



# Treasure Hill Traffic Study DRAFT Addendum #7

Submitted To:

MPE, Inc.  
P.O. Box 2429  
Park City, Utah 84060

Submitted By:

Triton Engineering  
954 East Oakridge Road South  
Park City, Utah 84098



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## EXECUTIVE SUMMARY

This study addresses the traffic impacts associated with the proposed Treasure Hill development located in Park City, Utah. The proposed land use consists of a mixed-use development that includes hotel, condominiums, employee housing, and limited commercial.

At full buildout, the Treasure Hill site is expected to generate 109 AM peak hour trips and 160 PM peak hour trips.

This study analyzes project traffic impacts at the following intersections:

- Park Ave / Deer Valley
- Empire Ave / Shadow Ridge
- Empire Ave / Crescent Tram
- Lowell Ave / Manor Way
- Park Ave / Silver King
- Park Ave / Crescent Tram (8<sup>th</sup> Street)
- Park Ave / Silver King
- Empire Ave / Manor Way
- Lowell Ave / Shadow Ridge
- Lowell Ave / North Star
- Park Ave / 14th Street
- Empire Ave / 14 Street

The Treasure Hill site will be accessed by the Empire Avenue and Lowell Avenue roadway loop. For this study, it was estimated that 50% of the traffic would enter and exit from Lowell Avenue and 50% from Empire Avenue.

### Existing Conditions

The intersection of Empire Ave / Silver King currently operates at a level of service (“LOS”) LOS C in the AM peak hour and LOS F in the PM peak hour. The remaining intersections operate an acceptable LOS in both the AM and PM peak hours.

### Future Conditions Without Project

In the year 2037, without taking into account the proposed development, the intersections are projected to operate at an acceptable LOS during both the AM and PM peak hours except for the Empire Ave / Silver King and the Lowell Ave / Silver King intersection during the PM peak hour. The delays experienced at the Lowell Ave / Silver King intersection are the result of vehicles queuing from the Empire Ave / Silver King intersection. The Park Ave / Deer Valley intersection operates at an LOS of D which is an acceptable LOS. There are minor traffic signal timing efforts that can be implemented to improve the LOS for each of the turning movements at the Park Ave / Deer Valley intersection.

For traffic operations to improve at the Empire Ave / Silver King intersection, installation of a traffic signal or a roundabout is required. For a traffic signal to operate efficiently and safely, separate turn lanes in the northbound and southbound direction are necessary. The Lowell Ave / Silver King intersection delays are resolved with the improvement at the Empire Ave / Silver King intersection.

### Future Conditions With Project

With the implementation of the above mitigation/improvement measures, with the Treasure Hill Project built as proposed, all the intersections will operate at an acceptable LOS during both the AM and PM peak hours.

### Conclusion

As reflected in the original Traffic Impact Analysis by PEC in July 2004 (the "Original Report"), Addenda 1-6 thereto, issued between 2004 and 2009 (the "Six Addenda," the Original Report and the Six Addenda, collectively the "Original Studies") and this addendum, the roadway network can facilitate the traffic needs for (a) existing traffic and (b) traffic anticipated from the Treasure Hill Project. Implementation of the improvements at the Empire Ave / Silver King intersection, which will be necessary regardless of the impacts of the Treasure Hill development, will allow the intersections and roadways in the study area, even with the Treasure Hill development, to operate at an acceptable level of service in the future.

Traffic Demand Management ("TDM") strategies will reduce the traffic impact of Treasure Hill. These strategies include:

- Installation of a cabriolet system.
- Installation of beginner/intermediate ski runs that connect with the Park City Mountain Resort ("Resort").
- Implementation of a mixed-use development that includes employee housing and commercial facilities on site.
- During the busy winter season and special events, encouragement of employees not living on site to use public transportation to access the site.
- During the busy winter season and special events, implementing a shuttle service to and from the airport.
- During the construction phase of the project, off-site parking and shuttles to the site for construction workers at the Richardson Flats or similar park and ride. Nonetheless, it is recognized there will be employees that need to drive to the site in order to fulfill job responsibilities including delivery services.

## INTRODUCTION

The purpose of this addendum is to update the Original Studies to take into account traffic conditions in 2017 as well as to determine the potential impacts upon traffic conditions due to the completion of the proposed Treasure Hill development in Park City, Utah. The development is proposed to consist of 60,323 square feet (sq-ft) of commercial space that includes 16, 127 sq-ft of meeting space. The development will also have 200,000 sq-ft of hotel space (202 rooms), 45,153 sq-ft or 18 units of three story condominiums, 6,369 sq-ft or 3 units of two story condominiums, 220,164 sq-ft or 82 units of one story condominiums, and 6,669 sq. ft. of employee housing dormitory style.

**Figure 1** depicts the site plan and **Figure 2** a vicinity map along with the study intersections. The intersections under study and analysis scenarios were determined with Park City Municipal Corporation (“PCMC”) staff.

This addendum will address:

- 2017 traffic conditions in the study area.
- Future 2037 traffic conditions in the study area, also known as background.
- Future 2037 traffic conditions in the study with additional traffic from the proposed Treasure Hill development.
- Proposed TDM strategies to mitigate the increase of traffic generated by the proposed Treasure Hill development.
- Proposed mitigation measures to maintain appropriate traffic operations at the intersections for each traffic condition.

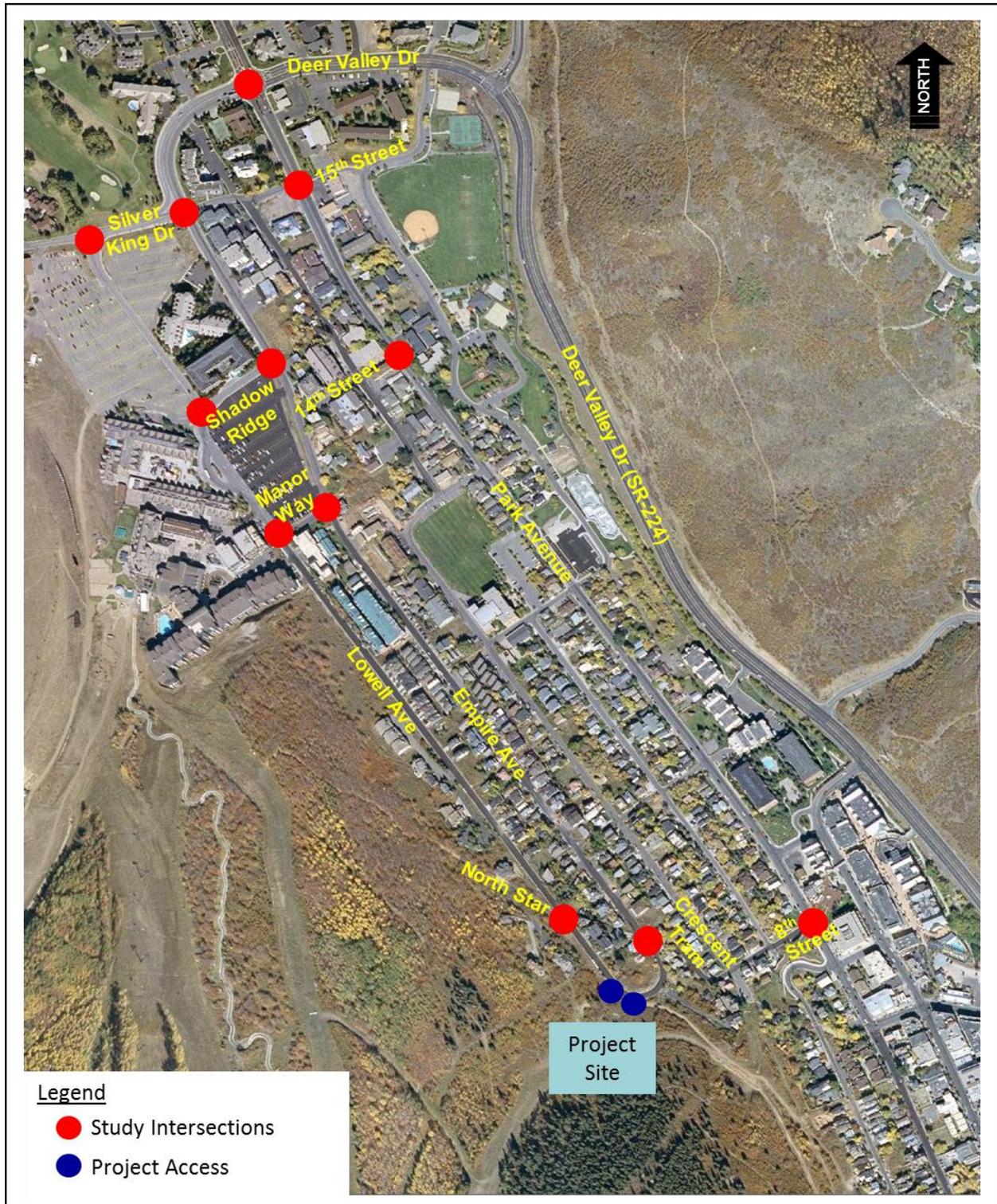
## Study Area

In collaboration with PCMC, the study area was modified for the 2017 traffic conditions and additional intersections were included that expanded the original study area. The following intersections were analyzed for traffic operations. The study area intersections are also highlighted in **Figure 2**.

- Park Ave / Deer Valley
- Empire Ave / Shadow Ridge
- Empire Ave / Crescent Tram
- Lowell Ave / Manor Way
- Park Ave / Silver King
- Park Ave / Crescent Tram (8<sup>th</sup> Street)
- Project access One / Lowell Ave
- Park Ave/ Silver King
- Empire Ave / Manor Way
- Lowell Ave / Shadow Ridge
- Lowell Ave / North Star
- Park Ave / 14th Street
- Empire Ave / 14 Street
- Project access Two / Empire Ave



Figure 1  
Project Site Plan



**Figure 2**  
Project Location & Study Intersections

## EXISTING (2017) TRAFFIC VOLUMES

Traffic counts at the intersections under study, as listed above, were collected to establish a baseline of existing conditions and allow for analysis of traffic operation in the area. For this addendum to reflect similar baseline conditions as the Original Studies, the volumes were gathered on Saturday, February 18, 2017, over President’s Day Weekend. At the intersections, AM peak period traffic counts were recorded from 8:00 AM until 10:00 AM and PM peak period traffic counts were recorded from 3:00 PM to 6:00 PM. These hours were obtained from the Original Report and the Six Addenda, and they reflect the peak operating hours for the proposed Treasure Hill development and the largest volume of traffic on the roadways. The dates were selected because President’s Day weekend represents one of the busiest ski times and therefore high traffic volumes on the intersections and roadways in the study area.

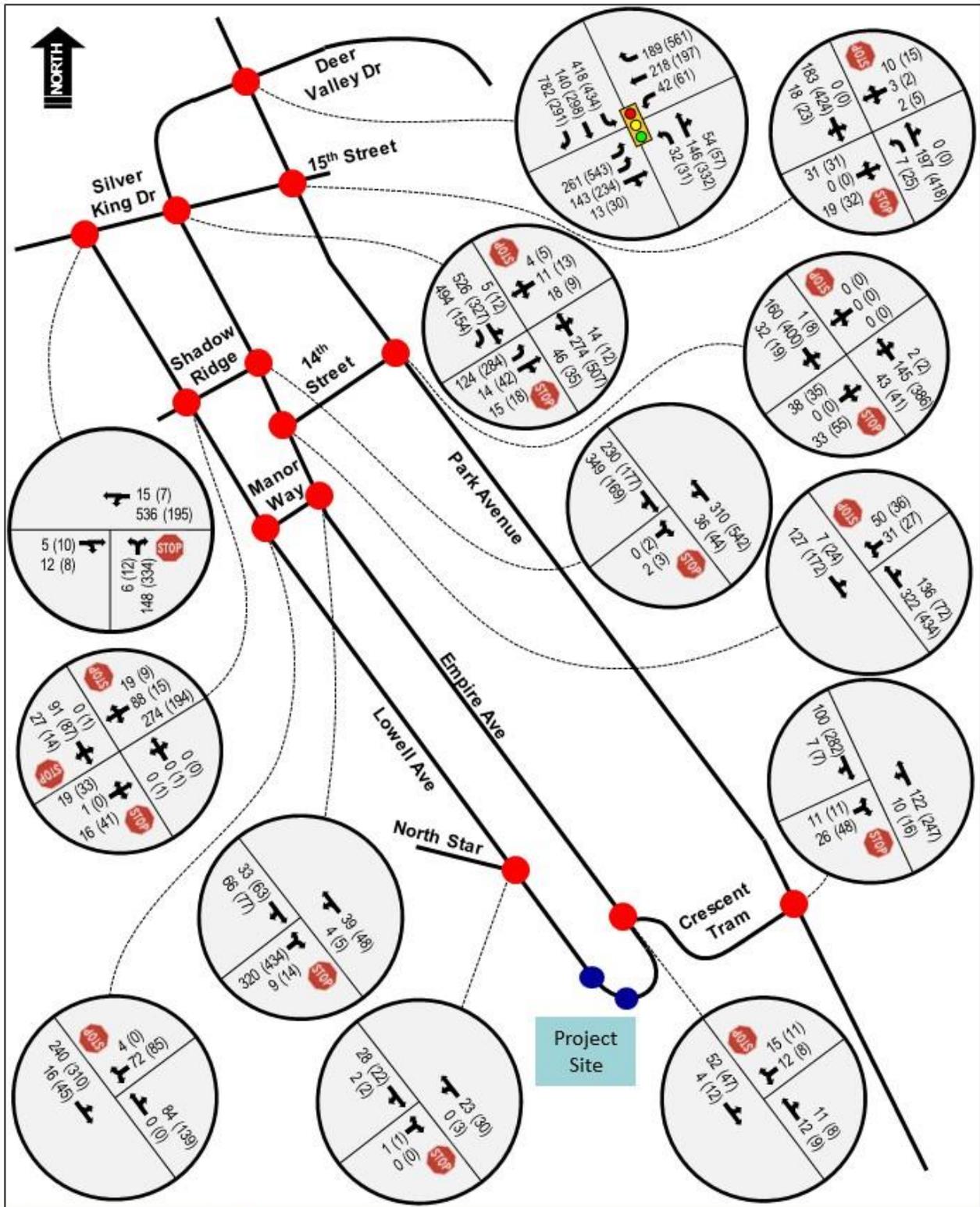
**Table 1** below summarizes the data gathered from President’s Day Weekend 2017 compared to what was estimated in the Original Report in 2004 and what was gathered over President’s Day Weekend 2005. A detail of the traffic counts for February 18, 2017, can be found in the Appendix.

**Table 1 Existing Traffic Count Summary**

<i>Intersection</i>	<i>Estimated Traffic From Original Report</i>		<i>Actual Counts February 19<sup>th</sup> 2005</i>		<i>Actual Counts February 18<sup>th</sup> 2017</i>	
	<i>AM</i>	<i>PM</i>	<i>AM</i>	<i>PM</i>	<i>AM</i>	<i>PM</i>
Park Ave / Deer Valley	2392	3868	2302	3503	2438	3069
Empire Ave / Silver King	624	1003	314	438	1545	1418
Empire Ave / Shadow Ridge	431	694	188	303	927	937
Empire Ave / Manor Way	277	435	120	190	471	641
Empire Ave / Crescent Tram	84	140	37	123	53	95
Lowell Ave / Shadow Ridge	201	230	82	101	535	396
Lowell Ave / Manor Way	170	637	74	139	416	579
Lowell Ave / North Star	96	197	21	41	27	48
Park Ave / Silver King	NA	NA	NA	NA	470	975
Park Ave / 14th Street	NA	NA	NA	NA	454	946
Park Ave / 8 <sup>th</sup> Street	NA	NA	NA	NA	276	611
Empire Ave / 14 Street	NA	NA	NA	NA	573	765

*Note: The numbers depict the total volume at the intersection during one peak hour.*

As detailed in **Table 1**, most of the intersections have seen growth in overall traffic in the study area over the past twelve years except for the PM peak at the Park Ave / Deer Valley intersection. Since the traffic counts in 2005, various TDM strategies/improvements have been implemented that could have had an impact on the time and methods utilized by skiers when leaving the Resort. **Figure 3** depicts the existing traffic volumes, intersection geometry, and the traffic control measures currently used for each of the study intersections.



**Legend**  
 15 AM Peak Hour  
 (22) PM Peak Hour

**Figure 3**  
 Existing Peak Hour Traffic Volumes, Lane Config. & Traffic Control

## FUTURE (2037) TRAFFIC VOLUMES

The purpose of the future 2037 background conditions analysis is to evaluate the intersections under study during the AM and PM peak travel period, utilizing the projected 2037 traffic volumes. This analysis provides a baseline condition for the year 2037, which can be used to determine future project impacts.

Summit County, with the support of Park City and the Utah Department of Transportation, has created a traffic model to analyze future traffic conditions throughout Summit County, including Park City. As part of that model, future traffic volumes are created based on demographics associated with land use plans approved by Park City and Summit County. The land use plans provide the best estimate of future population along with the associated traffic. **Table 2** depicts the anticipated traffic volumes for Summit County and Park City.

**Table 2 Anticipated Population Growth**

	2015	2037	Growth
Resident Population Summit County	41,133	60,138	46.2%
Resident Population Park City	7,309	9,197	25.8%

Along with population, vehicle miles traveled (“VMT”) is factored into the traffic model. Historically VMTs in Park City and Summit County have grown at a greater rate than population. However, Park City and Summit County are implementing TDM strategies to reduce the number of single occupancy vehicles and reduce the VMTs throughout the City and the County. Nonetheless and to be conservative, the population growth of 25.8% expected for Park City was applied to the existing traffic volumes to determine future traffic volumes in the study area. The 25.8% figure reflects a growth of approximately 1.1% per year of traffic growth.

**Table 3 Existing vs. Future Traffic Volume Summary**

<b>Intersection</b>	<b>Actual Counts February 18<sup>th</sup> 2017</b>		<b>Future Traffic Volumes 2037</b>	
	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
Park Ave / Deer Valley	2438	3069	3067	3861
Empire Ave / Silver King Dr.	1545	1418	1944	1784
Empire Ave / Shadow Ridge	927	937	1166	1178
Empire Ave / Manor Way	471	641	593	806
Empire Ave / Crescent Tram	53	95	67	120
Lowell Ave / Shadow Ridge	535	396	673	498
Lowell Ave / Manor Way	416	579	523	728
Lowell Ave / North Star	27	48	34	60
Park Ave / Silver King	470	975	591	1227
Park Ave / 14th Street	454	946	571	1190
Park Ave / 8 <sup>th</sup> Street	276	611	347	768
Empire Ave / 14 Street	573	765	721	962

*Note: The numbers depict the total volume at the intersection during one peak hour.*

In connection with the evaluation of future traffic volumes, Park City staff requested MPE, Inc., the Conditional Use Permit applicant, to consider a cumulative 20-year forecast that includes entitled projects which reflect the approved Park City Master Plan. In discussions with staff, there are two entitled developments that will have a direct effect on the roadways and intersections in the study area.

On April 2, 2015, Park City retained a consultant to complete a traffic model on Lowell Avenue that included details regarding the one of the entitled properties in the Park City Master Plan. From that study:

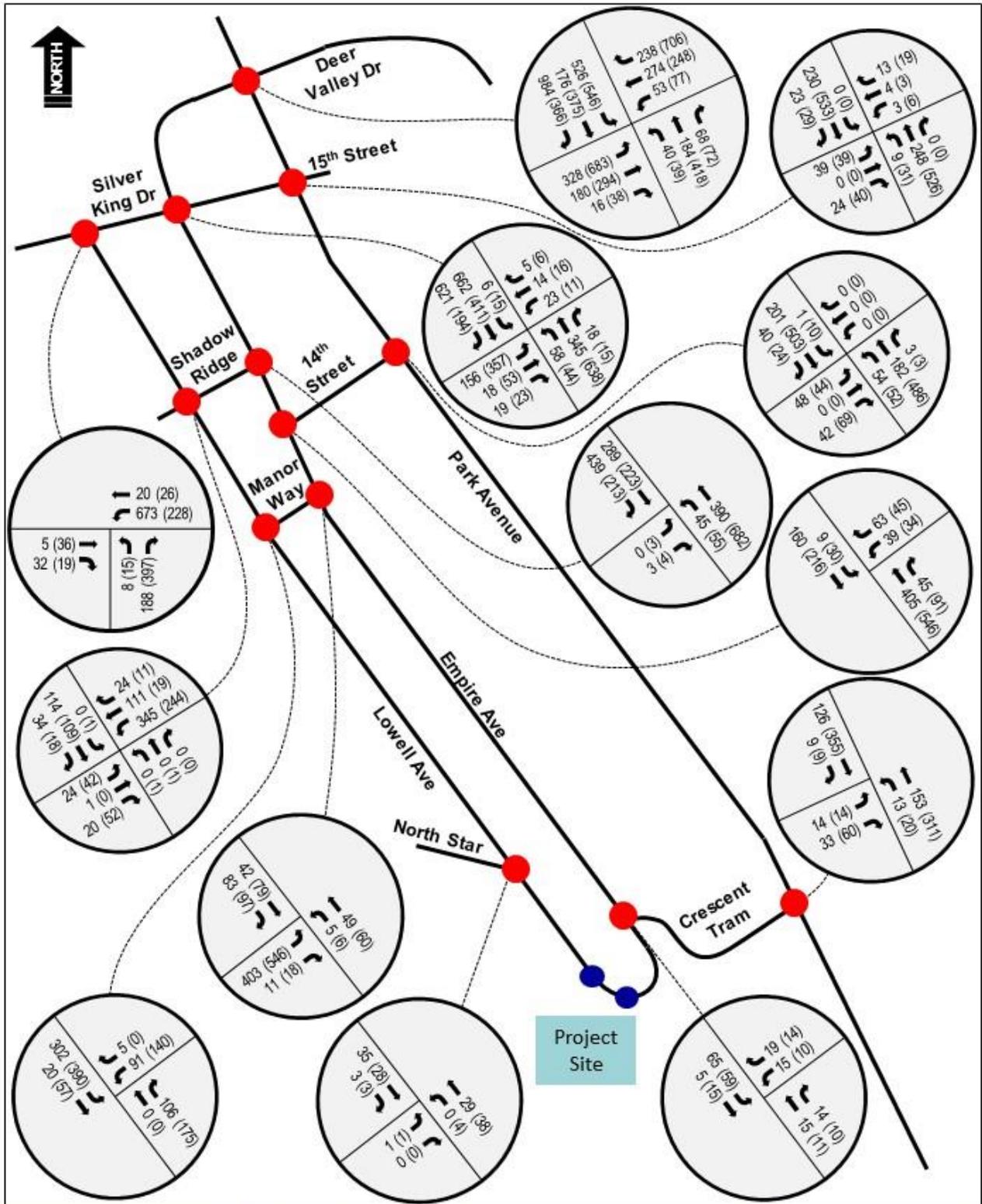
“The Bamberger property is a large piece of land to the west of Lowell Avenue and to the south of the current PCMR base area. For the analysis, it was assumed that development of the Bamberger property would not resemble the typical Old Town street and parcel layout originally platted for the property. Approximately 60 percent of the 20 acre Bamberger property is now zoned as Open Space with only the corner of the property near the PCMR base being zoned for development. Thus, it was assumed that the number of residential units that were originally platted for the entire property would be developed as equivalent resort-type development in the Resort Commercial zoned area near the existing PCMR base. Access to Bamberger property development was assumed to be located on Lowell Avenue adjacent to the PCMR base area.”

Triton Engineering contacted a representative of the Bamberger property and was informed that the owner is currently preparing to propose a development that will include 27 (twenty-seven) single family homes, 25 (twenty-five) condominiums, 7 (seven) townhomes, and 18 (eighteen) 900 sq. ft., 2 bedroom units for employee housing.

While no imminent development plans are known for the Resort, there is a Development Agreement between PCMC and the Resort that entitles the Resort to 491.78 maximum unit equivalents. The specific details of what is defined as a unit equivalent are set forth in the Development Agreement.

The ITE Trip Generation Manual, 9th Edition, was used to estimate the number of peak hour trips that are expected to be generated by the Bamberger property and the Resort’s potential development. Because the exact plans are unknown at this time for the Resort’s development, a variety of mixed land uses equaling a maximum of 491.78 equivalent units was assumed.

The projected traffic volumes for the combination of both developments ranged between 187 to 363 during the AM Peak Hour and 332 to 462 during the PM Peak Hour. The range of trips is dependent upon the type of development that is proposed at the Resort and how much trip reduction can be applied. (Methodologies for trip generation and trip reductions are detailed in the Project Traffic Volumes). From **Table 3** on the Park Ave / Deer Valley intersection, it is anticipated there will be an additional 629 vehicles in the AM Peak Hour and 800 vehicles in the PM Peak based on background growth in the area. The anticipated trips generated from the Bamberger and Resort developments fall well within the anticipated range of growth. Thus, the volumes in **Table 3** and depicted in **Figure 4** will be used to evaluate the study intersections for the baseline condition 2037 without the proposed Treasure Hill development.



**Legend**  
 15 AM Peak Hour  
 (22) PM Peak Hour

**Figure 4**  
 Future (2037) Peak Hour Traffic Volumes

## PROJECT TRAFFIC VOLUMES

The ITE Trip Generation Manual, 9th Edition, was used to estimate the number of AM and PM peak hour trips that are expected to be generated by the Treasure Hill development. To calculate the anticipated trips from each element of the Treasure Hill development, the following land uses were applied;

- For the proposed hotel, ITE Land Use 310 was utilized, and it was assumed the hotel was 83% occupied for the initial trip generation rates, as recommended in the ITE Trip Generation Manual. The ITE Trip Generation manual states: “Hotels are places of lodging that provide sleeping accommodations and supporting facilities such as restaurants, cocktail lounges, meeting and banquet rooms, limited recreational facilities (pool), and/or other retail space and service shops.” The layout and design of the meeting space and a portion of the commercial for the proposed development were therefore included in the hotel trip generation rates because they fit the description above as support commercial to the hotel space and other housing amenities. However, a portion of the commercial, 17,470 sq-ft, is not integrated with the hotel building and therefore this portion of the commercial space is anticipated to spur trips to the Treasure Hill development as discussed below. A layout of the hotel, commercial and meeting space can be found in the Appendix.
- The employee housing element of the proposed development is dormitory type housing with an average size of 250 square feet (sq-ft). 6669 sq-ft of proposed employee housing space results in approximately 25 units. There is not a dormitory land use in ITE, so ITE Land Use 220, Apartments, was selected to represent this land use type/intensity.
- For the proposed condominiums/townhouses, ITE Land Use 230 dwelling unit alternative was utilized. The ITE Trip Generation manual states: “Both condominiums and townhouses are included in this land use.” It was assumed that a portion of the condominium or townhouses would be used as rental properties. The ITE Trip Generation Manual makes no distinction between condominiums or townhouses that are owner occupied and those that are used for nightly rental. Therefore, ITE Land Use 230 was applied.
- As noted above, a portion of the commercial space (17,470 sq-ft) may spur trips to the Treasure Hill Project. To calculate those trips, ITE Land Use 826, Specialty Retail Center, and ITE Land Use 931, Quality Restaurant were selected by applying the sq-ft of usable building area from the Trip Generation Manual. 8,735 sq-ft was applied towards Specialty Retail Center Land Use and 8,735 sq-ft was also applied towards the Quality Restaurant Land Use.

**Table 4** provides the results of the trip generation for each of the individual land uses.

**Table 4 Land Use Specific Trip Generation**

Land Use (ITE Reference)	Size	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Hotel	122,225 sq-ft or 202 units	70	57	127	81	61	142
Employee Housing	6,669 sq-ft or 30 units	5	11	16	18	12	30
Condominium/Townhouse	103 units	10	42	52	45	26	71
Commercial	17,470 sq-ft	27	29	56	64	45	109
Total		111	139	250	209	144	353

### Trip Reduction

The ITE Trip Generation Manual provides trip generation rates for a hotel, which can be discounted based on occupancy rate. The occupancy rate for the project hotel was originally calculated at 83% using the occupancy rate from the ITE Trip Generation Manual. However, the average annual hotel rate was instead reduced to 65% based on peak hotel occupancy rates for 2014 reported by the Park City Chamber of Commerce Convention & Visitors Bureau Economic Profile. This information from the Park City Chamber of Commerce can be found in the Appendix.

The next reduction to trip generation arises from the internal capture rate that accounts for trips between various land uses located within the same development (hotel, employee housing, residential and commercial). These trips use only internal roads, and therefore, do not represent new trips external to the site. The layout of the Treasure Hill development is specifically designed to create this benefit. Internal interaction among the various land uses reduces the total number of external trips traveling to and from the project site. ITE outlines a method for estimating the expected amount of internal reduction.

- Trips from retail (commercial) to residential which are generated by employee housing and condominium/townhouses were reduced by 31%. While the ITE Trip Generation Manual does not specify a hotel use in this regard, it is reasonable to assume there would be a reduction in trips from the commercial to the hotel as well. Because the hotel land use was not specifically identified in the manual, a conservative approach was taken, such that hotel trip generation was reduced only by 16%, half that of the residential.
- Trips from retail (commercial) to retail (commercial) were reduced 20%.

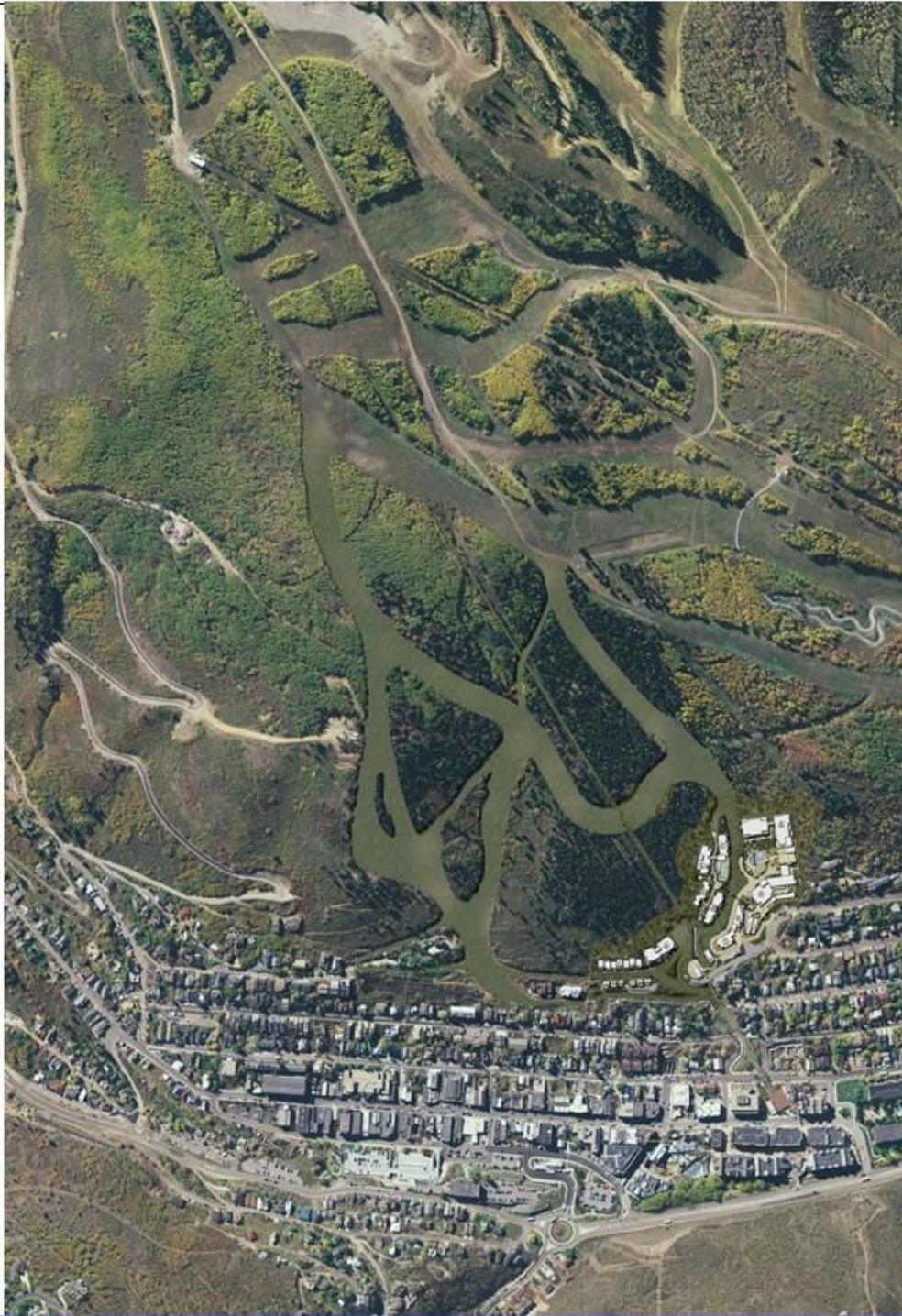
As an alternative to motorists traveling from Treasure Hill, along Empire Avenue, Lowell Avenue, and other roadways in the study area to reach the Resort, ski runs for beginner and intermediate skiers will

be constructed to connect them with Park City Mountain Resort. This is another significant trip reduction improvement specific to the Treasure Hill development that is expected to reduce trip generation by 10% for both the hotel and condominium/townhouses. While this study is focused on winter conditions, there will be trails that provide a similar benefit other times of the year. **Figure 5** below reflects the proposed ski runs and trails.

The final trip reduction specific to the Treasure Hill development is the cabriolet that will connect Treasure Hill development to amenities on Main Street. The gondola will traverse between Main Street and Treasure with a one-way capacity of approximately 2,500 passengers per hour and a transit time of approximately one minute. The hours of operation will start before the AM peak hour and extend beyond the PM peak hour. With the focus on trip reduction during the peak hours and the existing traffic congestion at a portion of the intersections in the study area, it is reasonable to estimate that many people departing or arriving from the hotel or residences during the peak hour will use the cabriolet. The cabriolet will provide convenient access to Main Street for shopping and restaurants. On Main Street and Park Avenue there is convenient opportunity to use the Park City Transit System and therefore residents, guests and employees are anticipated to use this alternate method of transportation. Accordingly, it was assumed that the cabriolet would reduce trip generation by 30% for all land uses.

An additional trip reduction could have been achieved due to pass-by trips, which account for trips to and from the development by motorists already traveling on the adjacent streets and from adjacent neighborhoods within the study area. These trips do not represent new trips to the external roads. It is anticipated that adjacent neighborhood visitors and residents may use the ski facilities, amenities and cabriolet at the Treasure Hill development, thus reducing overall traffic on the surrounding roadways. Although we anticipate some reduction due to pass-by trips, we chose not to apply it to the proposed trip generation in order to represent a more conservative condition as it relates to overall traffic impacts.

Another potential for trip reduction results from individuals choosing to walk or bike to the surrounding amenities. While it is, anticipated people will sometimes choose these alternative methods of travel, once again to be conservative, no trip reductions were applied.



**Figure 5**  
Ski and Trail Concept Plans

Table 5 provides the results of the trip generation traffic volumes after all the trip reductions have been applied.

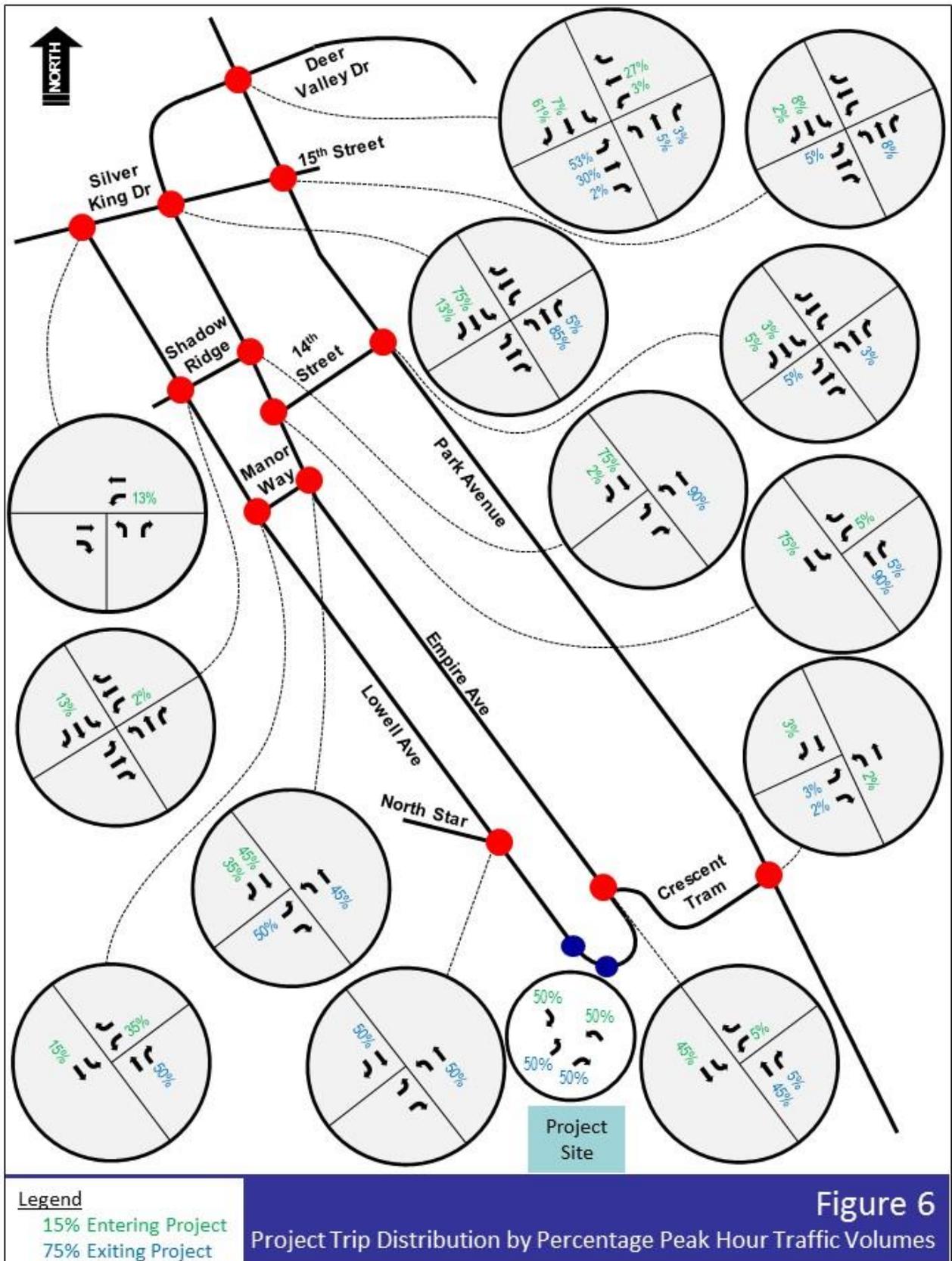
**Table 5 Trip Generation after Trip Reduction**

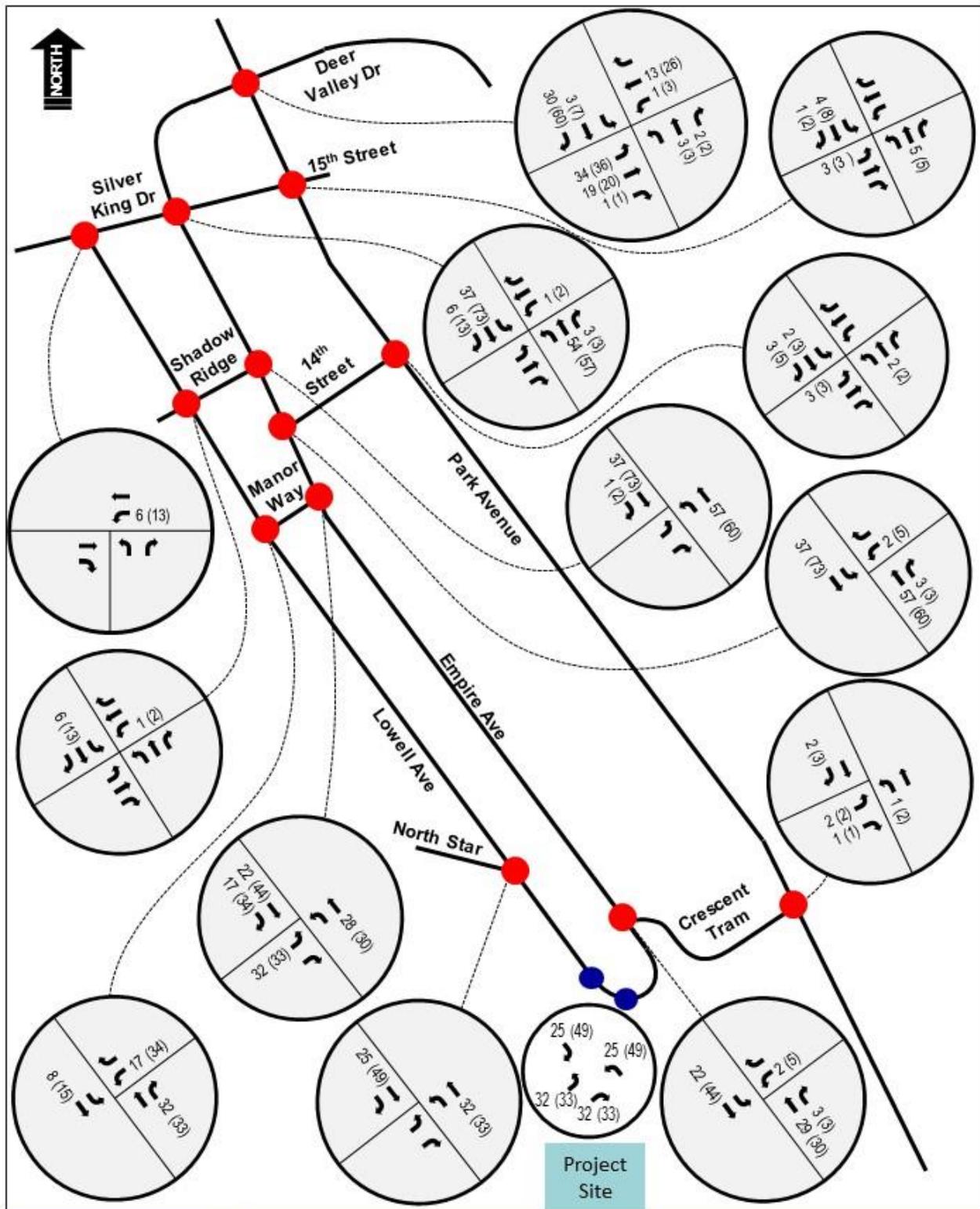
Land Use (ITE Reference)	Size	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Hotel	122,225 sq-ft or 202 units	27	22	49	31	24	55
Employee Housing	6,669 sq-ft or 30 units	3	5	8	9	6	15
Condominium/Townhouse	103 units	4	17	21	19	10	29
Commercial	17,470 sq-ft	15	16	31	36	25	61
Total		48	61	109	95	65	160

**Trip Distribution & Assignment**

Project Trip Distribution is the assignment of traffic generated by the Treasure Hill development to the various intersections and roadways throughout the study area. To determine the distribution of the Treasure Hill generated traffic three main elements were taken into consideration: major traffic corridors, traffic count data, and the natural flow of traffic in the area. A benefit of the project location is the ability for travelers to enter the project site either from Lowell Avenue or from Empire Avenue, aided by modern technologies that provide the fastest route to enter the project. In any event, for sake of analysis, it was assumed that 50% of the traffic will enter using the Access Point 1 (Lowell) and the remaining 50% will enter using the Access Point 2 (lower/Empire Loop) and that vehicles leaving the project will do likewise, albeit in the opposite direction.

Figure 6 shows the project trip distribution during AM and PM peak hours for the access points and the study area intersections. Figure 7 displays the project trip traffic volumes during the AM and PM peak hours based on the trip distribution in Figure 5 combined with the trip generation traffic volumes from Table 5.





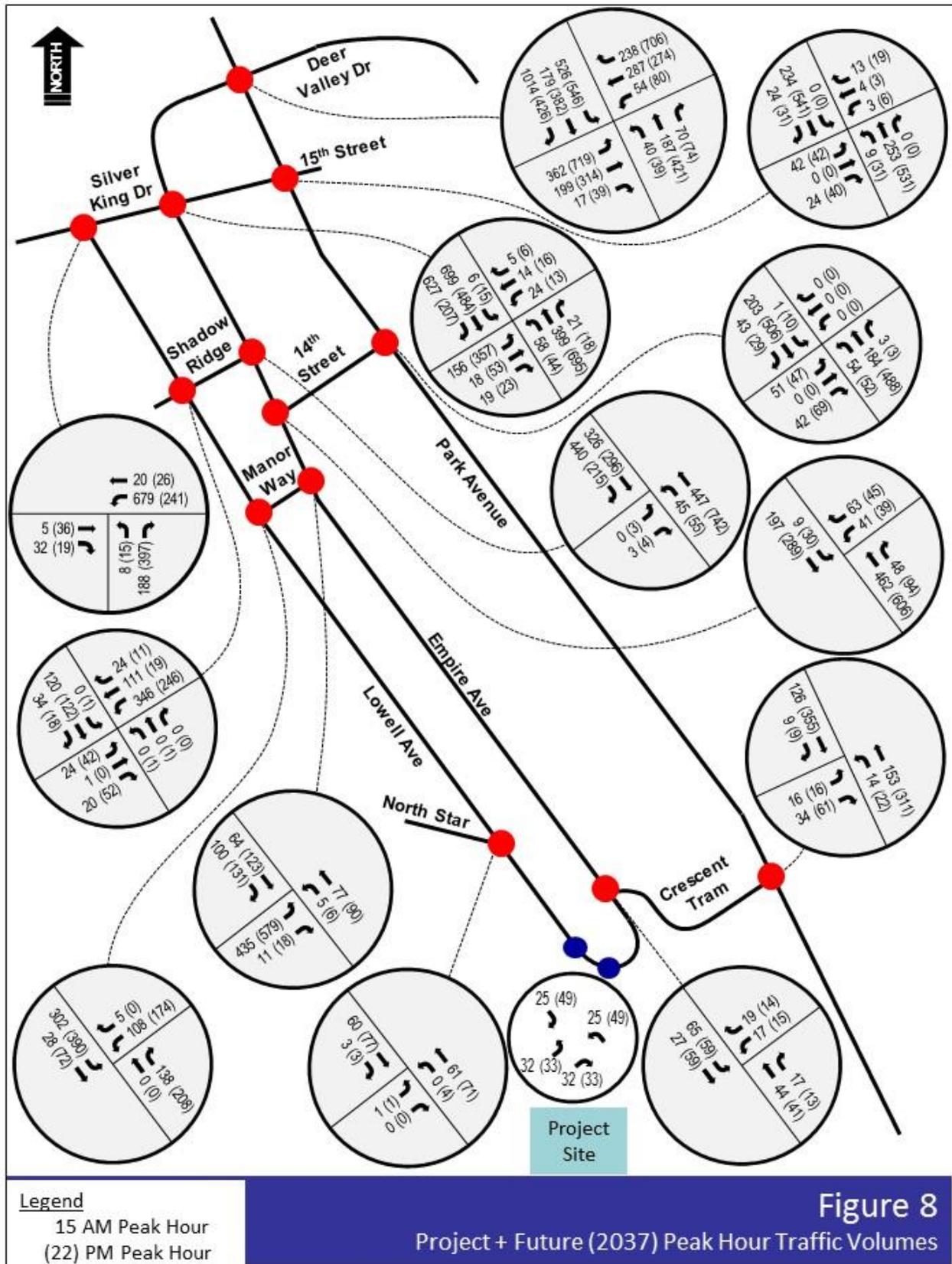
**Legend**  
 15 AM Peak Hour  
 (22) PM Peak Hour

**Figure 7**  
 Project Trip Generation Peak Hour Traffic Volumes

## FUTURE (2037) PLUS PROJECT TRAFFIC VOLUMES

The projected-generated traffic was added to the future traffic volumes to obtain the future plus project traffic volumes at the site driveways and study intersections. **Figure 8** shows the existing plus project traffic volumes.

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## TRAFFIC ANALYSIS

### Methodology

Traffic operations for the study area for existing and future traffic conditions were included. The Highway Capacity Manual 2010 (“HCM 2010”) and Transportation Research Board methodology was applied to remain consistent with customary practice in the traffic engineering industry and professional standards. LOS from HCM is a qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or pedestrians. A LOS definition generally describes these conditions in terms of factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. There are six levels of service describing these conditions, ranging from A to F, which have been standardized by the Transportation Research Board. LOS A represents a free-flowing traffic condition where motorists are affected very little by other motorists; a high degree of freedom to select desired speeds and the level of comfort and convenience to the motorist is excellent. LOS F is characterized by congested flow conditions with stoppages; the amount of traffic approaching a point exceeds the amount that can pass that point. **Table 6** provides a description of each LOS letter designation and an accompanying average delay per vehicle for unsignalized and signalized intersections.

All the traffic analysis used Synchro/SimTraffic Software, which follow the Highway Capacity Manual (HCM) 2010 methodology, to evaluate study intersections and obtain the LOS listed in **Table 6**. Multiple runs of SimTraffic were used to provide a statistical evaluation of the interaction between the intersections. These results serve as a base for the analysis. Detailed traffic operations outputs are included in the Appendix.

The traffic analysis for all of the intersections in the study area are evaluated for the AM and PM peak hour. The AM and PM peak hour is defined by a one hour period when the traffic volumes were the highest at each intersection in the study area.

**Table 6 Level of Service Descriptions**

LOS	Description of Delay	Unsignalized Intersections Average Delay (1)	Signalized Intersections Average Delay (2)	Graphical Representation of Delay
A	Free Flow	0 to 10	0 than 10	
B	Stable Flow (slight delays)	10 to 15	10 to 20	
C	Stable Flow (acceptable delays)	15 to 25	20 to 35	
D	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)	25 to 35	35 to 55	
E	Unstable flow (intolerable delay)	35 to 50	55 to 80	
F	Forced flow (congested and queues fail to clear)	Greater than 50	Greater than 80	
<p>Notes:</p> <p>(1) Worst approach LOS and delay measured (seconds/vehicle).</p> <p>(2) Overall intersection LOS and average delay (seconds/vehicle) for all approaches.</p>				

### Existing Levels of Service

**Table 7** shows the level of service and corresponding delay (sec/veh) at each of the study intersections for the existing traffic conditions.

**Table 7 Existing Levels of Service**

Intersection	Control	Worst Approach <sup>1</sup>		Overall Intersection <sup>2</sup>
		LOS AM / PM	Approach AM / PM	LOS AM / PM
Park Ave / Deer Valley	Signal			B (19.9) / C (24.3)
Empire Ave / Silver King Dr	Stop	C (19.2) / F (56.0)	EB / EB	
Empire Ave / Shadow Ridge	Stop	A (7.4) / A (9.8)	NB / EB	
Empire Ave / Manor Way	Stop	A (5.2) / A (6.1)	EB / EB	
Empire Ave / Crescent Tram	Stop	A (4.2) / A (3.8)	WB / WB	
Empire Ave / 14 Street	Stop	A (8.5) / A (9.5)	EB / EB	
Lowell Ave / Silver King	Stop	B (13.7) / B (14.4)	NB / NB	
Lowell Ave / Manor Way	Stop	A (3.9) / A (6.8)	WB / SB	
Lowell Ave / North Star	Stop	A (4.4) / A (3.7)	EB / EB	
Lowell Ave / Shadow Ridge	Stop	A (8.9) / A (5.4)	EB / WB	
Park Ave / 15th	Stop	A (7.0) / B (12.7)	EB / EB	
Park Ave / 14th Street	Stop	A (6.3) / B (11.0)	EB / EB	
Park Ave / 8th	Stop	A (4.6) / A (6.6)	EB / EB	
Notes:				
(1) The level of service and delay for worst approach is shown for stop-controlled intersections only.				
(2) The overall intersection level of service is shown for signalized intersections only				

As shown in **Table 7**, all the intersections currently operate at an acceptable LOS during both the AM and PM peak hours except for the Empire Ave / Silver King intersection during the PM peak hour. The eastbound left turning movement at the Empire Ave / Silver King intersection experiences excessive delays during a typical winter ski day as the motorists leave the Resort.

### Future (2037) Levels of Service

**Table 8** shows the level of service and corresponding delay (sec/veh) at each of the study intersections for the future traffic conditions without the Treasure Hill development.

**Table 8 Future Levels of Service**

		Worst Approach <sup>1</sup>		Overall Intersection <sup>2</sup>
Intersection	Control	LOS AM / PM	Approach AM / PM	LOS AM / PM
Park Ave / Deer Valley	Signal			D (35.6) / D (53.3)
Empire Ave / Silver King	Stop	F (51.9) / F (164.1)	EB / EB	
Empire Ave / Shadow Ridge	Stop	B (13.4) / D (25.6)	NB / EB	
Empire Ave / Manor Way	Stop	A (6.0) / A (8.3)	EB / EB	
Empire Ave / Crescent Tram	Stop	A (4.2) / A (4.1)	WB / WB	
Empire Ave / 14 Street	Stop	B (11.4) / C (15.4)	WB / WB	
Lowell Ave / Silver King	Stop	B (19.2) / F (205.1)	NB / NB	
Lowell Ave / Manor Way	Stop	A (6.2) / B (10.0)	SB / SB	
Lowell Ave / North Star	Stop	A (3.1) / A (1.6)	EB / SB	
Lowell Ave / Shadow Ridge	Stop	A (7.0) / A (6.7)	WB / WB	
Park Ave / 15th	Stop	B (10.1) / C (15.8)	WB / WB	
Park Ave / 14th Street	Stop	A (6.8) / B (14.4)	EB / EB	
Park Ave / Crescent Tram	Stop	A (5.6) / A (8.1)	EB / EB	
Notes:				
(1) The level of service and delay for worst approach is shown for stop-controlled intersections only.				
(2) The overall intersection level of service is shown for signalized intersections only				

As shown in **Table 8**, the intersections are expected to operate at an acceptable LOS during both the AM and PM peak hours except for the Empire Ave / Silver King and the Lowell Ave / Silver King intersection during the PM peak hour. The delays experienced at the Lowell Ave / Silver King intersection result from vehicles queuing from the Empire Ave / Silver King intersection.

The eastbound left turning movement in the AM peak hour and all the eastbound movements experience excessive delays at the Empire Ave / Silver King due to the volume of vehicles.

### Future Levels of Service Without Project

With the intersections in the study area operating in the future at undesirable levels of service even without taking into account the impact of the Treasure Hill project, expected mitigation/improvement measures were applied and analyzed. **Table 9** shows the level of service and corresponding delay (sec/veh) at specific intersections for the future traffic conditions without the Treasure Hill development.

**Table 9 Future Mitigated Levels of Service**

Intersection	Control	Worst Approach <sup>1</sup>		Overall Intersection <sup>2</sup>
		LOS AM / PM	Approach AM / PM	LOS
Park Ave / Deer Valley	Signal			D (43.8) / D (53.5)
Empire Ave / Silver King	Roundabout or Signal			A (7.1) / B (11.9)
Lowell Ave / Silver King	Stop	A (7.1) / B (10.6)	WB / NB	
Notes:				
(1) The level of service and delay for worst approach is shown for stop-controlled intersections only.				
(2) The overall intersection level of service is shown for signalized intersections only				

As shown in **Table 9**, to improve the traffic operations for the Empire Ave / Silver King intersection, installation of a traffic signal or a roundabout is required. For a traffic signal to operate efficiently and safely, separate turn lanes in the northbound and southbound direction are necessary.

The Lowell Ave / Silver King intersection delays are resolved with the improvement at the Empire Ave / Silver King intersection.

While the Park Ave / Deer Valley intersection operates at an acceptable LOS, certain traffic movements experience excessive delays. Retiming the existing traffic signal will remove excessive delays and still provide an acceptable LOS for the intersection.

### Future Levels of Service With Project

**Table 10** shows the level of service and corresponding delay (sec/veh) at each of the study intersections for the future traffic conditions, with the Treasure Hill development applying the same mitigation/improvement measures applied in the future conditions, as applied in **Table 9**.

**Table 10 Future Plus Project Levels of Service**

Intersection	Control	Worst Approach <sup>1</sup>		Overall Intersection <sup>2</sup>
		LOS AM / PM	Approach AM / PM	LOS AM / PM
Park Ave / Deer Valley	Signal			D (47.7) / D (53.9)
Empire Ave. / Silver King	Roundabout or Signal			A (7.1) / B (12.1)
Empire Ave / Shadow Ridge	Stop	C (15.4) / C (24.0)	NB / EB	
Empire Ave / Manor Way	Stop	A (6.9) / B (11.6)	EB / EB	
Empire Ave / Crescent Tram	Stop	A (4.6) / A (4.7)	WB / WB	
Empire Ave / 14 Street	Stop	B (11.7) / C (16.7)	WB / WB	
Lowell Ave / Silver King	Stop	A (7.1) / B (10.6)	WB / NB	
Lowell Ave / Manor Way	Stop	A (6.4) / B (11.2)	SB / SB	
Lowell Ave / North Star	Stop	A (4.2) / A (8.2)	EB / EB	
Lowell Ave / Shadow Ridge	Stop	A (7.2) / A (6.1)	WB / WB	
Park Ave / 15th	Stop	A (10.0) / D (28.7)	WB / WB	
Park Ave / 14th Street	Stop	A (7.2) / B (19.2)	EB / EB	
Park Ave / 8th	Stop	A (5.6) / A (8.3)	EB / EB	
Access 1 / Empire Ave	Stop	A (2.5) / A (2.6)	NB / NB	
Access 2 / Lowell Ave	Stop	A (3.8) / A (3.9)	EB / EB	
Notes:				
(1) The level of service and delay for worst approach is shown for stop-controlled intersections only.				
(2) The overall intersection level of service is shown for signalized intersections only				

As shown in **Table 10**, with the implementation of the mitigation/improvement measures applied in **Table 9**, in the future, all the intersections will operate at an acceptable LOS during both the AM and PM peak hours with the Treasure Hill Project.

**TRAFFIC DEMAND MANAGEMENT / TRAFFIC MITIGATION**

The Treasure Hill project will implement various Traffic Demand Management (TDM) strategies.

- A very significant TDM strategy is the creation of a transportation system that does not put additional vehicles on the roadways. The Treasure Hill project is committed to providing a cabriolet system that will connect the project to Main Street. The gondola will traverse between Main Street and Treasure Hill with a one-way capacity of approximately 2,500 passengers per hour and a transit time of approximately one minute. The hours of operation will start before the AM peak hour and extend beyond the PM peak hour. The cabriolet will allow employees and visitors from the project to access the Park City transit system without using a private vehicle or hired vehicle. This cabriolet will also be available to ride for residents living near the project, resulting in fewer vehicles on the roadway.
- Another TDM commitment is the construction of ski runs for beginner and intermediate skiers that will provide connection to Park City Mountain Resort. The same ski run terrain will provide trail connections during the summer months of the year.
- Another TDM strategy is the inclusion of employee housing and on-site commercial. Recent studies have found there are significant trip reductions for trips between various land uses located within the same development (hotel, employee housing, residential and commercial).
- For employees not living in on-site employee housing, during the winter ski season and other special events like Sundance Film Festival, the Treasure Hill development will incentivize such employees to use public transportation and / or the cabriolet to access the site to reduce the traffic load on the intersections.
- Another TDM strategy that will be implemented during the winter ski season and other special events like Sundance Film Festival is the use of a shuttle that will pick up visitors from the airport and deliver them to the Treasure Hill development. This shuttle system might be specific to Treasure Hill or in combination with existing private transportation services.
- During the construction phase of the project, some construction workers will park at the Richardson Flats park and ride lot (or other park and ride lots) and be shuttled to the site, or they will use the Park City Transit System to get to the site. Flexibility regarding this strategy is necessary to accommodate the many aspects of construction.

## PARKING ANALYSIS

As part of this addendum, a parking generation study was completed to estimate parking demand that the Treasure Hill project would be expected to create. Forecasts of vehicle parking demand for the proposed development were calculated using the 4<sup>th</sup> edition of *Parking Generation*, published by the Institute of Transportation Engineers (“ITE”). Land use codes that matched the codes defined above in the updated traffic impact analysis were used to estimate the parking generation by the facility, one exception being Specialty Retail Center which is not currently a use category in *Parking Generation*. For this use, Land use code 820, Shopping Center was substituted.

**Table 11 Parking Generation**

Land Use (ITE Reference)	Size or Units	Weekday Parking Generation	Weekend Parking Generation
Hotel	122,225 sq-ft or 202 units	129	182
Employee Housing	6,669 sq-ft or 30 units	36	32
Condominium/Townhouse	103 units	142	88
Commercial	17,470 sq-ft	178	184
Total		485	486

Details on how each land use was applied in this analysis include:

- Land Use 310: Hotel, Urban – Actual parking generation data was available for the weekday and Saturday peak period. Therefore, the Saturday rate was applied for the weekend rates. As noted above in the traffic analysis section of this addendum, it was assumed that a portion of the commercial space is complementary to the hotel and therefore it was also included in the hotel parking generation analysis.
- Land Use 221: Low/Mid-Rise Apartment, Urban (used for employee housing) – This land use was chosen as best representing the parking generation for the employee housing. As noted in the traffic analysis section, it was assumed that 6,669 sq-ft, with units of 250 sq-ft of space (dormitory style) would approximate the parking generation of one urban low/mid-rise apartment, resulting in 30 units for analysis purposes. The weekday urban peak period and Saturday urban peak period from *Parking Generation* were used.
- Land Use 230: Residential Condominium/Townhouse, Suburban and Urban – Actual parking generation data was available for the weekday (suburban) and Saturday (urban) peak period. Therefore, the Saturday rate was applied for the weekend rates.
- Land Use 820: Shopping Center & Land Use 931: Quality Restaurant (used for the commercial) – As with the trip generation analysis, half of the commercial building space was applied using the shopping center Parking Generation land use and the other half was applied using the Quality Restaurant land use. Actual parking generation data was available for the weekday, Saturday and Sunday peak period. The highest value for the Saturday and Sunday peak period was applied to determine the parking generation for the weekend rates.

As with the updated traffic impact analysis, the raw estimated parking demand was calculated assuming no interaction or internal sharing of trips by the different land uses. This is unlikely, considering the mixed-use nature of the development and the high probability of shared trips between the different land uses. In the traffic impact analysis, a reduction was made to the calculated trips to account for the trips that are made internal to the development. In addition, trips were further reduced to account for

the addition of on-site employee housing. Similarly, a portion of the parking demand is expected to be shared among the different land uses.

However, the reduction in parking demand due to shared land use is not expected to be as high as the reduction in vehicle trips. In some instances, the reduction in vehicle trips does not correlate to a similar reduction in parking demand. Some examples of this could include patrons of the hotel who access Main Street via the gondola and employees who live on site and walk to work, Main Street, etc. In both examples, there is justification for reducing the number of vehicle trips. However, the demand for parking still exists since, in both cases, the patron and employee still have a car parked in the project. The mitigating factors that allow for parking reduction (compared to the raw numbers) is the internal capture rate because of the proposed mixed-use development. For the reasons stated above, however, the reduction in parking generation is expected to be somewhat less.

The assumed reductions for each of the land uses are as described below:

- Residential Uses (Condominium/Townhouse and Employee Housing) – While vehicle trips for these land uses are greatly reduced by the ability to ride the cabriolet, the reduction in parking demand is expected to be modest. For purposes of this study, a 10% reduction was assumed.
- Hotel/Resort Commercial – The 20% reduction applied in the trip reduction was also applied in the parking generation analysis. As noted above, the commercial space integrated with the hotel is intended primarily for the use of hotel patrons. However, realistically, some parking will be used by visitors to the hotel. Nonetheless, no parking generation was applied for the commercial space that is integrated with the hotel. A portion of the parking will be needed for managers, employees living off-site, and service needs, but the manual accounts for this in the hotel parking generation.

The reduced parking generation is shown in **Table 12**.

**Table 12 Reduced Parking Generation**

Land Use (ITE Reference)	Size or Units	Weekday Parking Generation	Weekend Parking Generation
Hotel	122,225 sq-ft or 202 units	129	182
Employee Housing	6,669 sq-ft or 30 units	32	29
Condominium/Townhouse	103 units	128	79
Commercial	17,470 sq-ft	142	147
Total		432	437

It is anticipated the Treasure Hill development will require on a typical weekend approximately 437 parking stalls and on a typical weekday, 432 stalls.

## SUMMARY AND CONCLUSIONS

As reflected in the Original Report, the Six Addenda and this addendum, the roadway network can facilitate the traffic needs for existing traffic and the traffic anticipated from the Treasure Hill project. Implementing the improvements at the Empire Ave / Silver King and Park Ave / Deer Valley intersections, which will ultimately be necessary regardless of the impact of the Treasure Hill development, will allow the intersections and roadways in the study area, including the Treasure Hill development, to operate at an acceptable level of service in the future.

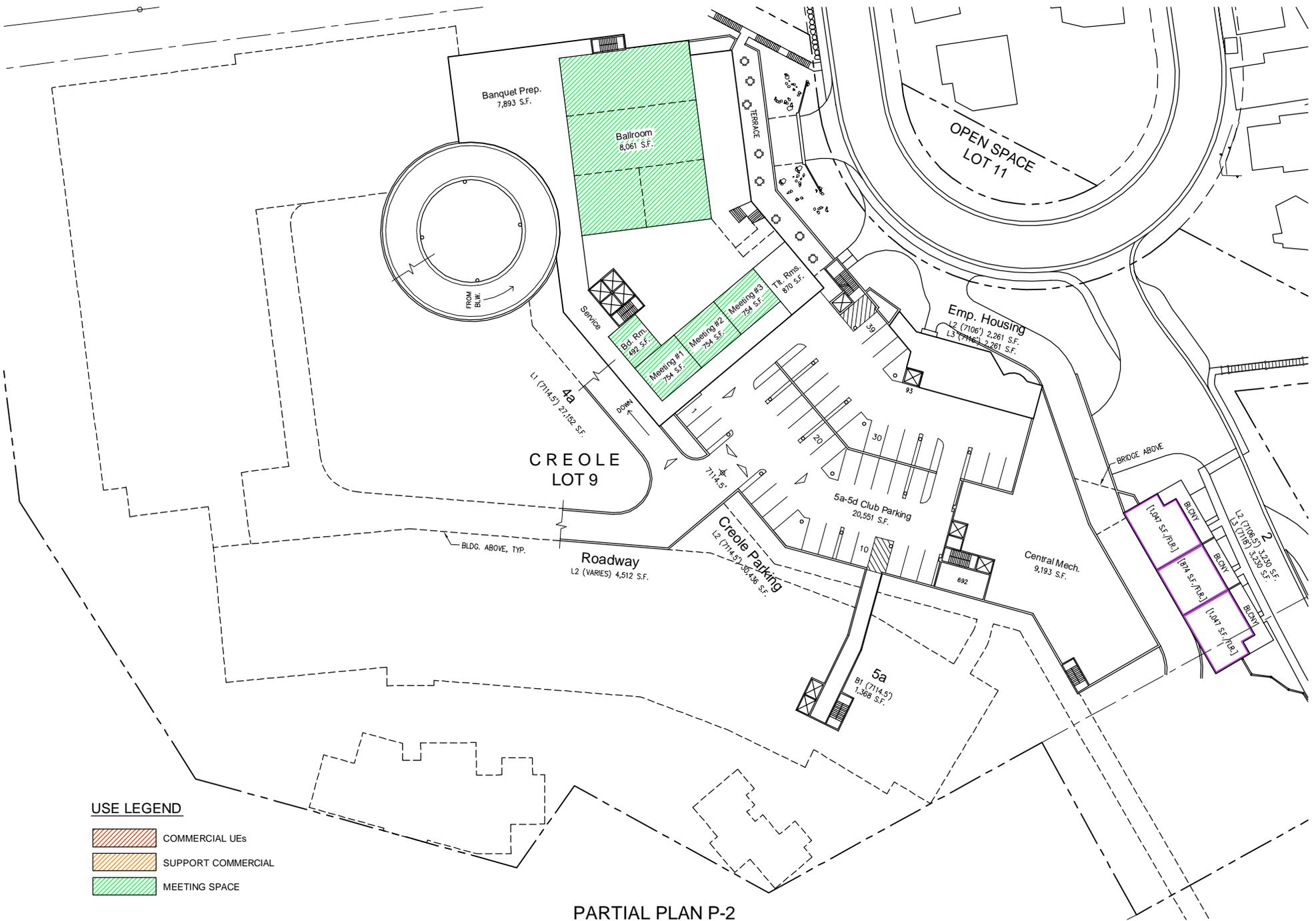
While the intersections and roadways can operate at an acceptable level of service with the Treasure Hill development by implementing the proposed traffic improvement measures, nonetheless, it is important to implement the TDM strategies as well. These strategies include:

- Installation of the cabriolet system.
- Installation of beginner and intermediate ski runs that connect with the remainder of the Resort.
- Implementation of the mixed-use development that includes employee housing and commercial on site.
- During the busy winter season and special events, encouragement of employees not living on site to use public transportation to access the site.
- During the busy winter season and special events, implementation of shuttle service to and from the airport.
- During the construction phase of the project, making arrangements for some construction workers to park off site at the Richardson Flats, or similar park and ride lots and shuttle them to the site.



**APPENDIX – Commercial Space Exhibit**

DRAFT



**USE LEGEND**

-  COMMERCIAL UEs
-  SUPPORT COMMERCIAL
-  MEETING SPACE

**PARTIAL PLAN P-2**





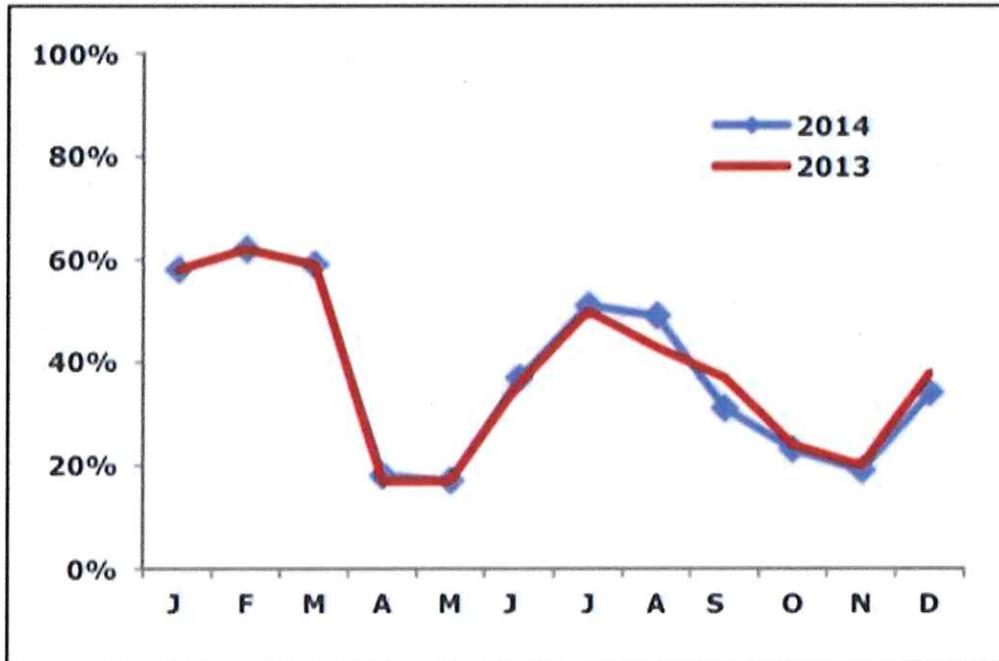




## APPENDIX – Hotel Occupancy Rates

DRAFT

### Summit County Hotel Occupancy Rates by Month



Source: DestiMetrics; Kern C. Gardner Policy Institute, University of Utah 2015  
Utah Tourism Report  
Data Current March 2016



## APPENDIX – Existing Conditions Traffic Analysis

DRAFT

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.5	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.0	4.7	5.7	6.6	3.1	2.5	0.3	1.4	1.2	1.6

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.0	0.0	3.3	0.3	0.2	0.0	0.0	0.0	2.6	1.0	0.7
Total Del/Veh (s)	28.6	21.2	12.6	44.7	39.2	5.0	18.1	27.5	10.8	28.6	16.9	9.1

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	0.8
Total Del/Veh (s)	19.9

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	19.2	11.1	5.3	13.3	15.1	7.0	5.0	1.3	0.9	4.1	1.3	3.6

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	3.9

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.2	2.4	0.0	0.1	1.7	0.5	1.6

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.2	1.3	3.9	2.4	0.4	0.3	0.4	3.4

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.4	0.0	0.9	0.7	0.8

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.2	0.0	0.0	0.1
Total Del/Veh (s)	4.6	2.9	1.7	0.1	1.6	1.4	1.3

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	WBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	3.9	2.8	3.5	5.7	1.6	4.0

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.3	0.2	3.2	4.3	1.8	0.9	1.6	0.6	0.3	1.7

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.2	0.0
Total Del/Veh (s)	0.3	0.2	5.8	4.5	13.7	3.7	5.3

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	5.1	7.4	1.2	2.3	1.5	1.8

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.1	8.9	2.4	5.4	6.1	3.8	0.2	1.3	3.4	3.1

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	8.5	5.2	1.3	0.8	3.7	0.6	1.6

**Total Network Performance**

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	27.8

Queuing and Blocking Report  
AM Peak Hour Existing

04/11/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (ft)	59	33	16
Average Queue (ft)	26	13	1
95th Queue (ft)	49	36	10
Link Distance (ft)	388	334	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	108	131	133	84	223	84	58	112	121	243	373	265
Average Queue (ft)	50	69	59	33	123	42	20	48	57	165	87	118
95th Queue (ft)	94	112	117	73	197	73	49	85	102	261	257	211
Link Distance (ft)			591		536	536	357	357	357		706	706
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	215	215		250						220		
Storage Blk Time (%)					0					6	0	
Queuing Penalty (veh)					0					8	0	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LTR	LTR	LT
Maximum Queue (ft)	116	103	46	97	29
Average Queue (ft)	48	20	16	25	1
95th Queue (ft)	89	69	37	68	13
Link Distance (ft)		315	388	602	591
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	50				
Storage Blk Time (%)	12	0			
Queuing Penalty (veh)	4	0			

Queuing and Blocking Report  
AM Peak Hour Existing

04/11/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	41	29
Average Queue (ft)	16	2
95th Queue (ft)	38	14
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	93	18
Average Queue (ft)	45	1
95th Queue (ft)	74	10
Link Distance (ft)	146	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	19
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
AM Peak Hour Existing

04/11/2017

Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	49	18
Average Queue (ft)	20	1
95th Queue (ft)	47	11
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	63	59	69
Average Queue (ft)	30	32	41
95th Queue (ft)	48	53	62
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	54	75	14
Average Queue (ft)	28	13	0
95th Queue (ft)	43	49	10
Link Distance (ft)	392	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 AM Peak Hour Existing

04/11/2017

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	11	67	94
Average Queue (ft)	1	12	40
95th Queue (ft)	7	44	67
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	28	126	22
Average Queue (ft)	2	29	1
95th Queue (ft)	13	87	10
Link Distance (ft)	270	167	602
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	21	94	60
Average Queue (ft)	8	53	32
95th Queue (ft)	18	80	50
Link Distance (ft)	232	270	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

# Queuing and Blocking Report

## AM Peak Hour Existing

04/11/2017

### Intersection: 29: Empire Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	87	25	41
Average Queue (ft)	35	1	3
95th Queue (ft)	63	13	21
Link Distance (ft)	392	332	167
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Network Summary

Network wide Queuing Penalty: 13

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.0
Total Del/Veh (s)	12.7	1.2	7.2	9.5	12.5	3.7	4.5	0.7	1.9	1.4	2.0

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	2.9	0.4	0.5	0.0	0.0	0.0	2.9	0.9	0.5
Total Del/Veh (s)	32.1	24.5	17.9	46.9	39.1	17.8	18.3	27.5	21.1	29.7	17.7	3.2

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	0.7
Total Del/Veh (s)	24.3

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	56.0	25.3	17.5	14.3	6.4	9.1	3.2	1.2	0.7	6.1	1.7	3.0

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	13.6

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.8	2.5	0.0	0.0	2.1	0.5	1.5

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	6.1	1.5	4.7	2.1	0.4	0.5	0.4	4.1

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.7	1.7	0.1	1.2	1.1	1.0

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.2	0.0	0.0	0.1
Total Del/Veh (s)	6.6	4.0	2.5	0.2	3.4	4.2	2.5

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.1	0.0	0.0	0.1
Total Del/Veh (s)	4.3	4.0	6.8	7.0	5.8

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.6	0.0	0.0	0.0	0.1
Total Del/Veh (s)	11.0	0.2	5.5	5.7	2.8	3.0	2.9	0.8	0.5	2.4

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	1.1	0.6	0.4
Total Del/Veh (s)	2.6	0.1	4.7	3.0	14.4	13.6	10.3

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	9.8	4.0	3.5	0.7	1.7	1.1	1.1

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0		0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.0	2.5	4.9	5.4	3.5		0.0	2.7	2.9	3.7

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	9.5	5.2	1.1	0.8	4.2	0.7	1.6

**Total Network Performance**

Denied Del/Veh (s)	0.9
Total Del/Veh (s)	36.7

Queuing and Blocking Report  
PM Peak Hour Existing

04/11/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (ft)	70	43	38	8
Average Queue (ft)	27	15	8	0
95th Queue (ft)	54	42	29	4
Link Distance (ft)	382	341		357
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			1	

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	201	211	216	97	229	345	59	171	183	294	325	112
Average Queue (ft)	121	132	107	43	117	162	19	93	103	176	116	39
95th Queue (ft)	179	193	187	84	193	286	46	147	161	282	257	79
Link Distance (ft)			591		537	537		357	357		706	706
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	215	215		250			300			300		
Storage Blk Time (%)	0	0	0		0					2	0	
Queuing Penalty (veh)	0	0	2		0					5	0	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LTR	LTR	LT
Maximum Queue (ft)	150	322	51	76	71
Average Queue (ft)	119	129	14	11	10
95th Queue (ft)	176	336	35	44	43
Link Distance (ft)		315	382	602	591
Upstream Blk Time (%)		7			
Queuing Penalty (veh)		24			
Storage Bay Dist (ft)	50				
Storage Blk Time (%)	70	2			
Queuing Penalty (veh)	42	7			

Queuing and Blocking Report  
PM Peak Hour Existing

04/11/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	36	11
Average Queue (ft)	13	0
95th Queue (ft)	36	7
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	123	18
Average Queue (ft)	63	1
95th Queue (ft)	99	11
Link Distance (ft)	146	2121
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	18	6
Average Queue (ft)	1	0
95th Queue (ft)	9	4
Link Distance (ft)	247	292
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Queuing and Blocking Report  
PM Peak Hour Existing

04/11/2017

Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	65	37
Average Queue (ft)	30	4
95th Queue (ft)	53	23
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	65	73	104
Average Queue (ft)	32	41	56
95th Queue (ft)	51	62	87
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	98	119	68
Average Queue (ft)	33	24	4
95th Queue (ft)	63	81	30
Link Distance (ft)	392	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 PM Peak Hour Existing

04/11/2017

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	23	35	235
Average Queue (ft)	2	3	84
95th Queue (ft)	13	20	211
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	22	107	17
Average Queue (ft)	3	22	1
95th Queue (ft)	18	73	6
Link Distance (ft)	270	167	602
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	49	81	59
Average Queue (ft)	14	42	31
95th Queue (ft)	31	67	52
Link Distance (ft)	232	270	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 29: Empire Ave

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Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	64	9	66
Average Queue (ft)	31	0	11
95th Queue (ft)	57	4	42
Link Distance (ft)	392	332	167
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Network Summary

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Network wide Queuing Penalty: 81

HCM 2010 Signalized Intersection Summary  
 6: Park Ave & Empire Ave/Deer Valley Dr

04/11/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	261	143	13	42	218	189	32	146	54	418	140	782
Future Volume (veh/h)	261	143	13	42	218	189	32	146	54	418	140	782
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	284	155	14	46	237	205	35	159	59	454	152	850
Adj No. of Lanes	2	1	0	1	1	1	1	2	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	408	398	36	67	290	484	348	961	344	732	919	969
Arrive On Green	0.12	0.24	0.24	0.04	0.16	0.16	0.03	0.38	0.38	0.15	0.49	0.49
Sat Flow, veh/h	3442	1684	152	1774	1863	1583	1774	2557	914	1774	1863	1583
Grp Volume(v), veh/h	284	0	169	46	237	205	35	108	110	454	152	850
Grp Sat Flow(s),veh/h/ln	1721	0	1836	1774	1863	1583	1774	1770	1701	1774	1863	1583
Q Serve(g_s), s	7.1	0.0	7.0	2.3	11.1	5.7	1.1	3.7	3.9	13.5	4.1	19.4
Cycle Q Clear(g_c), s	7.1	0.0	7.0	2.3	11.1	5.7	1.1	3.7	3.9	13.5	4.1	19.4
Prop In Lane	1.00		0.08	1.00		1.00	1.00		0.54	1.00		1.00
Lane Grp Cap(c), veh/h	408	0	434	67	290	484	348	665	640	732	919	969
V/C Ratio(X)	0.70	0.00	0.39	0.68	0.82	0.42	0.10	0.16	0.17	0.62	0.17	0.88
Avail Cap(c_a), veh/h	784	0	651	130	373	554	389	665	640	732	919	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.1	0.0	28.9	42.8	36.8	10.8	16.1	18.7	18.7	12.8	12.6	6.4
Incr Delay (d2), s/veh	2.1	0.0	0.6	11.5	10.6	0.6	0.1	0.5	0.6	1.6	0.4	11.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	0.0	3.6	1.3	6.6	2.5	0.5	1.9	1.9	1.6	2.2	11.2
LnGrp Delay(d),s/veh	40.2	0.0	29.5	54.3	47.4	11.4	16.2	19.2	19.3	14.4	13.0	17.5
LnGrp LOS	D		C	D	D	B	B	B	B	B	B	B
Approach Vol, veh/h		453			488			253			1456	
Approach Delay, s/veh		36.2			32.9			18.8			16.0	
Approach LOS		D			C			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.0	38.3	7.9	25.8	7.4	48.9	15.2	18.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	13.5	20.0	6.6	31.9	5.0	28.5	20.5	18.0				
Max Q Clear Time (g_c+I1), s	15.5	5.9	4.3	9.0	3.1	21.4	9.1	13.1				
Green Ext Time (p_c), s	0.0	5.3	0.0	2.0	0.0	3.5	1.5	0.9				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			22.9									
HCM 2010 LOS			C									



**APPENDIX – Future (2037) Conditions Without Treasure Hill Traffic Analysis**

DRAFT

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.9	4.4	10.1	6.9	2.9	2.3	0.3	1.5	1.1	1.5

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.0	0.0	3.3	0.4	0.3	0.0	0.0	0.0	10.6	9.2	8.5
Total Del/Veh (s)	33.3	23.3	12.2	49.3	45.4	6.9	36.1	30.8	13.6	58.9	35.6	31.6

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	5.3
Total Del/Veh (s)	35.6

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	51.9	25.1	15.4	25.0	26.3	7.0	7.0	2.5	1.9	4.3	1.5	4.5

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.1
Total Del/Veh (s)	7.7

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1	0.0	0.1
Total Del/Veh (s)	4.2	2.7	0.1	0.0	1.9	0.3	1.7

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.0	4.8	2.7	0.4	0.4	0.4	3.8

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.1	0.0	1.0	0.9	0.8

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.2	0.2	0.0	0.0	0.1
Total Del/Veh (s)	5.6	3.1	2.1	0.2	1.4	2.0	1.3

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	WBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.1	3.0	3.8	6.2	1.6	4.4

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.8	3.6	3.8	2.0	1.9	2.3	0.6	0.4	2.0

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.3	0.2	0.0
Total Del/Veh (s)	0.5	0.3	6.8	4.5	19.2	5.9	6.4

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.2	13.4	3.2	3.1	1.9	3.1

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.9	5.0	2.8	6.3	7.0	4.9	0.2	1.3	3.8	3.4

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.4	7.7	1.5	1.2	4.2	0.8	2.2

**Total Network Performance**

Denied Del/Veh (s)	5.3
Total Del/Veh (s)	47.0

Queuing and Blocking Report  
 AM Peak Hour Future (2037)

04/11/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB
Directions Served	LTR	LTR	L
Maximum Queue (ft)	56	33	16
Average Queue (ft)	26	13	1
95th Queue (ft)	49	36	9
Link Distance (ft)	388	334	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			50
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	146	160	156	143	305	128	74	116	142	245	700	719
Average Queue (ft)	77	92	74	42	164	52	27	56	71	227	418	430
95th Queue (ft)	134	142	138	96	265	99	57	95	121	283	838	822
Link Distance (ft)			591		536	536	357	357	357		706	706
Upstream Blk Time (%)											9	7
Queuing Penalty (veh)											0	0
Storage Bay Dist (ft)	215	215		250						220		
Storage Blk Time (%)					2					36	0	
Queuing Penalty (veh)					1					64	0	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	SB	SB
Directions Served	L	TR	LTR	LTR	LT	R
Maximum Queue (ft)	149	228	72	163	55	86
Average Queue (ft)	81	50	21	45	3	7
95th Queue (ft)	144	183	51	122	24	59
Link Distance (ft)		315	388	602	591	591
Upstream Blk Time (%)		2				
Queuing Penalty (veh)		3				
Storage Bay Dist (ft)	50					
Storage Blk Time (%)	49	2				
Queuing Penalty (veh)	18	3				

Queuing and Blocking Report  
AM Peak Hour Future (2037)

04/11/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	41	31
Average Queue (ft)	18	2
95th Queue (ft)	39	16
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	114	25
Average Queue (ft)	57	1
95th Queue (ft)	94	10
Link Distance (ft)	146	2121
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	1	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	24
Average Queue (ft)	2
95th Queue (ft)	13
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
AM Peak Hour Future (2037)

04/11/2017

Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	55	46
Average Queue (ft)	26	2
95th Queue (ft)	52	18
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	56	71	87
Average Queue (ft)	34	36	46
95th Queue (ft)	52	57	71
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	60	81	6
Average Queue (ft)	32	16	0
95th Queue (ft)	53	53	6
Link Distance (ft)	392	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
AM Peak Hour Future (2037)

04/11/2017

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	30	87	124
Average Queue (ft)	2	27	49
95th Queue (ft)	14	73	90
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		1	
Queuing Penalty (veh)		0	

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	27	179	40
Average Queue (ft)	2	63	4
95th Queue (ft)	16	155	23
Link Distance (ft)	270	167	602
Upstream Blk Time (%)		2	
Queuing Penalty (veh)		9	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	30	128	67
Average Queue (ft)	10	63	34
95th Queue (ft)	22	98	55
Link Distance (ft)	232	270	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 29: Empire Ave

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Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	93	94	45
Average Queue (ft)	37	9	6
95th Queue (ft)	68	62	29
Link Distance (ft)	392	332	167
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Network Summary

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Network wide Queuing Penalty: 99

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.3	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.0	5.0	8.5	7.7	3.4	2.9	0.3	1.6	0.9	1.7

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.0	0.0	4.4	1.4	1.4	0.0	0.0	0.0	8.1	6.8	7.1
Total Del/Veh (s)	34.2	24.4	15.4	101.1	117.0	7.3	31.5	48.2	26.1	70.3	47.4	21.3

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	4.4
Total Del/Veh (s)	43.8

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	16.3	10.7	5.9	11.8	11.8	3.8	17.2	5.5	3.0	11.2	6.8	4.9

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	7.1

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.0	2.6	0.1	0.1	1.9	0.5	1.8

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	5.8	4.7	2.2	0.4	0.4	0.5	3.8

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.7	0.0	1.0	0.9	0.8

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.2	0.0	0.0	0.1
Total Del/Veh (s)	6.0	3.3	1.9	0.1	2.2	2.6	1.7

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	WBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.2	2.6	3.9	6.2	1.8	4.4

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	7.7	4.2	3.9	2.1	2.9	0.7	0.4	2.2

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.2	0.2	0.0
Total Del/Veh (s)	1.2	0.3	7.3	5.6	26.9	5.7	6.8

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.6	12.3	2.7	4.7	3.5	3.8

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.3	6.0	2.6	6.6	6.9	4.6	0.2	1.5	3.8	3.5

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.1	6.5	1.1	0.9	3.5	1.0	2.0

**Total Network Performance**

Denied Del/Veh (s)	4.4
Total Del/Veh (s)	54.9

Queuing and Blocking Report  
 AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (ft)	60	38	26	4
Average Queue (ft)	30	16	2	0
95th Queue (ft)	53	40	13	3
Link Distance (ft)	382	334		357
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	183	190	182	275	546	273	59	149	172	245	728	732
Average Queue (ft)	82	99	77	108	319	91	25	78	92	229	457	353
95th Queue (ft)	152	166	153	270	557	316	54	130	153	292	833	722
Link Distance (ft)			591		536	536	357	357	357		706	706
Upstream Blk Time (%)					6	1					8	3
Queuing Penalty (veh)					0	0					0	0
Storage Bay Dist (ft)	215	215		250						220		
Storage Blk Time (%)	0	0	0	0	33					41	0	
Queuing Penalty (veh)	0	0	0	0	18					73	0	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	T	R
Maximum Queue (ft)	111	69	48	105	171	49	206	196
Average Queue (ft)	60	17	15	28	68	6	99	18
95th Queue (ft)	102	49	38	67	128	29	170	109
Link Distance (ft)		309	382		601		591	591
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100			100		100		
Storage Blk Time (%)	1			0	2		4	
Queuing Penalty (veh)	0			0	1		0	

Queuing and Blocking Report  
AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	40	19
Average Queue (ft)	18	1
95th Queue (ft)	39	10
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	119	6
Average Queue (ft)	57	0
95th Queue (ft)	97	4
Link Distance (ft)	146	2121
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	19
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	60	28
Average Queue (ft)	25	2
95th Queue (ft)	53	13
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	63	70	79
Average Queue (ft)	35	39	47
95th Queue (ft)	52	61	69
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	75	79	4
Average Queue (ft)	33	17	0
95th Queue (ft)	55	56	3
Link Distance (ft)	391	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	34	114	114
Average Queue (ft)	2	29	47
95th Queue (ft)	14	84	96
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		2	
Queuing Penalty (veh)		0	

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	28	165	17
Average Queue (ft)	3	57	1
95th Queue (ft)	16	146	9
Link Distance (ft)	265	165	601
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		3	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	26	119	69
Average Queue (ft)	10	66	36
95th Queue (ft)	21	96	58
Link Distance (ft)	232	265	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

# Queuing and Blocking Report

## AM Peak Hour Future (2037) Mitigated

04/12/2017

### Intersection: 29: Empire Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	89	59	66
Average Queue (ft)	40	3	4
95th Queue (ft)	71	30	30
Link Distance (ft)	391	332	165
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Network Summary

Network wide Queuing Penalty: 96

HCM 2010 Signalized Intersection Summary  
 6: Park Ave & Empire Ave/Deer Valley Dr

04/11/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	328	180	16	53	274	238	40	184	68	526	176	984
Future Volume (veh/h)	328	180	16	53	274	238	40	184	68	526	176	984
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	357	196	17	58	298	259	43	200	74	572	191	1070
Adj No. of Lanes	2	1	0	1	1	1	1	2	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	447	463	40	75	348	603	340	738	265	483	671	776
Arrive On Green	0.13	0.27	0.27	0.04	0.19	0.19	0.12	0.29	0.29	0.19	0.36	0.36
Sat Flow, veh/h	3442	1690	147	1774	1863	1583	1774	2555	916	1774	1863	1583
Grp Volume(v), veh/h	357	0	213	58	298	259	43	137	137	572	191	1070
Grp Sat Flow(s),veh/h/ln	1721	0	1837	1774	1863	1583	1774	1770	1701	1774	1863	1583
Q Serve(g_s), s	9.1	0.0	8.6	2.9	13.9	10.9	0.0	5.4	5.6	17.5	6.6	23.8
Cycle Q Clear(g_c), s	9.1	0.0	8.6	2.9	13.9	10.9	0.0	5.4	5.6	17.5	6.6	23.8
Prop In Lane	1.00		0.08	1.00		1.00	1.00		0.54	1.00		1.00
Lane Grp Cap(c), veh/h	447	0	503	75	348	603	340	511	492	483	671	776
V/C Ratio(X)	0.80	0.00	0.42	0.77	0.86	0.43	0.13	0.27	0.28	1.18	0.28	1.38
Avail Cap(c_a), veh/h	631	0	557	142	373	625	340	511	492	483	671	776
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.0	0.0	26.8	42.6	35.4	20.6	30.6	24.7	24.8	29.6	20.5	9.2
Incr Delay (d2), s/veh	4.8	0.0	0.6	15.0	16.9	0.5	0.2	1.3	1.4	102.0	1.1	178.8
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	4.6	0.0	4.4	1.7	8.7	4.8	0.9	2.8	2.8	17.1	3.6	48.6
LnGrp Delay(d),s/veh	42.8	0.0	27.4	57.6	52.3	21.1	30.8	25.9	26.2	131.6	21.6	188.0
LnGrp LOS	D		C	E	D	C	C	C	C	F	C	F
Approach Vol, veh/h		570			615			317			1833	
Approach Delay, s/veh		37.1			39.7			26.7			153.0	
Approach LOS		D			D			C			F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	22.0	30.5	8.3	29.2	15.6	36.9	16.2	21.3				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	17.5	20.0	7.2	27.3	5.1	32.4	16.5	18.0				
Max Q Clear Time (g_c+I1), s	19.5	7.6	4.9	10.6	2.0	25.8	11.1	15.9				
Green Ext Time (p_c), s	0.0	1.3	0.0	3.6	0.5	3.5	0.6	0.9				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			100.3									
HCM 2010 LOS			F									

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.3	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.0	5.0	8.5	7.7	3.4	2.9	0.3	1.6	0.9	1.7

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.2	0.0	0.0	4.4	1.4	1.4	0.0	0.0	0.0	8.1	6.8	7.1
Total Del/Veh (s)	34.2	24.4	15.4	101.1	117.0	7.3	31.5	48.2	26.1	70.3	47.4	21.3

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	4.4
Total Del/Veh (s)	43.8

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	16.3	10.7	5.9	11.8	11.8	3.8	17.2	5.5	3.0	11.2	6.8	4.9

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	7.1

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.0	2.6	0.1	0.1	1.9	0.5	1.8

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	5.8	4.7	2.2	0.4	0.4	0.5	3.8

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.7	0.0	1.0	0.9	0.8

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.2	0.0	0.0	0.1
Total Del/Veh (s)	6.0	3.3	1.9	0.1	2.2	2.6	1.7

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	WBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.2	2.6	3.9	6.2	1.8	4.4

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBR	NBL	NBT	NBR	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	7.7	4.2	3.9	2.1	2.9	0.7	0.4	2.2

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.2	0.2	0.0
Total Del/Veh (s)	1.2	0.3	7.3	5.6	26.9	5.7	6.8

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.6	12.3	2.7	4.7	3.5	3.8

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.3	6.0	2.6	6.6	6.9	4.6	0.2	1.5	3.8	3.5

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	10.1	6.5	1.1	0.9	3.5	1.0	2.0

**Total Network Performance**

Denied Del/Veh (s)	4.4
Total Del/Veh (s)	54.9

Queuing and Blocking Report  
 AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (ft)	60	38	26	4
Average Queue (ft)	30	16	2	0
95th Queue (ft)	53	40	13	3
Link Distance (ft)	382	334		357
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	183	190	182	275	546	273	59	149	172	245	728	732
Average Queue (ft)	82	99	77	108	319	91	25	78	92	229	457	353
95th Queue (ft)	152	166	153	270	557	316	54	130	153	292	833	722
Link Distance (ft)			591		536	536	357	357	357		706	706
Upstream Blk Time (%)					6	1					8	3
Queuing Penalty (veh)					0	0					0	0
Storage Bay Dist (ft)	215	215		250						220		
Storage Blk Time (%)	0	0	0	0	33					41	0	
Queuing Penalty (veh)	0	0	0	0	18					73	0	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	T	R
Maximum Queue (ft)	111	69	48	105	171	49	206	196
Average Queue (ft)	60	17	15	28	68	6	99	18
95th Queue (ft)	102	49	38	67	128	29	170	109
Link Distance (ft)		309	382		601		591	591
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100			100		100		
Storage Blk Time (%)	1			0	2		4	
Queuing Penalty (veh)	0			0	1		0	

Queuing and Blocking Report  
AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	40	19
Average Queue (ft)	18	1
95th Queue (ft)	39	10
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	119	6
Average Queue (ft)	57	0
95th Queue (ft)	97	4
Link Distance (ft)	146	2121
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	19
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
AM Peak Hour Future (2037) Mitigated

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Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	60	28
Average Queue (ft)	25	2
95th Queue (ft)	53	13
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	63	70	79
Average Queue (ft)	35	39	47
95th Queue (ft)	52	61	69
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	75	79	4
Average Queue (ft)	33	17	0
95th Queue (ft)	55	56	3
Link Distance (ft)	391	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 AM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	34	114	114
Average Queue (ft)	2	29	47
95th Queue (ft)	14	84	96
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		2	
Queuing Penalty (veh)		0	

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	28	165	17
Average Queue (ft)	3	57	1
95th Queue (ft)	16	146	9
Link Distance (ft)	265	165	601
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		3	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	26	119	69
Average Queue (ft)	10	66	36
95th Queue (ft)	21	96	58
Link Distance (ft)	232	265	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

# Queuing and Blocking Report

## AM Peak Hour Future (2037) Mitigated

04/12/2017

### Intersection: 29: Empire Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	89	59	66
Average Queue (ft)	40	3	4
95th Queue (ft)	71	30	30
Link Distance (ft)	391	332	165
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

### Network Summary

Network wide Queuing Penalty: 96

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.1	0.1	0.2	0.0	0.1	0.1	0.1
Total Del/Veh (s)	13.2	1.8	8.5	15.5	15.8	4.4	5.4	0.8	1.8	1.2	2.1

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	105.2	107.9	113.1	0.0	0.0	0.0	78.0	78.0	78.2
Total Del/Veh (s)	42.2	25.0	16.9	67.2	52.3	82.0	18.9	33.4	26.9	99.4	48.0	9.0

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	57.0
Total Del/Veh (s)	53.3

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	5.4	13.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	164.1	90.6	82.9	18.9	11.1	13.5	4.7	2.0	1.3	7.6	2.1	3.1

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	1.1
Total Del/Veh (s)	30.2

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.1	2.6	0.0	0.1	2.4	0.6	1.7

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	8.3	2.4	6.2	2.0	0.4	0.7	0.5	5.6

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)		0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)		1.2	0.0	1.2	1.6	1.0

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.3	0.0	0.0	0.1
Total Del/Veh (s)	8.1	4.1	3.3	0.4	3.6	5.4	2.7

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.2	0.1	0.0	0.1
Total Del/Veh (s)	4.8	5.5	10.0	9.7	7.9

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.3	0.5	0.0	0.0	0.0	0.1
Total Del/Veh (s)	14.4	0.3	8.8	6.1	3.5	5.6	3.6	0.9	0.6	3.2

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	26.0	6.9	0.0	0.0	681.7	596.6	350.3
Total Del/Veh (s)	75.0	75.5	5.1	4.2	205.1	196.3	105.8

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.3	0.3	0.0	0.0	0.2
Total Del/Veh (s)	25.6	2.8	5.6	1.6	2.1	1.3	1.9

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBT	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.2	0.0	0.0	0.0	0.1		0.0	0.0	0.0
Total Del/Veh (s)	4.5	2.9	5.7	6.7	3.8	0.0	2.2	3.0	3.3	4.3

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	15.4	7.2	1.4	1.0	5.7	1.2	2.2

**Total Network Performance**

Denied Del/Veh (s)	111.8
Total Del/Veh (s)	84.8

Queuing and Blocking Report  
 PM Peak Hour Future (2037)

04/11/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (ft)	73	52	34	14
Average Queue (ft)	28	19	11	0
95th Queue (ft)	53	45	33	6
Link Distance (ft)	382	341		357
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	276	278	248	218	580	584	60	218	222	325	744	709
Average Queue (ft)	161	173	118	64	427	479	22	125	136	309	558	378
95th Queue (ft)	240	258	203	144	746	699	51	195	205	380	929	925
Link Distance (ft)			591		537	537		357	357		706	706
Upstream Blk Time (%)					38	61					33	10
Queuing Penalty (veh)					0	0					0	0
Storage Bay Dist (ft)	215	215		250			300			300		
Storage Blk Time (%)	2	4	1		2			0		49	1	
Queuing Penalty (veh)	7	15	4		2			0		185	3	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	SB
Directions Served	L	TR	LTR	LTR	LT
Maximum Queue (ft)	150	331	59	143	100
Average Queue (ft)	149	324	20	28	16
95th Queue (ft)	150	335	44	97	60
Link Distance (ft)		315	382	602	591
Upstream Blk Time (%)		62			
Queuing Penalty (veh)		269			
Storage Bay Dist (ft)	50				
Storage Blk Time (%)	100	2			
Queuing Penalty (veh)	76	9			

Queuing and Blocking Report  
PM Peak Hour Future (2037)

04/11/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	41	29
Average Queue (ft)	16	2
95th Queue (ft)	39	16
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	157	18
Average Queue (ft)	91	1
95th Queue (ft)	146	9
Link Distance (ft)	146	2121
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	4	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
PM Peak Hour Future (2037)

04/11/2017

Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	60	76
Average Queue (ft)	33	10
95th Queue (ft)	53	43
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	94	102	200
Average Queue (ft)	41	51	82
95th Queue (ft)	68	81	149
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	105	128	76
Average Queue (ft)	43	31	7
95th Queue (ft)	80	92	40
Link Distance (ft)	392	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 PM Peak Hour Future (2037)

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Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	WB	NB
Directions Served	TR	L	T	LR
Maximum Queue (ft)	133	53	6	484
Average Queue (ft)	49	10	0	402
95th Queue (ft)	191	37	4	487
Link Distance (ft)	334		315	738
Upstream Blk Time (%)	5			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)		50		
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	28	173	17
Average Queue (ft)	6	46	1
95th Queue (ft)	23	134	9
Link Distance (ft)	270	167	602
Upstream Blk Time (%)		0	
Queuing Penalty (veh)		2	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	42	102	59
Average Queue (ft)	16	48	33
95th Queue (ft)	34	77	54
Link Distance (ft)	232	270	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 29: Empire Ave

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Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	85	89	100
Average Queue (ft)	35	4	18
95th Queue (ft)	66	34	63
Link Distance (ft)	392	332	167
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Network Summary

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Network wide Queuing Penalty: 576

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1
Total Del/Veh (s)	19.5	1.0	12.1	15.8	20.4	5.9	7.6	2.0	2.1	1.5	3.2

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	35.3	38.3	40.1	0.0	0.0	0.0	4.1	2.7	2.1
Total Del/Veh (s)	52.8	34.9	29.6	191.7	131.9	48.8	25.7	66.5	65.4	53.1	31.0	5.0

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	11.3
Total Del/Veh (s)	53.5

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	18.3	10.3	6.0	12.0	4.1	8.6	19.1	12.6	8.5	23.9	9.6	3.2

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	11.9

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.2	2.4	0.1	0.1	2.3	0.6	1.6

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	8.6	3.3	7.5	2.6	0.5	0.7	0.5	5.7

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.9	1.4	0.0	1.3	0.9	1.1

**12: Park Ave & Osborne St Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.2	0.3	0.0	0.0	0.1
Total Del/Veh (s)	7.8	4.1	3.1	0.3	4.0	5.1	2.9

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.1
Total Del/Veh (s)	4.9	5.1	9.6	9.7	7.8

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.1
Total Del/Veh (s)	21.1	0.3	9.8	8.0	3.9	2.8	4.1	1.0	0.8	3.6

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.3	0.3	0.2
Total Del/Veh (s)	0.4	0.1	5.3	3.8	8.9	5.2	4.9

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.7	0.3	0.0	0.0	0.2
Total Del/Veh (s)	42.3	3.3	6.4	1.9	3.8	2.9	2.7

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.3	2.9	5.8	6.5	4.2	0.0	0.0	3.2	3.9	4.5	

**29: Empire Ave Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	15.4	7.4	1.5	1.0	6.2	1.4	2.3

**Total Network Performance**

Denied Del/Veh (s)	11.0
Total Del/Veh (s)	64.7

Queuing and Blocking Report  
 PM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	L	TR	LTR
Maximum Queue (ft)	90	39	48	90	8
Average Queue (ft)	35	21	12	13	1
95th Queue (ft)	69	46	39	99	6
Link Distance (ft)	376	341		345	357
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)			50		
Storage Blk Time (%)			0	2	
Queuing Penalty (veh)			2	1	

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	304	357	407	274	533	575	124	322	332	325	743	677
Average Queue (ft)	212	237	198	164	373	400	30	202	211	288	349	134
95th Queue (ft)	314	362	385	337	661	655	111	326	326	371	729	476
Link Distance (ft)			591		537	537		357	357		706	706
Upstream Blk Time (%)			0		18	20	0	3	3		6	1
Queuing Penalty (veh)			4		0	0	0	9	8		0	0
Storage Bay Dist (ft)	215	215		250			300			300		
Storage Blk Time (%)	9	16	4	11	33		0	5		20	0	
Queuing Penalty (veh)	31	54	28	26	26		0	2		75	3	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	T
Maximum Queue (ft)	194	151	46	122	310	98	255
Average Queue (ft)	120	31	11	28	160	14	109
95th Queue (ft)	177	82	32	89	267	53	202
Link Distance (ft)		309	376		601		591
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	100			100		100	
Storage Blk Time (%)	12	0		0	17		6
Queuing Penalty (veh)	9	0		1	7		1

Queuing and Blocking Report  
PM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	31	24
Average Queue (ft)	15	1
95th Queue (ft)	37	12
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	155	25
Average Queue (ft)	92	1
95th Queue (ft)	150	12
Link Distance (ft)	146	2121
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	5	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	24
Average Queue (ft)	1
95th Queue (ft)	11
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
PM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 12: Park Ave & Osborne St

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	60	70
Average Queue (ft)	32	7
95th Queue (ft)	53	36
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	84	99	184
Average Queue (ft)	41	47	82
95th Queue (ft)	69	77	145
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	111	192	77
Average Queue (ft)	46	40	8
95th Queue (ft)	87	122	40
Link Distance (ft)	391	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 PM Peak Hour Future (2037) Mitigated

04/12/2017

Intersection: 20: Lowell Ave & Silver King Dr

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	60	119
Average Queue (ft)	11	63
95th Queue (ft)	39	97
Link Distance (ft)		738
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	50	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	28	178	13
Average Queue (ft)	5	47	1
95th Queue (ft)	23	141	8
Link Distance (ft)	265	165	601
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		5	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	58	98	76
Average Queue (ft)	17	53	39
95th Queue (ft)	37	80	64
Link Distance (ft)	232	265	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 29: Empire Ave

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Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	83	61	112
Average Queue (ft)	35	4	22
95th Queue (ft)	68	31	73
Link Distance (ft)	391	332	165
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Network Summary

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Network wide Queuing Penalty: 298

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# HCM 2010 Signalized Intersection Summary

## 6: Park Ave & Empire Ave/Deer Valley Dr

04/12/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	683	294	38	77	248	706	39	418	72	546	375	366
Future Volume (veh/h)	683	294	38	77	248	706	39	418	72	546	375	366
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	742	320	41	84	270	767	42	454	78	593	408	398
Adj No. of Lanes	2	1	0	1	1	1	1	2	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	742	518	66	107	307	714	238	514	88	593	789	1012
Arrive On Green	0.22	0.32	0.32	0.06	0.16	0.16	0.03	0.17	0.17	0.29	0.42	0.42
Sat Flow, veh/h	3442	1619	207	1774	1863	1583	1774	3025	517	1774	1863	1583
Grp Volume(v), veh/h	742	0	361	84	270	767	42	265	267	593	408	398
Grp Sat Flow(s),veh/h/ln	1721	0	1826	1774	1863	1583	1774	1770	1772	1774	1863	1583
Q Serve(g_s), s	23.7	0.0	18.4	5.1	15.6	18.1	2.1	16.0	16.2	31.5	17.8	2.7
Cycle Q Clear(g_c), s	23.7	0.0	18.4	5.1	15.6	18.1	2.1	16.0	16.2	31.5	17.8	2.7
Prop In Lane	1.00		0.11	1.00		1.00	1.00		0.29	1.00		1.00
Lane Grp Cap(c), veh/h	742	0	584	107	307	714	238	301	301	593	789	1012
V/C Ratio(X)	1.00	0.00	0.62	0.79	0.88	1.07	0.18	0.88	0.89	1.00	0.52	0.39
Avail Cap(c_a), veh/h	742	0	584	137	307	714	262	301	301	593	789	1012
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.49	0.00	0.49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	0.0	31.7	51.0	44.9	11.6	35.8	44.5	44.6	28.7	23.4	3.5
Incr Delay (d2), s/veh	23.3	0.0	1.0	20.3	24.3	55.4	0.3	28.6	29.8	37.0	2.4	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.6	0.0	9.5	3.1	10.1	29.3	1.1	10.2	10.4	24.0	9.7	3.5
LnGrp Delay(d),s/veh	66.5	0.0	32.7	71.3	69.2	67.0	36.1	73.1	74.4	65.7	25.8	4.7
LnGrp LOS	F		C	E	E	F	D	E	E	F	C	A
Approach Vol, veh/h		1103			1121			574			1399	
Approach Delay, s/veh		55.4			67.9			71.0			36.7	
Approach LOS		E			E			E			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	36.0	23.2	11.1	39.7	8.1	51.1	28.2	22.6				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	31.5	18.7	8.5	33.3	5.1	45.1	23.7	18.1				
Max Q Clear Time (g_c+I1), s	33.5	18.2	7.1	20.4	4.1	19.8	25.7	20.1				
Green Ext Time (p_c), s	0.0	0.3	0.0	4.4	0.0	8.1	0.0	0.0				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay			54.6									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary  
 7: Empire Ave & Silver King Dr/15th St

04/12/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	357	53	23	11	16	6	44	638	15	15	411	194
Future Volume (veh/h)	357	53	23	11	16	6	44	638	15	15	411	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
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
Adj Sat Flow, veh/h/ln	1863	1863	1900	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	388	58	25	12	17	7	48	693	16	16	447	0
Adj No. of Lanes	1	1	0	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	598	400	172	227	297	103	460	895	21	279	920	782
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.49	0.49	0.49	0.49	0.49	0.00
Sat Flow, veh/h	1381	1236	533	401	918	318	939	1813	42	737	1863	1583
Grp Volume(v), veh/h	388	0	83	36	0	0	48	0	709	16	447	0
Grp Sat Flow(s),veh/h/ln	1381	0	1769	1637	0	0	939	0	1855	737	1863	1583
Q Serve(g_s), s	12.1	0.0	1.6	0.0	0.0	0.0	1.8	0.0	15.4	0.9	7.9	0.0
Cycle Q Clear(g_c), s	12.7	0.0	1.6	0.7	0.0	0.0	9.6	0.0	15.4	16.3	7.9	0.0
Prop In Lane	1.00		0.30	0.33		0.19	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	598	0	572	627	0	0	460	0	916	279	920	782
V/C Ratio(X)	0.65	0.00	0.15	0.06	0.00	0.00	0.10	0.00	0.77	0.06	0.49	0.00
Avail Cap(c_a), veh/h	766	0	787	820	0	0	551	0	1097	351	1101	936
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	15.5	0.0	11.8	11.5	0.0	0.0	11.5	0.0	10.2	16.9	8.3	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	2.9	0.1	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.0	0.8	0.3	0.0	0.0	0.5	0.0	8.4	0.2	4.1	0.0
LnGrp Delay(d),s/veh	16.7	0.0	11.9	11.5	0.0	0.0	11.6	0.0	13.1	17.0	8.7	0.0
LnGrp LOS	B		B	B			B		B	B	A	
Approach Vol, veh/h		471			36			757			463	
Approach Delay, s/veh		15.9			11.5			13.0			9.0	
Approach LOS		B			B			B			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.8		20.4		28.8		20.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		29.1		21.9		29.1		21.9				
Max Q Clear Time (g_c+I1), s		17.4		14.7		18.3		2.7				
Green Ext Time (p_c), s		6.3		1.2		6.0		1.8				
<b>Intersection Summary</b>												
HCM 2010 Ctrl Delay				12.7								
HCM 2010 LOS				B								



**APPENDIX – Future (2037) Conditions With Treasure Hill Traffic Analysis**

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**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.5	5.0	6.4	10.0	3.3	3.3	0.4	1.5	1.0	1.7

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	3.5	1.0	0.6	0.0	0.0	0.0	23.3	21.1	22.2
Total Del/Veh (s)	33.2	24.9	18.3	84.4	116.5	8.0	27.7	44.2	25.4	81.9	56.1	29.5

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	12.4
Total Del/Veh (s)	47.7

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	17.7	10.4	6.9	12.9	13.2	5.5	22.9	6.7	5.0	11.1	7.4	4.6

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	7.8

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.6	2.8	0.2	0.2	2.3	0.7	1.6

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	6.9	5.4	3.5	0.7	0.5	0.5	4.3

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.2	0.3	1.2	1.9	0.9

**12: Park Ave & 8th St. Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.1	0.2	0.0	0.0	0.1
Total Del/Veh (s)	5.6	3.0	1.8	0.1	1.9	2.4	1.5

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	WBR	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.1	0.0	0.0	0.0
Total Del/Veh (s)	4.4	3.1	4.3	6.4	2.0	4.6

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	7.2	3.9	4.2	1.9	2.6	1.3	0.7	0.4	2.1

**16: Access 1 & Lowell Ave/Empire Ave Performance by movement**

Movement	EBT	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.1	1.7	0.4	2.5	1.3

**17: Lowell Ave & Access 2 Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.8	0.0	0.3	0.1	1.2

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.2	0.2	0.0
Total Del/Veh (s)	0.6	0.1	7.1	5.5	24.8	5.3	6.6

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.1	0.1	0.0
Total Del/Veh (s)	5.9	15.4	4.0	5.3	3.9	4.6

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.4	3.7	3.1	6.6	7.2	4.8	0.2	1.5	3.8	3.7

29: Empire Ave Performance by movement

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Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	11.7	9.3	1.9	1.0	5.4	1.1	2.6

Total Network Performance

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Denied Del/Veh (s)	12.3
Total Del/Veh (s)	60.0

Queuing and Blocking Report  
 AM Peak Hour Future (2037) + Project Mitigated

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Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	LTR
Maximum Queue (ft)	65	37	27	4
Average Queue (ft)	30	14	2	0
95th Queue (ft)	53	38	14	3
Link Distance (ft)	382	334		357
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			50	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	204	225	208	247	523	476	72	134	172	245	744	732
Average Queue (ft)	88	106	89	103	328	85	24	83	101	237	543	462
95th Queue (ft)	156	170	170	266	553	282	55	124	156	273	894	861
Link Distance (ft)			591		536	536	357	357	357		706	706
Upstream Blk Time (%)					5	1					16	9
Queuing Penalty (veh)					0	0					0	0
Storage Bay Dist (ft)	215	215		250						220		
Storage Blk Time (%)	0	0	1		35					49	0	
Queuing Penalty (veh)	0	1	2		19					88	0	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	T	R
Maximum Queue (ft)	120	75	43	123	266	48	208	182
Average Queue (ft)	64	18	16	35	91	6	105	14
95th Queue (ft)	108	49	38	82	182	33	168	89
Link Distance (ft)		309	382		601		591	591
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100			100		100		
Storage Blk Time (%)	2	0		0	3		6	
Queuing Penalty (veh)	1	0		0	2		0	

Queuing and Blocking Report  
AM Peak Hour Future (2037) + Project Mitigated

04/12/2017

Intersection: 9: Empire Ave & Crescent Tram

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	45	4	36
Average Queue (ft)	21	0	5
95th Queue (ft)	42	3	24
Link Distance (ft)	185	211	2121
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 10: Empire Ave & Manor Way

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	144	28
Average Queue (ft)	71	1
95th Queue (ft)	117	14
Link Distance (ft)	146	2121
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	1	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 11: Lowell Ave & Northstar Dr

Movement	EB
Directions Served	LR
Maximum Queue (ft)	19
Average Queue (ft)	1
95th Queue (ft)	10
Link Distance (ft)	247
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report  
 AM Peak Hour Future (2037) + Project Mitigated

04/12/2017

Intersection: 12: Park Ave & 8th St.

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	63	25
Average Queue (ft)	27	1
95th Queue (ft)	52	11
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	64	88	78
Average Queue (ft)	37	42	49
95th Queue (ft)	58	71	72
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	65	83	10
Average Queue (ft)	32	16	0
95th Queue (ft)	54	55	7
Link Distance (ft)	391	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report  
 AM Peak Hour Future (2037) + Project Mitigated

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Intersection: 16: Access 1 & Lowell Ave/Empire Ave

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	12	59
Average Queue (ft)	0	23
95th Queue (ft)	6	48
Link Distance (ft)	211	126
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Lowell Ave & Access 2

Movement	EB
Directions Served	LR
Maximum Queue (ft)	54
Average Queue (ft)	20
95th Queue (ft)	48
Link Distance (ft)	128
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	11	83	122
Average Queue (ft)	0	29	49
95th Queue (ft)	6	76	93
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		1	
Queuing Penalty (veh)		0	

Queuing and Blocking Report  
 AM Peak Hour Future (2037) + Project Mitigated

04/12/2017

Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	22	180	43
Average Queue (ft)	2	78	3
95th Queue (ft)	14	187	19
Link Distance (ft)	265	165	601
Upstream Blk Time (%)		2	
Queuing Penalty (veh)		13	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	26	126	70
Average Queue (ft)	10	69	37
95th Queue (ft)	21	102	61
Link Distance (ft)	232	265	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 29: Empire Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	97	164	62
Average Queue (ft)	42	16	5
95th Queue (ft)	76	85	28
Link Distance (ft)	391	332	165
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 127

HCM 2010 TWSC  
3: Park Ave & 15th St

04/12/2017

Intersection

Int Delay, s/veh 2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕			↕	
Traffic Vol, veh/h	42	0	24	3	4	13	9	253	0	0	234	24
Future Vol, veh/h	42	0	24	3	4	13	9	253	0	0	234	24
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	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	46	0	26	3	4	14	10	275	0	0	254	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	571	562	267	575	575	275	280	0	0	275	0	0
Stage 1	267	267	-	295	295	-	-	-	-	-	-	-
Stage 2	304	295	-	280	280	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	432	436	772	429	429	764	1283	-	-	1288	-	-
Stage 1	738	688	-	713	669	-	-	-	-	-	-	-
Stage 2	705	669	-	727	679	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	418	433	772	412	426	764	1283	-	-	1288	-	-
Mov Cap-2 Maneuver	418	433	-	412	426	-	-	-	-	-	-	-
Stage 1	732	688	-	707	664	-	-	-	-	-	-	-
Stage 2	682	664	-	702	679	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.4	11.3	0.3	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1283	-	-	502 594	1288	-	-
HCM Lane V/C Ratio	0.008	-	-	0.143 0.037	-	-	-
HCM Control Delay (s)	7.8	-	-	13.4 11.3	0	-	-
HCM Lane LOS	A	-	-	B B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.5 0.1	0	-	-

**Intersection**

Int Delay, s/veh 4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	17	19	44	17	65	27
Future Vol, veh/h	17	19	44	17	65	27
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	-	-	-	-	-
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	18	21	48	18	71	29

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	228	57	0	0	66	0
Stage 1	57	-	-	-	-	-
Stage 2	171	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	760	1009	-	-	1536	-
Stage 1	966	-	-	-	-	-
Stage 2	859	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	724	1009	-	-	1536	-
Mov Cap-2 Maneuver	724	-	-	-	-	-
Stage 1	966	-	-	-	-	-
Stage 2	819	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	9.4		0		5.3
HCM LOS	A				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	- 851	1536	-
HCM Lane V/C Ratio	-	- 0.046	0.046	-
HCM Control Delay (s)	-	- 9.4	7.5	0
HCM Lane LOS	-	- A	A	A
HCM 95th %tile Q(veh)	-	- 0.1	0.1	-

HCM 2010 TWSC  
10: Empire Ave & Manor Way

04/12/2017

**Intersection**

Int Delay, s/veh 11.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	435	11	5	77	64	100
Future Vol, veh/h	435	11	5	77	64	100
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	-	-	-	-	-
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	473	12	5	84	70	109

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	219	124	178	0	- 0
Stage 1	124	-	-	-	- -
Stage 2	95	-	-	-	- -
Critical Hdwy	6.42	6.22	4.12	-	- -
Critical Hdwy Stg 1	5.42	-	-	-	- -
Critical Hdwy Stg 2	5.42	-	-	-	- -
Follow-up Hdwy	3.518	3.318	2.218	-	- -
Pot Cap-1 Maneuver	769	927	1398	-	- -
Stage 1	902	-	-	-	- -
Stage 2	929	-	-	-	- -
Platoon blocked, %				-	- -
Mov Cap-1 Maneuver	766	927	1398	-	- -
Mov Cap-2 Maneuver	766	-	-	-	- -
Stage 1	902	-	-	-	- -
Stage 2	925	-	-	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	17.3	0.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1398	-	769	-	-
HCM Lane V/C Ratio	0.004	-	0.63	-	-
HCM Control Delay (s)	7.6	0	17.3	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0	-	4.5	-	-

**Intersection**

Int Delay, s/veh 0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	0	0	61	60	3
Future Vol, veh/h	1	0	0	61	60	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
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	1	0	0	66	65	3

Major/Minor	Minor2	Major1		Major2
Conflicting Flow All	133	67	68	0
Stage 1	67	-	-	-
Stage 2	66	-	-	-
Critical Hdwy	7.12	6.22	4.12	-
Critical Hdwy Stg 1	6.12	-	-	-
Critical Hdwy Stg 2	6.12	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-
Pot Cap-1 Maneuver	839	997	1533	-
Stage 1	943	-	-	-
Stage 2	945	-	-	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	839	997	1533	-
Mov Cap-2 Maneuver	839	-	-	-
Stage 1	943	-	-	-
Stage 2	945	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1533	-	839	-	-
HCM Lane V/C Ratio	-	-	0.001	-	-
HCM Control Delay (s)	0	-	9.3	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

**Intersection**

Int Delay, s/veh 1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	16	34	14	153	126	11
Future Vol, veh/h	16	34	14	153	126	11
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	37	15	166	137	12

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	340	143	149	0	0
Stage 1	143	-	-	-	-
Stage 2	197	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	656	905	1432	-	-
Stage 1	884	-	-	-	-
Stage 2	836	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	648	905	1432	-	-
Mov Cap-2 Maneuver	648	-	-	-	-
Stage 1	884	-	-	-	-
Stage 2	826	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	0.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1432	-	803	-	-
HCM Lane V/C Ratio	0.011	-	0.068	-	-
HCM Control Delay (s)	7.5	0	9.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

HCM 2010 TWSC  
14: Park Ave & 14th St

04/12/2017

Intersection

Int Delay, s/veh 2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	51	0	42	0	0	0	54	184	3	1	203	43
Future Vol, veh/h	51	0	42	0	0	0	54	184	3	1	203	43
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	0	46	0	0	0	59	200	3	1	221	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	565	567	244	588	589	202	267	0	0	203	0	0
Stage 1	246	246	-	319	319	-	-	-	-	-	-	-
Stage 2	319	321	-	269	270	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	436	433	795	421	421	839	1297	-	-	1369	-	-
Stage 1	758	703	-	693	653	-	-	-	-	-	-	-
Stage 2	693	652	-	737	686	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	419	411	795	381	399	839	1297	-	-	1369	-	-
Mov Cap-2 Maneuver	419	411	-	381	399	-	-	-	-	-	-	-
Stage 1	719	702	-	658	620	-	-	-	-	-	-	-
Stage 2	658	619	-	694	685	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	13.3	0	1.8	0
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1297	-	-	533	-	1369	-
HCM Lane V/C Ratio	0.045	-	-	0.19	-	0.001	-
HCM Control Delay (s)	7.9	0	-	13.3	0	7.6	0
HCM Lane LOS	A	A	-	B	A	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.7	-	0	-

**Intersection**

Int Delay, s/veh 4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	35	0	25	19	0	32
Future Vol, veh/h	35	0	25	19	0	32
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	38	0	27	21	0	35

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	38	113
Stage 1	-	-	38
Stage 2	-	-	75
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	1572	884
Stage 1	-	-	984
Stage 2	-	-	948
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1572	869
Mov Cap-2 Maneuver	-	-	869
Stage 1	-	-	984
Stage 2	-	-	932

Approach	EB	WB	NB
HCM Control Delay, s	0	4.2	8.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1034	-	-	1572	-
HCM Lane V/C Ratio	0.034	-	-	0.017	-
HCM Control Delay (s)	8.6	-	-	7.3	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

**Intersection**

Int Delay, s/veh 2.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	32	0	0	19	35	25
Future Vol, veh/h	32	0	0	19	35	25
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	-	-	-	-	-
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	35	0	0	21	38	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	73	52	65	0	-	0
Stage 1	52	-	-	-	-	-
Stage 2	21	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	931	1016	1537	-	-	-
Stage 1	970	-	-	-	-	-
Stage 2	1002	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	931	1016	1537	-	-	-
Mov Cap-2 Maneuver	931	-	-	-	-	-
Stage 1	970	-	-	-	-	-
Stage 2	1002	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1537	-	931	-	-
HCM Lane V/C Ratio	-	-	0.037	-	-
HCM Control Delay (s)	0	-	9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

**Intersection**

Int Delay, s/veh 9.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	5	32	679	20	8	188
Future Vol, veh/h	5	32	679	20	8	188
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	35	738	22	9	204

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	40	1521
Stage 1	-	-	23
Stage 2	-	-	1498
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	1570	130
Stage 1	-	-	1000
Stage 2	-	-	204
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1570	69
Mov Cap-2 Maneuver	-	-	69
Stage 1	-	-	1000
Stage 2	-	-	108

Approach	EB	WB	NB
HCM Control Delay, s	0	9	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	666	-	-	1570	-
HCM Lane V/C Ratio	0.32	-	-	0.47	-
HCM Control Delay (s)	12.9	-	-	9.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	1.4	-	-	2.6	-

**Intersection**

Int Delay, s/veh 0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3	45	447	326	440
Future Vol, veh/h	0	3	45	447	326	440
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	-	-	-	-	-
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	3	49	486	354	478

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1177	593	833	0	-	0
Stage 1	593	-	-	-	-	-
Stage 2	584	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	211	506	800	-	-	-
Stage 1	552	-	-	-	-	-
Stage 2	557	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	193	506	800	-	-	-
Mov Cap-2 Maneuver	193	-	-	-	-	-
Stage 1	552	-	-	-	-	-
Stage 2	510	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0.9	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	800	-	506	-	-
HCM Lane V/C Ratio	0.061	-	0.006	-	-
HCM Control Delay (s)	9.8	0	12.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	0	-	-

**Intersection**

Int Delay, s/veh 2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	41	63	462	48	9	197
Future Vol, veh/h	41	63	462	48	9	197
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	-	-	-	-	-
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	45	68	502	52	10	214

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	762	528	0	0	554	0
Stage 1	528	-	-	-	-	-
Stage 2	234	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	373	550	-	-	1016	-
Stage 1	592	-	-	-	-	-
Stage 2	805	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	369	550	-	-	1016	-
Mov Cap-2 Maneuver	369	-	-	-	-	-
Stage 1	592	-	-	-	-	-
Stage 2	796	-	-	-	-	-

Approach	WB		NB		SB
HCM Control Delay, s	15.3		0		0.4
HCM LOS	C				

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	461	1016
HCM Lane V/C Ratio	-	-	0.245	0.01
HCM Control Delay (s)	-	-	15.3	8.6
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1	0

**3: Park Ave & 15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.1	1.4	0.1	0.1	0.1	0.2
Total Del/Veh (s)	28.7	1.4	15.8	25.0	19.8	8.4	7.9	4.6	2.1	1.4	4.8

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.1	0.0	0.0	20.8	17.6	17.8	0.0	0.0	0.0	5.2	3.5	2.8
Total Del/Veh (s)	52.0	36.0	31.3	138.7	151.0	46.4	30.1	69.9	72.6	54.5	31.9	5.5

**6: Park Ave & Empire Ave/Deer Valley Dr Performance by movement**

Movement	All
Denied Del/Veh (s)	6.0
Total Del/Veh (s)	53.9

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	20.0	11.9	6.9	14.8	6.0	7.3	20.7	11.9	7.3	32.6	10.0	3.2

**7: Empire Ave & Silver King Dr/15th St Performance by movement**

Movement	All
Denied Del/Veh (s)	0.0
Total Del/Veh (s)	12.1

**9: Empire Ave & Crescent Tram Performance by movement**

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.7	2.8	0.2	0.1	2.6	1.2	1.6

**10: Empire Ave & Manor Way Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Total Del/Veh (s)	11.6	2.3	10.3	3.1	0.7	0.9	0.7	6.9

**11: Lowell Ave & Northstar Dr Performance by movement**

Movement	EBL	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	8.2	2.3	0.3	1.4	1.7	1.2

**12: Park Ave & 8th St. Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.3	0.3	0.0	0.0	0.1
Total Del/Veh (s)	8.3	4.8	2.7	0.3	3.8	4.5	2.8

**13: Lowell Ave & Manor Way Performance by movement**

Movement	WBL	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.0	0.1
Total Del/Veh (s)	5.1	6.7	10.6	11.2	8.5

**14: Park Ave & 14th St Performance by movement**

Movement	EBL	EBT	EBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.1
Total Del/Veh (s)	19.2	0.3	9.7	7.7	4.2	3.1	3.2	0.9	0.5	3.8

**16: Access 1 & Lowell Ave/Empire Ave Performance by movement**

Movement	EBT	WBL	WBT	NBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.1	1.8	0.5	2.6	1.3

**17: Lowell Ave & Access 2 Performance by movement**

Movement	EBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	3.9	0.1	0.3	0.2	1.0

**20: Lowell Ave & Silver King Dr Performance by movement**

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Denied Del/Veh (s)	0.1	0.1	0.0	0.0	0.4	0.3	0.2
Total Del/Veh (s)	0.4	0.1	5.5	3.5	10.6	5.7	5.3

**21: Empire Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.1	0.1	0.2	0.3	0.0	0.0	0.2
Total Del/Veh (s)	24.0	11.5	7.8	1.9	3.9	2.8	2.8

**22: Lowell Ave & Shadow Ridge Rd Performance by movement**

Movement	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR	All
Denied Del/Veh (s)	0.2	0.1	0.0	0.0	0.0		0.1	0.0	0.0	0.0	0.0
Total Del/Veh (s)	4.4	3.0	5.5	6.1	4.0		0.1	6.0	3.2	3.7	4.3

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29: Empire Ave Performance by movement

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Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	16.7	10.6	1.6	1.1	8.4	1.8	2.7

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Total Network Performance

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Denied Del/Veh (s)	5.9
Total Del/Veh (s)	66.4

Queuing and Blocking Report  
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Intersection: 3: Park Ave & 15th St

Movement	EB	WB	NB	NB	B15	SB
Directions Served	LTR	LTR	L	TR	T	LTR
Maximum Queue (ft)	120	56	56	136	21	18
Average Queue (ft)	40	20	14	33	1	1
95th Queue (ft)	96	47	41	190	16	9
Link Distance (ft)	376	341		345	312	357
Upstream Blk Time (%)				1		
Queuing Penalty (veh)				5		
Storage Bay Dist (ft)			50			
Storage Blk Time (%)			0	5		
Queuing Penalty (veh)			2	2		

Intersection: 6: Park Ave & Empire Ave/Deer Valley Dr

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	T	R	L	T	TR	L	T	R
Maximum Queue (ft)	314	390	388	275	575	565	184	320	325	325	735	479
Average Queue (ft)	225	246	193	163	420	409	33	221	228	279	365	158
95th Queue (ft)	321	356	326	334	666	659	115	356	358	380	780	542
Link Distance (ft)			591		537	537		357	357		706	706
Upstream Blk Time (%)					20	16	0	5	7		8	1
Queuing Penalty (veh)					0	0	0	15	20		0	0
Storage Bay Dist (ft)	215	215		250			300			300		
Storage Blk Time (%)	10	18	4	0	49			9		20	0	
Queuing Penalty (veh)	36	65	30	0	39			4		77	2	

Intersection: 7: Empire Ave & Silver King Dr/15th St

Movement	EB	EB	WB	NB	NB	SB	SB
Directions Served	L	TR	LTR	L	TR	L	T
Maximum Queue (ft)	193	196	68	112	384	109	263
Average Queue (ft)	125	39	15	34	171	14	118
95th Queue (ft)	188	115	43	95	285	55	216
Link Distance (ft)		309	376		601		591
Upstream Blk Time (%)		0					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)	100			100		100	
Storage Blk Time (%)	15	0		0	17		8
Queuing Penalty (veh)	11	0		0	7		1

**Intersection: 9: Empire Ave & Crescent Tram**

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	31	31
Average Queue (ft)	15	2
95th Queue (ft)	37	16
Link Distance (ft)	185	2121
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 10: Empire Ave & Manor Way**

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	163	24	4
Average Queue (ft)	112	2	0
95th Queue (ft)	170	13	3
Link Distance (ft)	146	2121	332
Upstream Blk Time (%)	3		
Queuing Penalty (veh)	19		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 11: Lowell Ave & Northstar Dr**

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	25	18
Average Queue (ft)	1	1
95th Queue (ft)	11	7
Link Distance (ft)	247	287
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

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Intersection: 12: Park Ave & 8th St.

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	75	53
Average Queue (ft)	33	7
95th Queue (ft)	59	32
Link Distance (ft)	160	288
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: Lowell Ave & Manor Way

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	96	114	219
Average Queue (ft)	47	55	86
95th Queue (ft)	79	91	154
Link Distance (ft)	146	1734	505
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 14: Park Ave & 14th St

Movement	EB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	115	258	52
Average Queue (ft)	46	40	3
95th Queue (ft)	86	134	23
Link Distance (ft)	391	2685	312
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 16: Access 1 & Lowell Ave/Empire Ave

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (ft)	35	57
Average Queue (ft)	2	20
95th Queue (ft)	15	48
Link Distance (ft)	211	106
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 17: Lowell Ave & Access 2

Movement	EB
Directions Served	LR
Maximum Queue (ft)	55
Average Queue (ft)	21
95th Queue (ft)	47
Link Distance (ft)	140
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 20: Lowell Ave & Silver King Dr

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	4	64	143
Average Queue (ft)	0	14	70
95th Queue (ft)	3	45	113
Link Distance (ft)	334		738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		50	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Queuing and Blocking Report  
 PM Peak Hour Future (2037) + Project Mitigated

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Intersection: 21: Empire Ave & Shadow Ridge Rd

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	36	181	40
Average Queue (ft)	6	56	2
95th Queue (ft)	26	158	17
Link Distance (ft)	265	165	601
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		6	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 22: Lowell Ave & Shadow Ridge Rd

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	46	104	76
Average Queue (ft)	17	50	38
95th Queue (ft)	38	81	64
Link Distance (ft)	232	265	738
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 29: Empire Ave

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	85	87	141
Average Queue (ft)	40	8	30
95th Queue (ft)	70	45	96
Link Distance (ft)	391	332	165
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 342