRAWN BY:	ACJ
REVIEWED BY:	JRR

REV	DATE	DESCRIPTION

ORIGINAL ISSUE DATE: 02/08/2021

SHEET TITLE:
SITE PLAN

SHEET NUMBER:
C100