Planning Commission
Staff Report

PARK CITY 1884
PLANNING DEPARTMENT

Subject: **Treasure**
Project #: **PL-08-00370**
Author: **Francisco Astorga, AICP, Senior Planner**
Date: **14 June 2017**
Type of Item: **Administrative – Conditional Use Permit**
Transportation/Traffic Update

Summary Recommendations

Staff recommends that the Planning Commission review the Treasure Hill Traffic Study DRAFT Addendum #7 (Transportation/Traffic Update) submitted to the City on May 4, 2017 and Staff's initial draft response/comments. As noticed, a public hearing should be held. Staff recommends that the Planning Commission continue the item to the July 12, 2017 Planning Commission meeting.

Description

Property Owner:	Sweeney Land Company and Park City II, LLC represented by Patrick Sweeney
Location:	Creole Gulch and Mid-station Sites Sweeney Properties Master Plan
Zoning:	Estate (E) District – Master Planned Development
Adjacent Land Use:	Ski resort area and residential
Topic of Discussion:	Transportation/Traffic Update
Reason for Review:	Conditional Use Permits are required for development per the Sweeney Properties Master Plan. Conditional Use Permits are reviewed by the Park City Planning Commission

Background

Despite the applicant's stated goal of completing their transportation/traffic study addendum in February 2017, the applicant was not able to conclude their study update until early May 2017. The applicant introduced this update on May 10, 2017. Due to the late submittal of the update, Staff was unable to present response/comments during the May 10, 2017 Planning Commission meeting.

Transportation Studies/Documents

The following list below has been further updated and is now in chronological order (document date - name of document - company that prepared the document):

- 2003.12.18 - TH Traffic Opinion Summary - PEC
- 2004.07.01 - TH Traffic Impact Analysis - PEC
- 2004.07.31 - Addendum One - PEC

- 2005.04.06 - Second Addendum to the TH Traffic Impact Analysis, July 2004 - Traffic Count President's Day Weekend - PEC
- 2005 .07.20 - Technical Memorandum TH Traffic Review - Fehr & Peers
- 2005.12.09 - Summary of Findings & Recommendations of the TH Traffic Report – Fehr & Peers
- 2006.02.24 - TH Response to Park City Planning Commission Questions - PEC
- 2008.01.07 - Third Addendum to the TH Traffic Impact Analysis, July 2004 - Lowell Ave. Sidewalk and Improvements - PEC
- 2009.02.24 - Letter to the Applicant – Park City Municipal Corporation
- 2009.03.31 - Walkability Study / Recommended Improvements - PEC
- 2009.04.02 - Sweeney Letter to the City – MPE
- 2009.04.02 - TH CUP Review Lowell Avenue Improvements Opinion Summary - Alta Engineering
- 2009.04.02 - TH Traffic Impact Analysis Addendum Four - PEC
- 2009.04.15 - Parking Count Numbers - Alta Engineering
- 2009.04.19 - Treasure Lowell Avenue Improvements - Alta Engineering
- 2009.06.18 - Fifth Addendum to the TH Traffic Analysis, July 200 - Parking Generation Study - PEC
- 2009.06.18 - Revised Letter TH Walkability Study / Recommended Improvements and Effects on Traffic of Proposed Roadway Section on Empire Ave. - PEC
- 2009.06.25 - Sixth Addendum to the TH Traffic Impact Analysis, July 2004 - Intersection Operations Limiting Development Traffic on Empire Ave. - PEC
- 2009.07.16 - Proposed Parking and Traffic Operations – MPE Incorporated
- 2009.07.22 - Updated Treasure Lowell Avenue Improvements - Alta Engineering
- 2017.01.05 - Treasure Hill Traffic Study Summary - Triton Engineering

- **2017.05.04 - Treasure Hill Traffic Study DRAFT Addendum #7 - Triton Engineering, see Exhibit A.**

Staff's Initial Repose to the Transportation/Traffic Update

The Planning Department worked closely with the City Engineer and the City's Transportation Planning Manager and reviewed applicant's Transportation/Traffic Update. The objective was to synthesize the current and previous Planning Commission discussions and public comments regarding traffic related impacts. Staff's approach is in multiple parts:

- Review applicant's submittal and previous reports and evaluate the assumptions.
- Evaluate the projected outcome of the applicant's studies, and add qualitative discussions regarding impacts to Park City.
- Evaluate the adequacy and effectiveness of proposed mitigations strategies.

Staff will recommend that an independent analysis be conducted, concentrating on the validity of the assumptions, and accuracy of predictions, including the target LOS. Staff may also request that an independent analysis provide potential mitigation strategies to Staff for their consideration prior to forwarding Staff recommendations to the Planning Commission.

Staff continues to work with Park City Fire District, and Park City Department of Building and Fire Safety (Fire Marshal), to add their insight regarding emergency service access and routes, plus construction traffic and parking impacts.

Staff is compiling the comments into three (3) categories for future discussions by the Planning Commission:

- Road and Intersection capacities / levels of service
- Operational characteristics and plans
- Mitigation strategies proposed by applicant

Staff's initial draft comments/response includes the following items that were verbally shared with the applicant on May 26, 2017. Written comments were provided to the applicant on June 5, 2017.

General:

1. *Define actual level of service (LOS).*

2. *Clearly identify time period in which data was collected in the Executive Summary. Also clarify weather conditions during both AM and PM peak.*

3. *The analysis fails to evaluate trips generated and parking impacts to Main Street for those seeking to access the mountain via the cabriolet.*

4. *Document states that the cabriolet will transport 2,500/hour; however, specifics on cabriolet capacity are lacking (# of passengers, timing loading and unloading, number of cabriolet cars, etc.).*

5. *Specify cabriolet hours or operations by day and by season.*

6. *Develop a detailed mitigation monitoring and report program that specifies mitigation measure, responsible party, timing/schedule, estimated cost, effectiveness measure, and any potential remedial/corrective action.*

7. *Clarification needed regarding construction trips and demands on Park City Transit from employee commuters to the cabriolet system.*

8. *Please verify that Sheet P.16 revised on March 20, 2009 contains the number of units and building area by use.*

9. *Verify all intersection figures. For example Silver King Drive at 15th Street shows a significant decrease in volumes between Silver King Drive/15th Street and Park Ave. and Deer Valley Drive where no major destination or street exist to divert or capture traffic between these two points.*

10. *Based on the information provided on the Appendix - Commercial Space Exhibit and Sheet P.16, it would seem that there are commercial spaces that are still not accounted for, equating to approximately 8,079 sf., identified as 1,393 sf. of allotted commercial and 6,686 sf. of support commercial. Please look into this. If correct, these missing commercial areas need to be added.*

11. *Confirm that none of the areas identified as common space & circulation and accessory space, with the exception of employee housing, are being counted towards trip generation.*

12. *When we calculate the hotel land use we get 53 AM trips and 59 PM trips while you indicate 49 AM and 55 PM. Could you please look into this? When we calculate the other three (3) land uses we get a lot closer, which may be a result of simple rounding. Please review the trip reduction calculations.*

<u>Trip Reduction Questions/Request for Information:</u>

1. *Page 13 – Justify 65% avg. hotel occupancy rate. Compare to comparable lodging properties.*

2. *Page 13 – Justify rationale for 31% trip reduction from retail to residential for employee housing.*

3. *Page 13 – Justify rationale for 16% trip reduction.*

4. *Page 13 – Justify further reduction of 20% from retail to retail.*

5. *Page 13 – It is assumed these uses are support commercial; however, it is likely external trips will be generated and should be account for or mechanisms to*

deter external trips should be outlined (i.e. restaurant, shopping, spa, etc.).

6. *Page 14 – Justify 30% reduction in trips for gondola from peer resorts operations and communities (could be gleaned from Environmental Impact Studies (EIS's) developed for existing Northstar/Ritz, Mammoth, Heavenly, Telluride that operate as transportation facilities).*

7. *Page 14 – Justify 10% reduction for beginner and intermediate trail construction and access from development.*

8. *Page 14 – Unclear on statement on access to Main to link with Transit. Is this assuming that additional trips beyond Main St. will be made via Park City Transit to further destinations?*
    a. *Existing conditions change in terms of blackout days, Park City School District school parking, variable-message signs (VMS), Canyons access and gondola connections, weather.*
    b. *Was the same modeling software used in 2005 as was used in 2017, (SimTraffic)?*
    c. *What is the LOS standard we are trying to achieve/maintain?*

9. *Page 16 – Define "modern technologies." We assume this is onsite and remote way-finding but it needs to be defined. Recommend monitoring percentage (%) of access (i.e. 50% Empire and 50% Lowell).*

10. *Page 23 – Park Ave. /Deer Valley Drive "Worst Approach." Why is this not shown/modeled? The "Overall Intersection" for this intersection does not seem to reflect reality as observed by City staff.*

11. *Page 24 – Please show Table 7 and 8 in one (1) table for comparison purposes?*

12. *Without Treasure, when does Empire Avenue/Silver King Drive fail (3 yrs, 5 yrs, 10 yrs?) and when does it fail with Treasure? This will help all parties, including Vail, to plan, budget, design, and construct.*

13. *Page 25 – Retiming signals is not adequate ongoing mitigation. Without modeling the other approaches and adjacent intersections impacts to these intersections and the signal coordination and timing (SCATs) system are unknown.*

<u>Summary and Conclusions:</u>

- *1st bullet – Definitively state that the cabriolet system "shall" be included in the project. Timing of construction shall also be identified as previous project documents state that construction workers will arrive via cabriolet. Again, specify hours of operation. To be effective the cabriolet must operate will beyond the PM peak.*

- *3rd Bullet – Is the "on-site commercial' really on-site commercial or support commercial?? Please clarify. If the commercial is open to the general public, have these trips been accounted for?*

- *Is the employee housing dedicated to Treasure employees and how many units?*

- *4th Bullet – Offsite parking should be mandatory and year round with little to no parking provided for employees aside from those that carpool. In regards to incentives, please specify what the actual incentives are. Certain incentives have various success rates and effectiveness that have been validated by various studies, e.g., California Air Pollution Control Officers Association (CAPCOA).*

- *5th Bullet – Shuttle system should operate during winter ski season and peak summer season. How many trips per day and/or hours per day should be specified?*

- *Valet shall be provided to control parking usage for those that are allowed to park onsite (i.e. guests vs. employees vs. general public).*

- *6th Bullet – This measure is too ambiguous considering the scope and duration of project. Richardson Flat parking lot will most likely be open to the public and will not be available for private entity leases. Proponent will be required to procure/secure private parking. Shuttles or van pools shall be provided from adjacent communities. Can the project proponent estimate peak number of shift/construction workers? If not now, when?*

Discussion requested: Staff requests that the Planning Commission continue to review the Transportation/Traffic Update and Staff's initial draft response/comments, as listed above. The Planning Commission may request additional clarification of the applicants report or conclusions. Staff does not expect the applicant to address all or any of these items at the meeting. The City Engineer and Transportation Planning Manager will attend the meeting with the City Planner, should the Planning Commission have any questions about this Staff report including Staff's initial draft response.

Specifically, Staff is of the current opinion that the Transportation/Traffic update, as submitted is disproportionality focused on intersection capacity (and road capacity) with measurements in term of levels of service that may, or may not reflect high peak conditions. Second, a number of the assumptions that drive intersection capacity etc., have not yet been vetted and rely on the Highway Capacity Model, without the background as to assumptions used in the creation of Highway Capacity model ratios. Third, Staff is requesting information regarding operations assumptions and detail regarding mitigations.

Staff has requested information from the Fire District as to dispatch locations,

procedures during heavy traffic or weather condition. Staff has also requested information regarding procedures upon arrival at the site due to the fire lanes being located within the parking Structure(s).

The Chief Building Official will provide a review of construction mitigation when provided by the applicant.

The City Engineer will provide a review of sight distances, corner sight triangles, truck turning movements along the route from U 224 to the site, etc.

The Planning Commission is requested to comment on the Staff' current opinions regarding the Transportation/Traffic Update. The Planning Commission may focus the discussion items as below:

- **Questions on the Staff Report and process**
- **Questions on the applicants' report**
- **Questions regarding Staff analysis to date**
- **Questions on Streets Master Plan and Lowell project(s)**

1986 Sweeney Properties Master Plan Development Parameters and Conditions

The following transportation/traffic/parking related text below is copied directly from the 1986 Sweeney Properties Master Plan (SPMP) narrative titled Section III. Development Parameters and Conditions:

III. DEVELOPMENT PARAMETERS and CONDITIONS

The staff's recommendation that the Sweeney Properties Large Scale Master Planned Development be approved by the Planning Commission, and subsequently by the City Council, is predicated upon the following terms and conditions. Upon approval, MPE Inc./Sweeney Land Company, its successors or assignees, shall become bound by and obligated for the performance of the following:

[…]

3. The approved densities are those attached as an Exhibit, and shall be limited to the maximums identified thereon. Parking shall be provided on-site in enclosed structures and reviewed in accordance with either the table on the approved Restrictions and Requirements Exhibit or the adopted ordinances at the time of project approval. All support commercial uses shall be oriented and provide convenient service to those residing within the project and not designed to serve off-site or attract customers from other areas.

4. Access to the Town Lift and Creole sites shall be provided by a private roadway with acceptable emergency access and utility easements

provided. No city maintenance of these streets is expected. All utility lines shall be provided underground with private maintenance required wherever located in inaccessible locations or outside approved easements.

[…]

7. All easements, deeds, and/or rights-of-way shall be provided without cost to the City and in accordance with the Master Plan documents and phasing plan approved. Likewise, it shall be the developer's sole responsibility to secure all easements necessary for the provision of utility services to the project.

8. Master Planned Development approval only conceptually established the ability of local utility service providers to supply service to the projects. It does not constitute any formal approval per se. The applicant has been notified that substantial off-site improvements will be necessary and that the burden is on the future developer(s) to secure various easements and upsize whatever utility lines may be necessary in order to serve this project. Prior to resale of this property in which this MPD approval is carried forward, or prior to any conditional use application for any portion of the MPD, a utility plan addressing water, fire flows, and sanitary sewer, storm drainage, cable utilities, and natural gas shall be prepared for review and approval by City Staff and the Snyderville Basin Sewer Improvement District. Part of the plan shall be cost estimates for each item of utility construction as it is anticipated that major costs for these utilities will be necessary. All such costs shall be paid by the developer unless otherwise provided. If further subdivision of the MPD property occurs, the necessary utility and access improvements (see below) will need to be guaranteed in roads, and access questions which will need to be resolved or upgraded by the developers at their cost (in addition to impact fees, water development and connection fees, and all other fees required by City Ordinances are as follows:

(a) Empire Avenue and Lowell Avenue will be the main access routes to the Creole Gulch site. As such, during construction these roads will need to carry heavy traffic, probably in the vicinity of up to 300 heavy trucks per day. At the present time and until the Creole Gulch site develops, Empire and Lowell south of Manor Way are and will be low-volume residential streets, with a pavement quality, width, and thickness that won't support that type of truck traffic. The City will continue to maintain the streets as low-volume residential streets, including pavement overlays and/or reconstruction. None of that work will be designed for the heavy truck traffic, but in order to save money for the developer of the Creole Gulch site, he or she is encouraged to keep the City Public Works Director notified as to the timetable of

construction at Creole Gulch. If the City is notified that the construction is pending such that an improved pavement section can be incorporated into normal City maintenance projects, then it is anticipated that the incremental additional cost of the additional pavement thickness (which is likely to be in the vicinity of 3 additional inches of asphalt over the entire 4,6000 linear feet [25-foot asphalt width] of Lowell/Empire south of Manor Way, or approximately $80,000 additional cost in 1986 dollars) could be paid by the developer with said amount deducted from future impact fees paid to the City as long as it did not exceed the total future impact fees. However, if the increased pavement section is not coordinated with the City by the developer such that the pavement of Lowell and Empire south of Manor Way remains inadequate at the time the Creole Gulch site is developed, then the developer shall essentially reconstruct the entire 4,600-foot length of Lowell and Empire south of Manor Way at his or her cost, which with excavation and reconstruction of an anticipated 6-inch asphalt thickness on top of 10 inches of road base, plus all other normal construction items and costs, would be in the approximately cost range of $300,000 to $400,000 in 1986 dollars. Further, because that reconstruction would be inconvenient to residents and the City, and because delays, impacts, and potential safety hazards would be created over and above normal City maintenance of existing streets, that action by the developer would be a new impact on City residents and the cost therefore would not be deductible from any developer impact fees.

(b) Contribute to the Park City Village, or other water tanks, determined to be necessary by the City Engineer in order to serve the project with culinary and fire storage. Based on a Type 1 fire resistive construction, it is assumed that the contribution would be on the order of 500,000 gallons at a cost of approximately $300,000, although the exact figures would need to be determined in a detailed study using adopted City standards.

(c) Construct pumped pressure system(s) with backup emergency power to provide a means of delivery of fire flows to the project. Construct a meter vault at the edge of the road adjacent to the project, beyond which all water facilities would be privately maintained. It is anticipated that in the vicinity of 2,500 feet of 12-inch water line with appurtenances may be required. Such pipe would cost about $70,000 in 1986 dollars exclusive of the pumps and backup power, which are even more expensive.

(d) Provide an easement, or pay all costs related to condemnation by Park City of an easement, suitable for construction and maintenance of a storm drain from the project site to Silver Creek or McLeod Creek.

All City streets and any public utility drainage easements normally provided in the course of other private development shall be available for utility construction related to this MPD subject to reasonable construction techniques and City standards.

(e) Pay for downstream detention basin construction costs in accordance with the ratio of increased runoff from the project during the 50-year flood event to the total design volume of the basin. (Note: The City Engineer will require runoff to meet the current standard. The detention basin must be able to hold the difference between pre and post development based on a 100 year storm event.)

(f) Construct a storm drain line to Silver Creek or McLeod Creek adequate to contain the runoff running through and off the site during the 50-year flood event. It is assumed that a minimum of 36-inch concrete storm drain line will need to be installed solely for Creole Gulch drainage. It is further assumed that special clean-out boxes and inlet boxes will need to be designed to address difficult hydraulic problems. Such boxes are expensive. (Note: the City Engineer will require that the storm drain meet the current standard. The size of the storm drain line should be able to handle the difference between pre and post development. This must be calculated and submitted to the City for review.)

(g) Provide re-vegetation over all on-site and off-site areas disturbed for project-related utilities.

(h) Sanitary sewer improvements are assumed to involve replacing in the vicinity of 3,000 feet of sewer line, with new manholes included. Such construction will cost in the vicinity of $100,000, is subject to the approval of SBSID (now SBWRD), and is further subject to all District fees and agreements necessary for extension of lines.

9. To minimize additional construction traffic impacts, on-site material stockpiling/staging and parking shall be provided during the course of construction. Similarly, cut and fill shall be balanced and distributed on-site whenever practicable, with any waste material to be hauled over City specified routes. Also at the time of conditional use review/approval, individual projects or phases shall provide detailed landscaping, vegetation protection, and construction staging plans.

[…]

1986 Sweeney Properties Master Plan Major Issues

The following transportation related text below is copied directly from the 1986 Sweeney Properties Master Plan (SPMP) narrative titled Section VI. Major Issues:

VI. Major Issues

Many concerns were raised and issues identified through the review process. A project of this scale and complexity would pose similar and considerable consternation no matter where it was proposed to be built. Because this particular site is located both within and adjacent to the Historic District, many of the concerns expressed related to the more subjective kinds of considerations. The Master Planned Development procedure attempts to deal with the general concept of the proposed development and defer or relegate the very detailed project review elements to the conditional use stage of review. At conditional use review, the following issues will be examined in considerable detail with technical solutions sought.

[…]

Access - All of the different concepts reviewed would result in similar access concerns. The Coalition properties along Park Avenue have excellent access as a result and efforts were, therefore, limited to combining driveways to minimize the number of curb cuts (~~i.e~~i.e.: ingress/egress points). The development of the Hillside Properties will undoubtedly impact not only Empire and Lowell Avenues but other local streets as well. While certain assumptions could be made as to the type or character of development proposed and possible corresponding differences in traffic patterns, many of the questions raised would remain unanswered. While it is true that the Norfolk Avenue extended alternative would best deal with the current problem of poor access to that area, it would not have solved all of the access issues. The proposed Master Plan will provide sufficient ground, to be dedicated to the city, for purposes of developing a reasonable turnaround for Upper Norfolk.

[…]

Traffic - Any form of development proposed in this area of town would certainly impact existing streets. Although the majority of traffic generated will use Empire and Lowell Avenues, other roads will also be affected. The concept of extending Norfolk Avenue would have improved access to the south end of old town, but would also have added additional traffic to Empire and Lowell as a result. It is expected that both Empire and Lowell will be improved in several years in order to facilitate traffic movement in general. Even without this project, some upgrading has been planned as identified through the development of the Streets Master Plan.

In evaluating traffic impacts, both construction and future automobile demand are considered. Many related issues also come into play, such as efforts to minimize site grading and waste export. The Master Plan review

process affords the opportunity to address these issues in considerable detail whereas other reviews would not. Several of the conditions proposed deal with the issue of traffic and efforts directed at mitigating the impacts created. Traffic within the project will be handled on private roadways with minimal impact.

[…]

Circulation - Circulation within the primary development sites will be on foot. Private roadways/drives access the project parking areas with vehicular circulation provided between projects and for service/delivery, construction, and emergency purposes. Pedestrian circulation within the projects will be provided via walkways and plazas with off-site improvements made to facilitate area-wide access. Several nearby stairways will be (re)constructed in accordance with the approved phasing and project plans.

Easements/Rights-of-Way - The Sweeneys have included the dedication and and/or deeding of several easements and sections of rights-of-way to Improve the city's title. As a part of the Master Plan, several roadway sections and utility/access corridors will be deeded over. In addition, a right-of-way will be supplied for the construction of a hammerhead-type turnaround for Upper Norfolk Avenue.

Norfolk Avenue - Although several staff members supported the idea of extending Norfolk Avenue through to Empire-Lowell, the consensus was in support of the clustering approach to development. Technical as well as fiscal concerns were discussed relative to the access benefits that would result. Similarly, although the resultant scale of HR-1 development that would have been likely is closer to that prevalent in the Historic District today, the spreading-out of the impacts of road and development construction would have been exacerbated. In lieu of extending Norfolk Avenue, the Sweeney's have consented to deed to the city sufficient land for a turnaround and to participate in the formation of a special improvement district for roadway improvements (in addition to providing an easement for the existing water line).

[…]

Fire Safety - The clustering of development proposed affords better overall fire protection capabilities than would a more scattered form. Buildings will be equipped with sprinkler systems and typical "high-rise" fire protection requirements will be implemented. The proposed development concept locates buildings in areas to avoid cutting and removing significant evergreens existing on the site. Specific parameters have been recommended by the staff with actual details proposed to be deferred until

conditional use review.

[…]

Trails - The proposed phasing plan identifies the timing of construction for summertime hiking trails and related pedestrian connections. Trails, stairways, and sidewalks accessing or traversing the various properties will be required in accordance with both the approved phasing plan and at the time of conditional use review/approval.

Past Traffic/Transportation/Parking Meetings

The following list below simply represents the last transportation/traffic related Planning Commission meetings and minutes that took place in 2009:

- 2009.02.11 Planning Commission Staff Report
- 2009.02.11 Planning Commission Work Session meeting minutes
- 2009.02.11 Planning Commission Regular meeting minutes

  Summary: *Park City Municipal Corporation Traffic Staff provided the Planning Commission with an outline of the previous Planning Commission meetings regarding traffic. Staff outlined four (4) issues raised within the previous Planning Commission review followed with specific questions. The topics were proposed use and traffic generation, pedestrian circulation, on-site parking, and displaced parking.*

- 2009.04.22 Planning Commission Staff Report
- 2009.04.22 Planning Commission Regular meeting minutes

  Summary: *Attorney Jody Burnett, who had been retained as independent counsel to render an advisory opinion on the issue of vested rights for the Sweeney MPD presented his findings. Next, the applicant responded to concerns raised by the Planning Commission during the February 11, 2009 meeting that were outlined by Staff in a letter. In general, the Planning Commission expressed concern that the proposed mitigation was creating too much of a burden on the adjacent neighborhood and that mitigation to Empire Avenue had not been addressed.*

- 2009.07.22 Planning Commission Staff Report
- 2009.07.22 Planning Commission Work Session meeting minutes
- 2009.07.22 Planning Commission Regular meeting minutes

Summary: *Staff provided an overview of the proposed traffic mitigation, which was recently updated by the applicant, specifically for Empire Avenue, and L*owell/Manor Way:

Empire Avenue

- *All sections 31 feet wide including curb.*
- *Anticipate future public process involving all impacted properties to arrive at detailed design customizing sections to meet individual neighbor needs based on the three sections provided (Options A - C).*
- *Accommodate snow storage equivalent to present conditions.*
- *Suggest permit parking for residents and guests.*
- *All current right-of-way parallel, perpendicular, and driveway parking maintained, and located outside of the two travel lanes.*
- *Suggest 15 mph speed limit.*
- *Signs to limit truck traffic on Empire (subject to fine).*
- *Encourage traffic from Treasure project to utilize Lowell Avenue with left turn only sign.*

Lowell Avenue and Manor Way

- *Four foot sidewalk from Manor up Empire on downhill (east) side. The sidewalk will continue in front of Treasure and around to Lowell Avenue. In this section it will be 5 feet wide. The sidewalk will continue down Lowell on the uphill (west) side at 4 feet wide down to Manor Way.*
- *Removed previous proposal to construct 10th street stair between Lowell and Empire.*
- *Removed snow storage location on the project site.*
- *Cross walks added at Empire and Lowell.*
- *Do not support prohibiting parking between 2 – 6 am for snow removal. Suggest occasional snow emergencies where residents are noticed to move their cars for a period of time for snow removal as happens in the rest of Old Town.*
- *Additional cost of maintenance will be covered by project tax base.*
- *Agree to participate in cost of improvements north of Manor based on the projects pro rata share of traffic as determined by studies.*

The applicant provided mitigation to decrease trips from the project after guest/residents arrival. Applicant submitted a proposal to decrease the demand to the site: 2009.07.16 - Proposed Parking and Traffic Operations – MPE Incorporated. The Planning Department explained the recommended on-street parking management plan and snow management plan, which there were disagreements with the applicant. Staff provided recommendations regarding sidewalk and snow storage placement. Staff summarized emergency vehicle access on Empire Avenue. Regarding the location and amount of off-street parking Staff analyzed the written language on the Master Plan, the effects of the employee housing, and adequacy of the proposed parking, including possible reduction. It was noted that the internal vehicular circulation system would be

further analyzed during mass and scale of the building as the Planning Commission was focused on the traffic patterns offsite. Control of delivery and service vehicles was analyzed during the traffic portion of the review. The applicant proposed utilization of signs to prohibit through truck traffic and also to improve Empire Avenue with a sidewalk, landscaping, and parking to preserve the residential experience of the street and slow down through traffic. Staff was skeptical of the of the applicant's proposal in that access to and from the project on Empire will not be encumbered by Stop signs while the route utilizing Lowell has a three-way Stop at Lowell and Manor Way and a Stop sign on Manor onto Empire. Further, unenforced signs have no effect and frequent delivery trucks will quickly utilize the fastest route to and from the project which will continue to be Empire Avenue.

The meeting minutes reflect ample discussion regarding these various topics from the City's transportation/traffic experts as well as the applicant's consultants. The record indicates that that all the Commissioners concurred with the Staff analysis. Commissioner Wintzer submitted a letter that was included as part of the record. The Planning Department commented on the MPD parking calculation, specifically, that the commercial was never considered in the MPD parking calculation. Input was considered from the City's Transportation Manager and the City Engineer regarding snow removal and having a no parking regulation between 2:00-6:00 a.m. There was also a discussion about snow removal costs, street aesthetic relating to proposed parking, road lanes (width), and sidewalk, including proposed improvements to Manor Way. A discussion took place about intermediate stop signs along Empire Avenue to discourage traffic as well as discussion of the Empire Crescent Tram connection to Main Street. A discussion also took place regarding the sidewalk location, minimum travel width, and the need of employee parking management plan for adequacy. The Planning Commission concurred that they would like to see an effort for reducing the parking below 366 spaces.

After the July 22, 2009 Planning Commission meeting, there was a site meeting that took place on August 26, 2009. On September 23, 2009 the focus of review was CUP criteria 8, 11, and 15 (mass, scale, and compatibility). On October 10, 2009 there was another scheduled site visit which was canceled due to the weather. On February 02, 2010 the applicant presented their physical model, and no new information, other than the model, was received by the Planning Staff, where the City re-published their last staff report dated September 23, 2009.

On January 11, 2017, Staff presented the following:

- all of the transportation documents,
- an outline of the development parameters and conditions, and major issues related to transportation/traffic/parking listed on the 1986 Sweeney Properties Master Plan,
- an outline and summary of the 2009 transportation/traffic/parking meetings,

- the City's 2011 Traffic & Transportation Master Plan, Old Town local road designation construction recommendation,

During the January 11, 2017, the applicant presented their Traffic Study Summary, response to issues raised, and executive summary to issues raised. Please see the January 11, 2017 Planning Commission staff report and meeting minutes:

- 2017.01.11 Planning Commission Staff Report
- 2017.01.11 Planning Commission Meeting Minutes

On May 10, 2017, the applicant presented to the Planning Commission the Treasure Hill Traffic Study DRAFT Addendum #7 (Transportation/Traffic Update) submitted to the City on May 4, 2017:

- 2017.05.10 Planning Commission Staff Report
- 2017.05.10 Planning Commission Meeting Minutes

Notice

The property was posted and notice was mailed to property owners within 300 feet on May 11, 2016 for the initial meeting held on June 8, 2106. Legal notice was published in the Park Record according to requirements of the Land Management Code prior to every meeting.

Public Input

Public input has been received by the time of this report. See the following hyperlink: Link A - Public Comments with public input received as of April 2016. All public comments are forwarded to the Planning Commission via the staff report link above and kept on file at the Planning Office. Planning Staff will not typically respond directly to the public comments, but may choose to address substantive review issues in subsequent staff reports. There are four (4) methods for public input to the Planning Commission:

- Attending the Planning Commission meetings and giving comments in the public hearing portion of the meeting
- Preparing comments in an e-mail to treasure.comments@parkcity.org
- Visiting the Planning office and filling out a Treasure CUP project Comment Card
- Preparing a letter and mailing/delivering it to the Planning Office

On June 9, 2017 a neighborhood group provided public comment in the form of a traffic study review memo, See Exhibit B - THINC TH Traffic Study Review Memo.

Summary Recommendations

Staff recommends that the Planning Commission review the Treasure Hill Traffic Study DRAFT Addendum #7 (Transportation/Traffic Update) submitted to the City on May 4, 2017. Staff recommends that the Planning Commission review the recently submitted Transportation/Traffic Update and Staff's initial draft response/comments. As noticed, a public hearing should be held. Staff recommends that the Planning Commission continue the item to the July 12, 2017 Planning Commission meeting.

Exhibits (printed)

Exhibit A - Treasure Hill Traffic Study DRAFT Addendum #7
Exhibit B - THINC TH Traffic Study Review Memo

Hyperlinks

Link A - Public Comments
Link B - Approved Sweeney Properties Master Plan (Narrative)
Link C - Approved MPD Plans
Link D - Proposed Plans – Visualization Drawings1

- Sheet BP-01 The Big Picture
- Sheet V-1 Illustrative Plan
- Sheet V-2 Illustrative Pool Plaza Plan
- Sheet V-3 Upper Area 5 Pathways
- Sheet V-4 Plaza and Street Entry Plan
- Sheet V-5 Building 4b Cliffscape Area
- Sheet V-6 Exterior Circulation Plan
- Sheet V-7 Parking and Emergency Vehicular Access
- Sheet V-8 Internal Emergency Access Plan
- Sheet V-9 Internal Service Circulation
- Sheet V-10 Site Amenities Plan
- Sheet V-11 Usable Open Space with Development Parcels
- Sheet V-12 Separation-Fencing, Screening & Landscaping
- Sheet V-13 Noise Mitigation Diagrams
- Sheet V-14 Signage & Lighting
- Sheet V-15 Contextual Site Sections - Sheet 1
- Sheet V-16 Contextual Site Sections - Sheet 2

Link E - Proposed Plans – Visualization Drawings2

- Sheet V-17 Cliffscapes
- Sheet V-18 Retaining Systems
- Sheet V-19 Selected Views of 3D Model - 1
- Sheet V-20 Selected Views of 3D Model – 2
- Sheet V-21 Viewpoints Index
- Sheet V-22 Camera Viewpoints 1 & 2
- Sheet V-23 Camera Viewpoints 3 & 4
- Sheet V-24 Camera Viewpoints 5 & 6
- Sheet V-25 Camera Viewpoints 7 & 8
- Sheet V-26 Camera Viewpoints 9 & 10
- Sheet V-27 Camera Viewpoint 11
- Sheet V-28 Illustrative Plan – Setback

Link F - Proposed Plans – Architectural/Engineering Drawings 1a

Sheet VM-1	Vicinity & Proposed Ski Run Map
Sheet EC.1	Existing Conditions
Sheet SP.1	Site & Circulation Plan Sheet
Sheet GP.1	Grading Plan
Sheet HL.1	Height Limits Plan
Sheet HL.2	Roof Heights Relative to Existing Grade
Sheet FD.1	Fire Department Access Plan

Link G - Proposed Plans – Architectural/Engineering Drawings 1b

Sheet P.1	Level 1 Use Plan
Sheet P.2	Level 2 Use Plan
Sheet P.3	Level 3 Use Plan
Sheet P.4	Level 4 Use Plan
Sheet P.5	Level 5 Use Plan
Sheet P.6	Level 6 Use Plan
Sheet P.7	Level 7 Use Plan
Sheet P.8	Level 8 Use Plan
Sheet P.9	Level 9 Use Plan
Sheet P.10	Level 10 Use Plan
Sheet P.11	Level 11 Use Plan
Sheet P.12	Level 12 Use Plan
Sheet P.13	Level 13 Use Plan
Sheet P.14	Level 14 Use Plan
Sheet P.15	Level 15 Use Plan
Sheet P.16	Area, Unit Equivalent & Parking Calculations

Link H – Proposed Plans – Architectural/Engineering Drawings 2

Sheet E.1AC2.1	Buildings 1A, 1C& 2 Exterior Elevations
Sheet E.1B.1	Building 1B Exterior Elevations
Sheet E.3A.1	Building & Parking Garage Exterior Elevations
Sheet E.3BC.1	Building 3BC Exterior Elevations
Sheet E.3BC.2	Building 3BC Exterior Elevations
Sheet E.3BC.3	Building 3BC Exterior Elevations
Sheet E.4A.1	Building 4A Exterior Elevations
Sheet E.4A.2	Building 4A Exterior Elevations
Sheet E.4B.1	Building 4B Exterior Elevations
Sheet E.4B.2	Building 4B Exterior Elevations
Sheet E.4B.3	Building 4B Exterior Elevations
Sheet E.4B.4	Building 4B Exterior Elevations
Sheet E.5A.1	Building 5A Exterior Elevations
Sheet E.5B.1	Building 5B Exterior Elevations
Sheet E.5C.1	Building 5C Exterior Elevations
Sheet E.5C.2	Building 5C Exterior Elevations
Sheet E.5D.1	Building 5D Exterior Elevations
Sheet S.1	Cross Section
Sheet S.2	Cross Section
Sheet S.3	Cross Section

Sheet S.4	Cross Section
Sheet S.5	Cross Section
Sheet S.6	Cross Section
Sheet S.7	Cross Section
Sheet S.8	Cross Section
Sheet S.9	Cross Section
Sheet UP.1	Concept Utility Plan

Link I – Applicant's Written & Pictorial Explanation
Link J – Fire Protection Plan (Appendix A-2)
Link K – Utility Capacity Letters (Appendix A-4)
Link L – Soils Capacity Letters (Appendix A-5)
Link M – Mine Waste Mitigation Plan (Appendix (A-6)
Link N – Employee Housing Contribution (Appendix A-7)
Link O – Proposed Finish Materials (Appendix A-9)
Link P – Economic Impact Analysis (Appendix A-10)
Link Q – Signage & Lighting (appendix A-13)
Link R – LEED (Appendix A-14)
Link S – Worklist (Appendix A-15)
Link T – Excavation Management Plan (Appendix A-16)
Link U – Project Mitigators (Appendix A-18)
Link V – Outside The Box (Appendix A-20)

Additional Hyperlinks

2009.04.22 Jody Burnett MPD Vesting Letter
Staff Reports and Minutes 2017
Staff Reports and Minutes 2016
Staff Reports and Minutes 2009-2010
Staff Reports and Minutes 2006
Staff Reports and Minutes 2005
Staff Reports and Minutes 2004
2004 LMC 50th Edition
1997 General Plan
1986.10.16 City Council Minutes
1985.12.18 Planning Commission Minutes
1986 Comprehensive Plan
1985 Minutes
1985 LMC 3rd Edition
1983 Park City Historic District Design Guidelines
Parking, Traffic Reports and Documents
MPD Amendments:
- October 14, 1987 - Woodside (ski) Trail
- December 30, 1992 - Town Lift Base
- November 7, 1996 – Town Bridge

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

Table of Contents **Page**

List of Figures **Page**

List of Tables **Page**

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 (8th 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 (8th 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

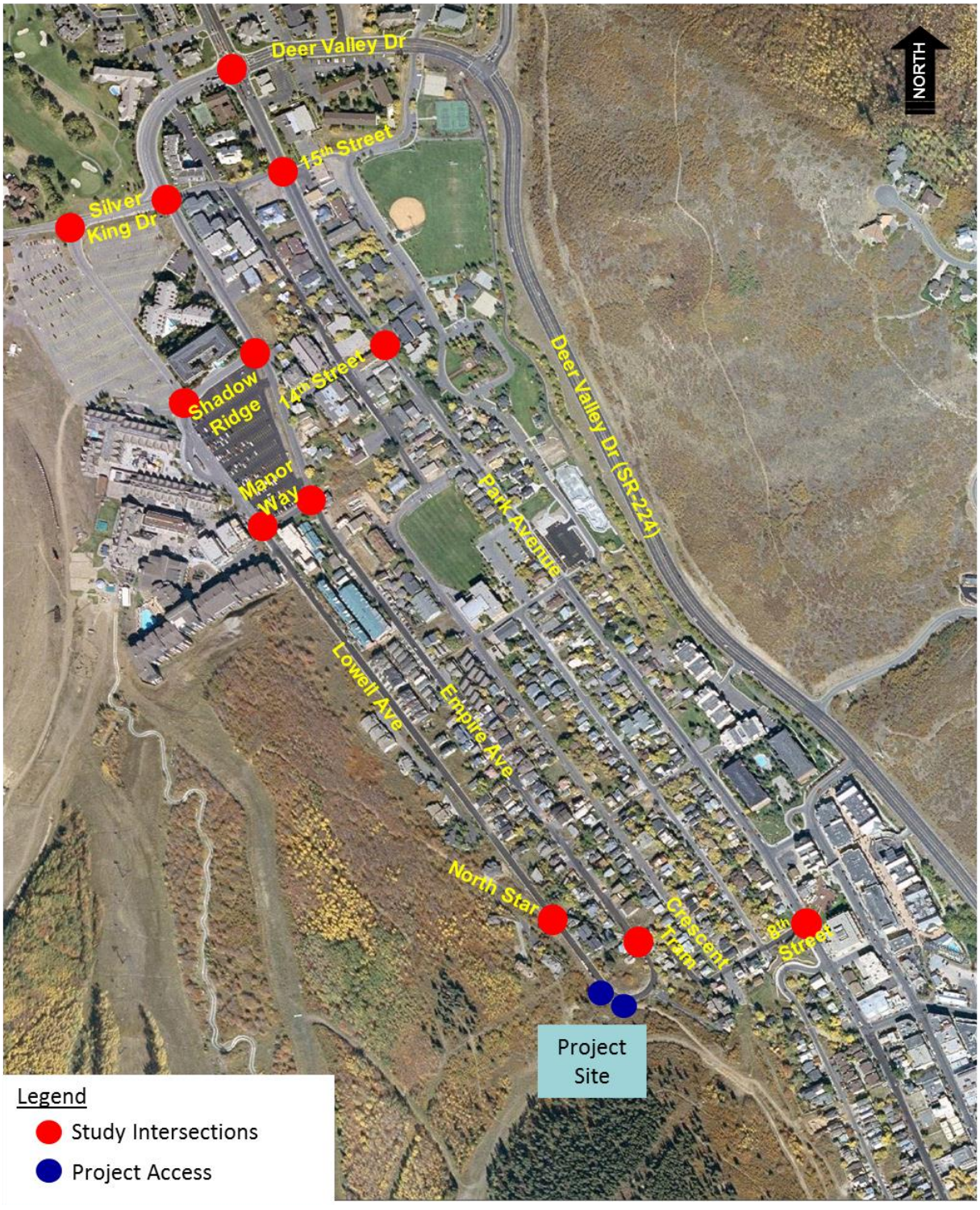


Figure 2
Project Location & Study Intersections

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

Intersection	*Estimated Traffic From Original Report*		*Actual Counts February 19th 2005*		*Actual Counts February 18th 2017*	
	AM	*PM*	*AM*	*PM*	*AM*	*PM*
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 / 8th 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.

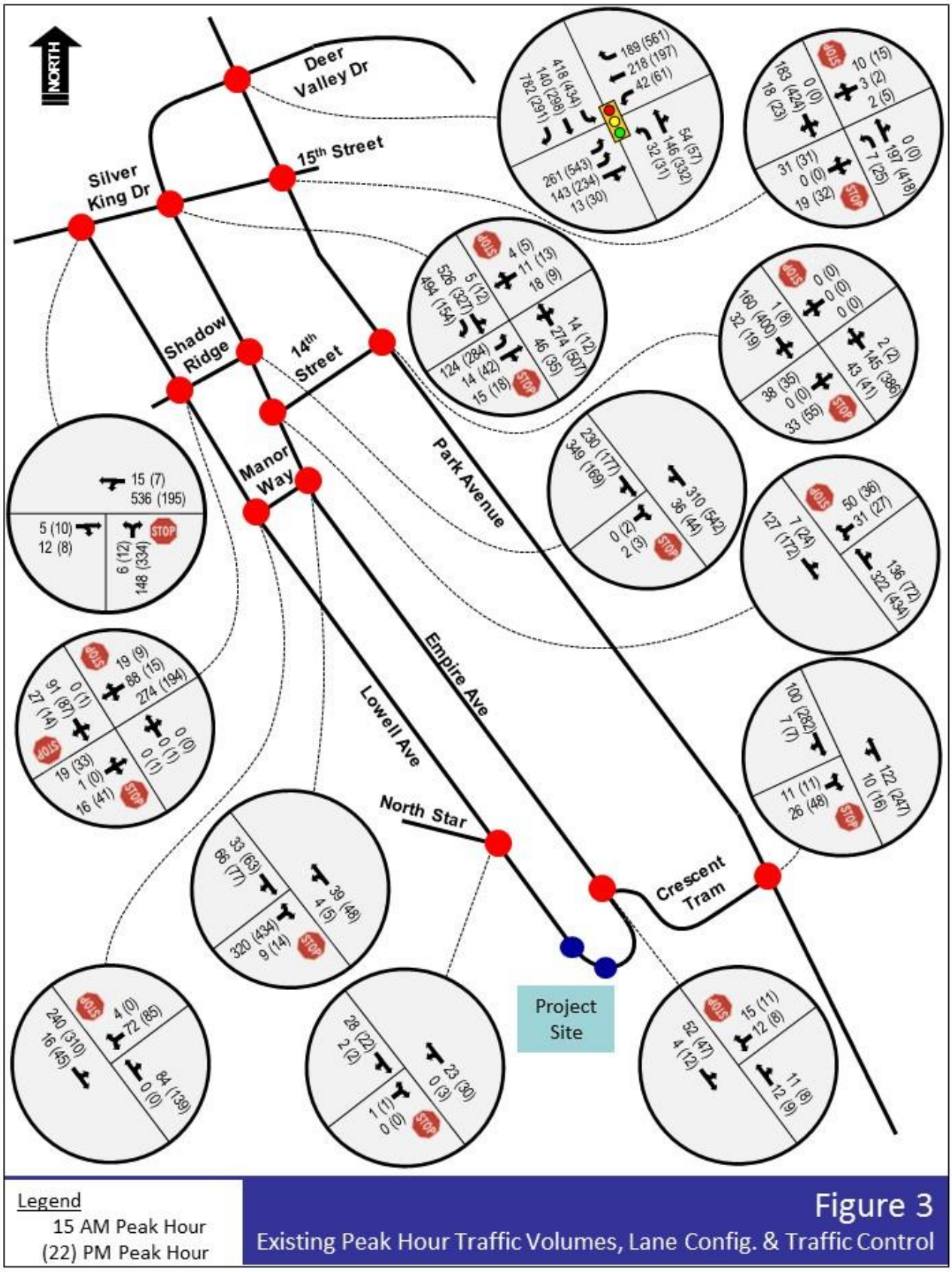


Figure 3
Existing Peak Hour Traffic Volumes, Lane Config. & Traffic Control

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

Intersection	***Actual Counts February 18th 2017***		***Future Traffic Volumes 2037***	
	AM	***PM***	***AM***	***PM***
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 / 8th 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.

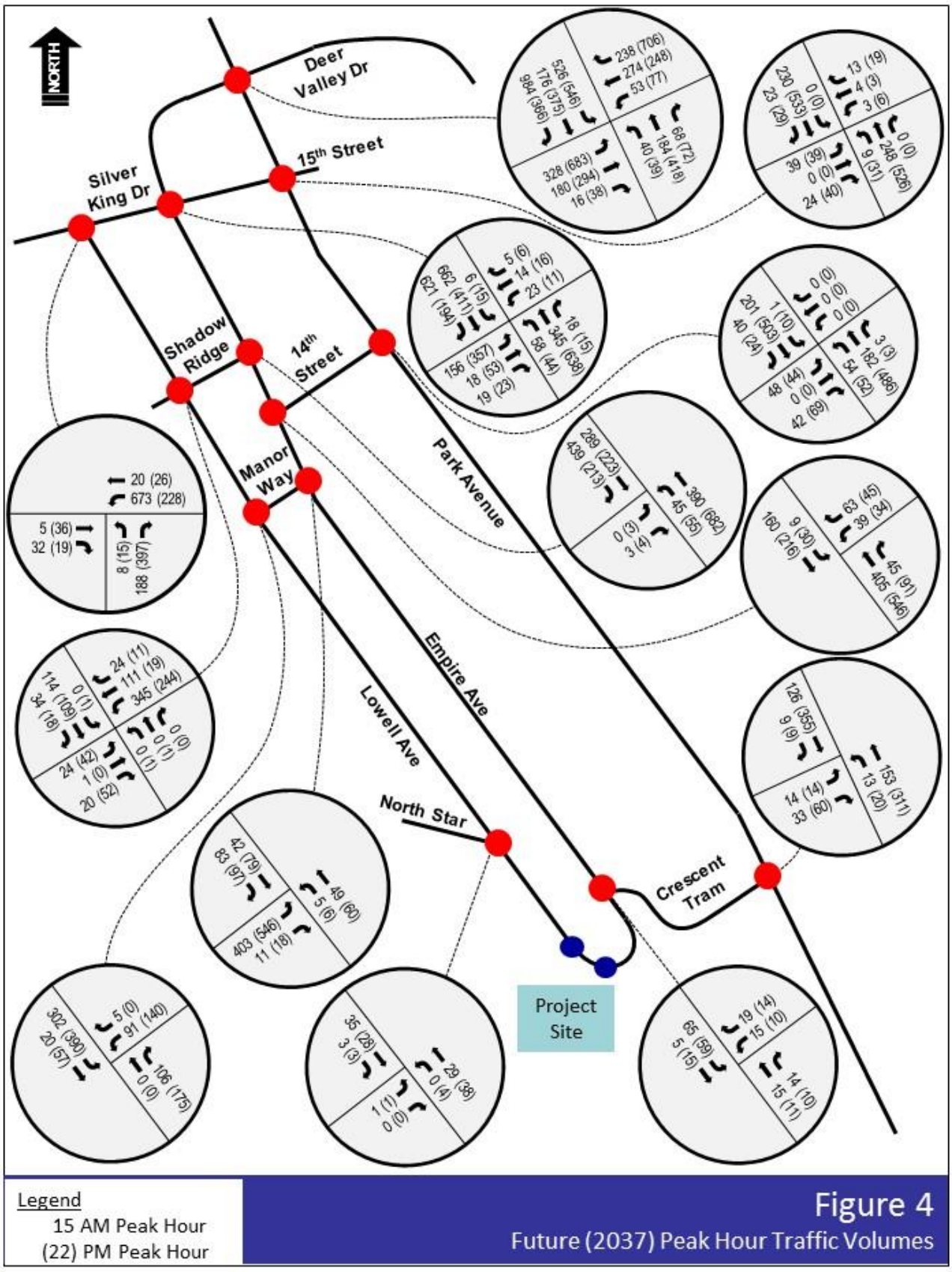


Figure 4
Future (2037) Peak Hour Traffic Volumes

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.

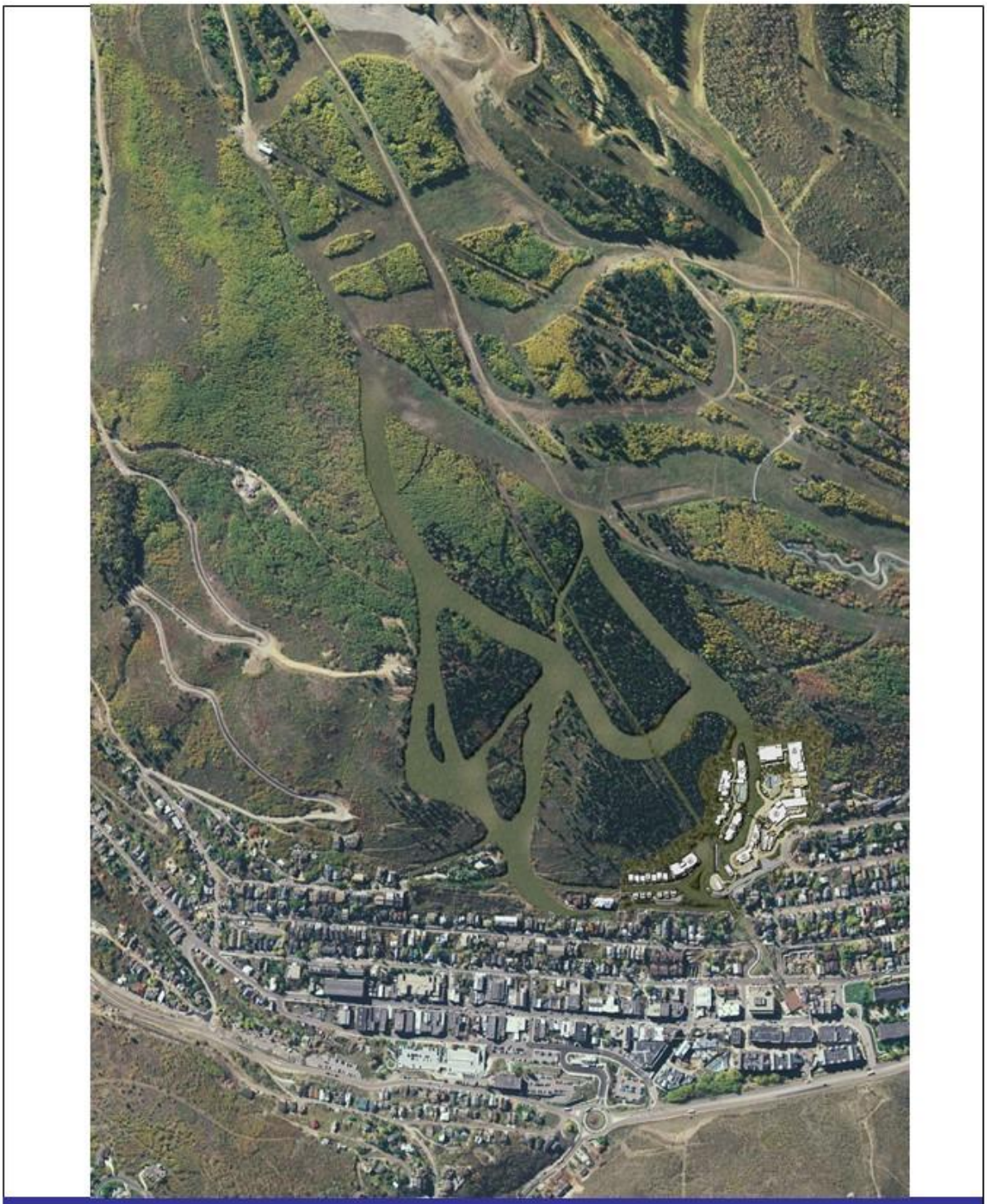


Figure 5
Ski and Trail Concept Plans

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**.

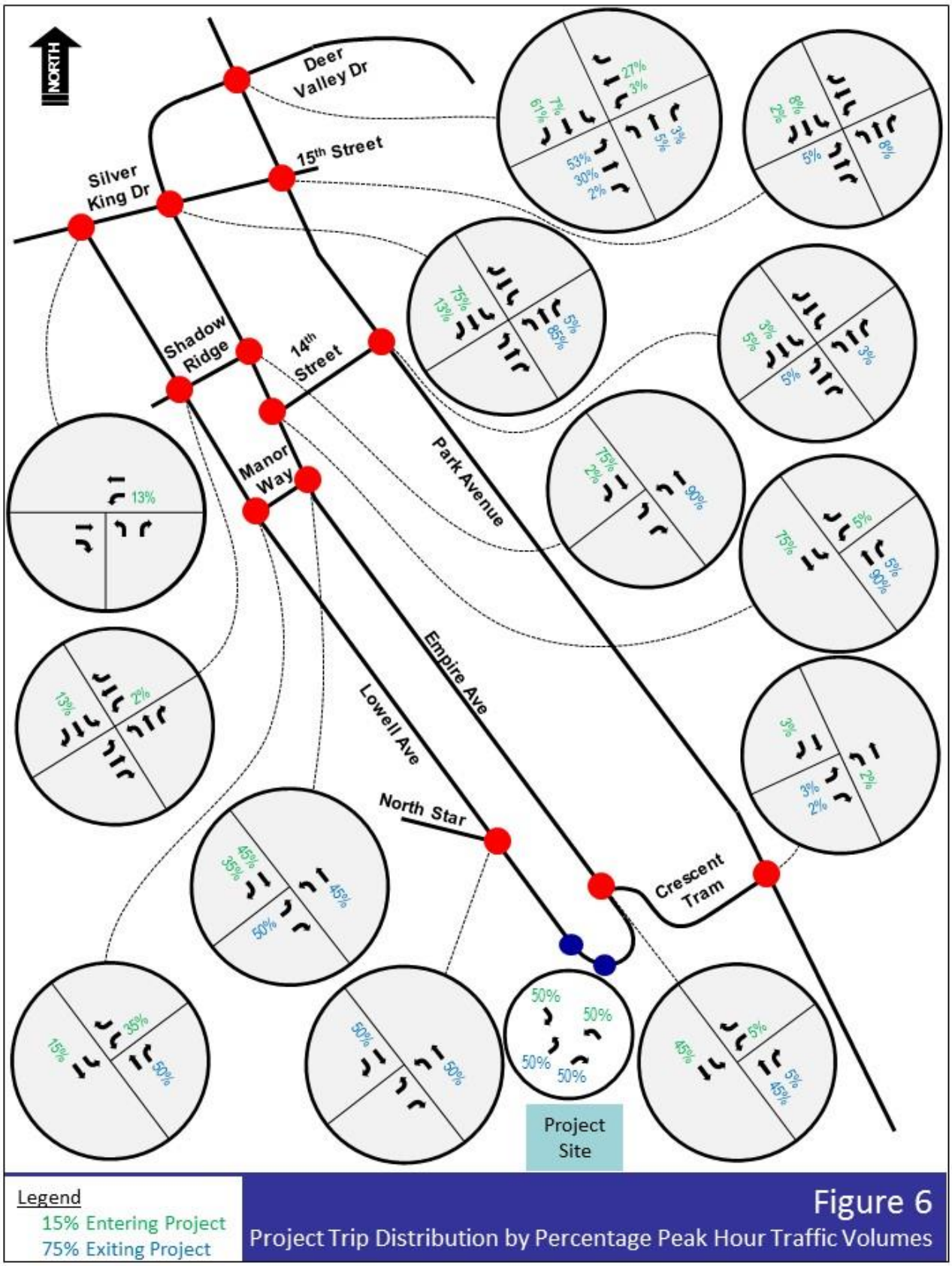


Figure 6
Project Trip Distribution by Percentage Peak Hour Traffic Volumes

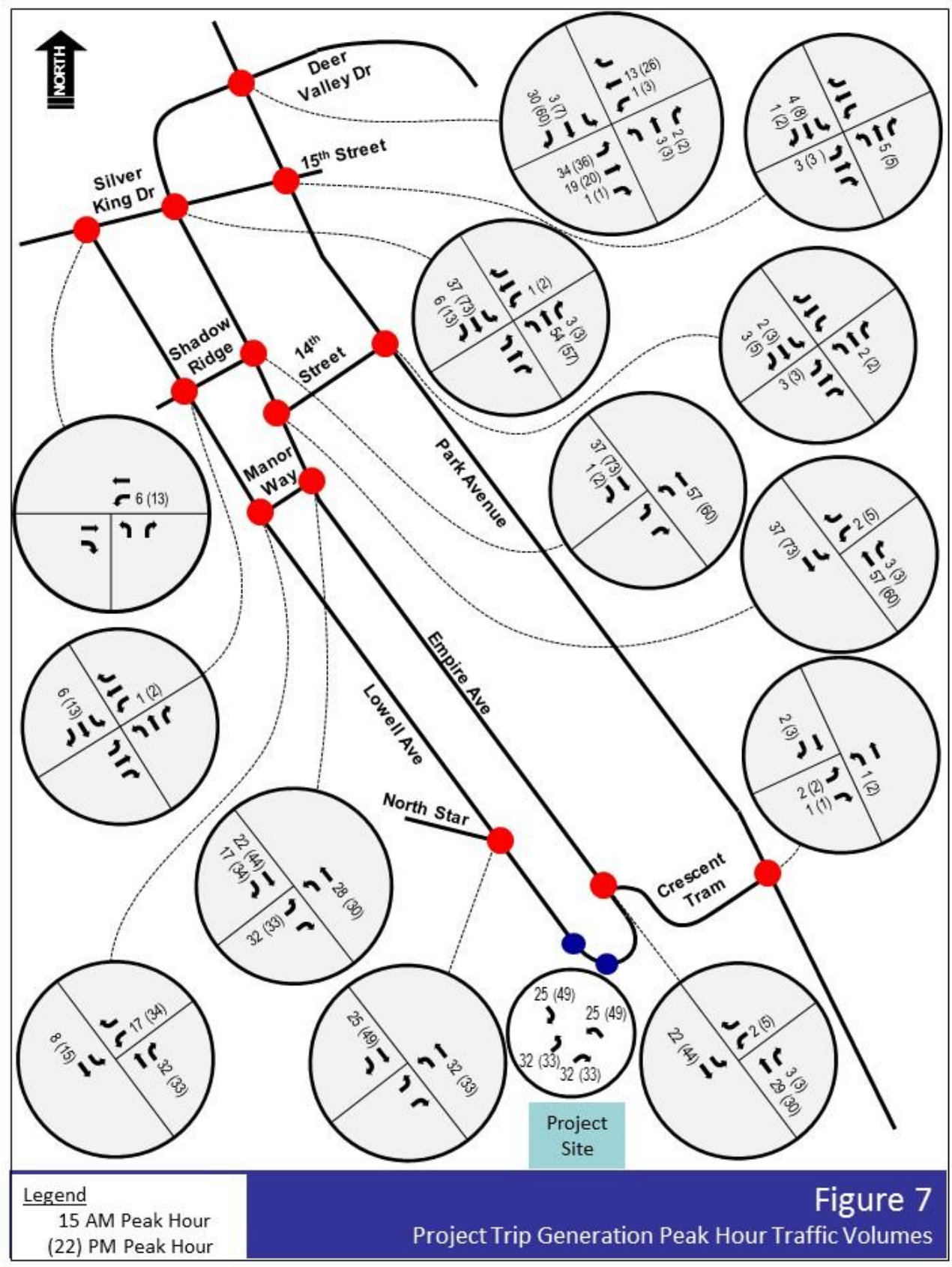


Figure 7
Project Trip Generation Peak Hour Traffic Volumes

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.

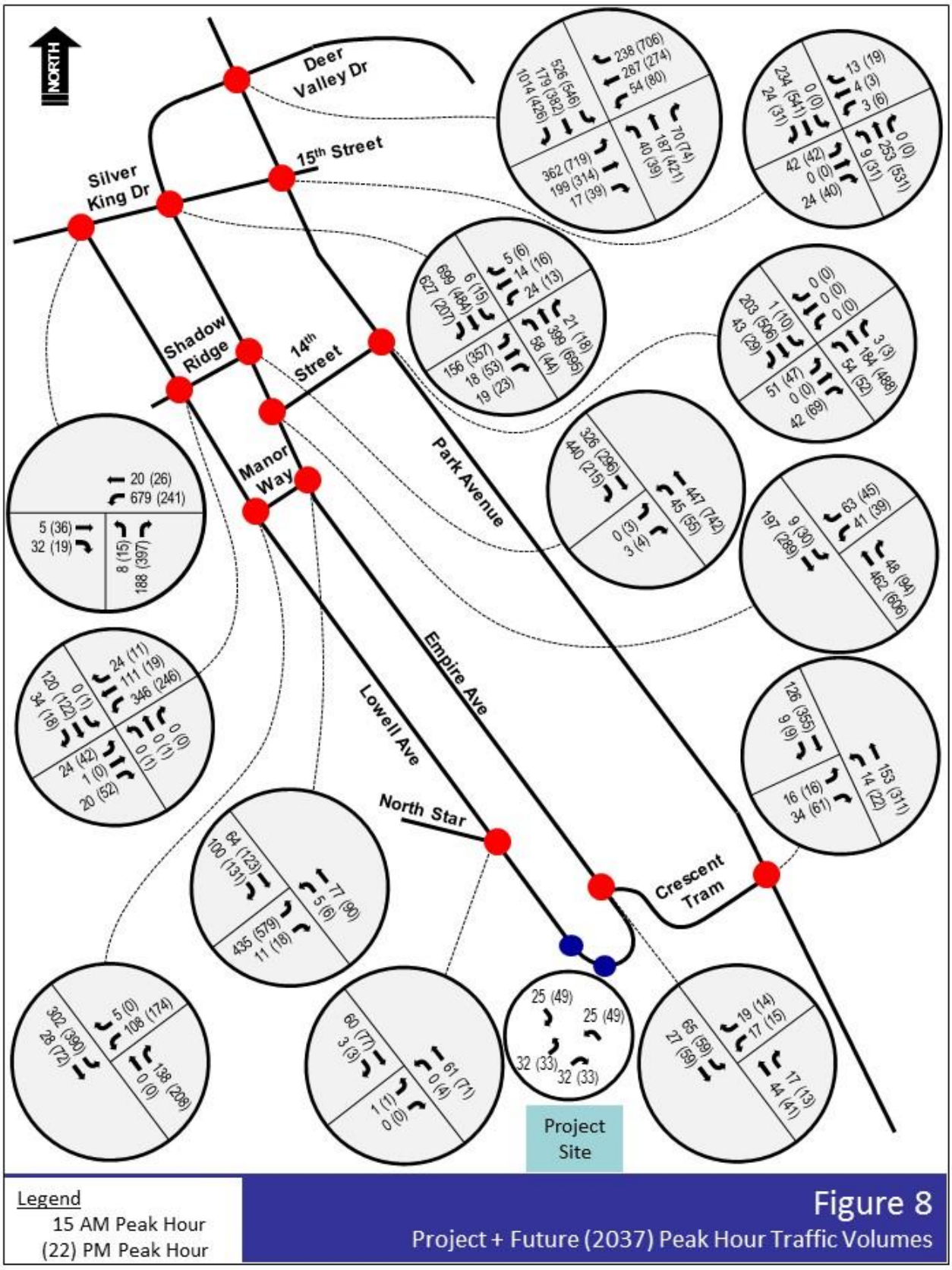


Figure 8
Project + Future (2037) Peak Hour Traffic Volumes

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	

Notes:

(1) Worst approach LOS and delay measured (seconds/vehicle).

(2) Overall intersection LOS and average delay (seconds/vehicle) for all approaches.

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

		Worst Approach[1]		Overall Intersection[2]
Intersection	Control	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

Intersection	Control	Worst Approach[1] LOS AM / PM	Worst Approach[1] Approach AM / PM	Overall Intersection[2] 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

		Worst Approach[1]		Overall Intersection[2]
Intersection	Control	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

		Worst Approach[1]		Overall Intersection[2]
Intersection	Control	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 4th 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.

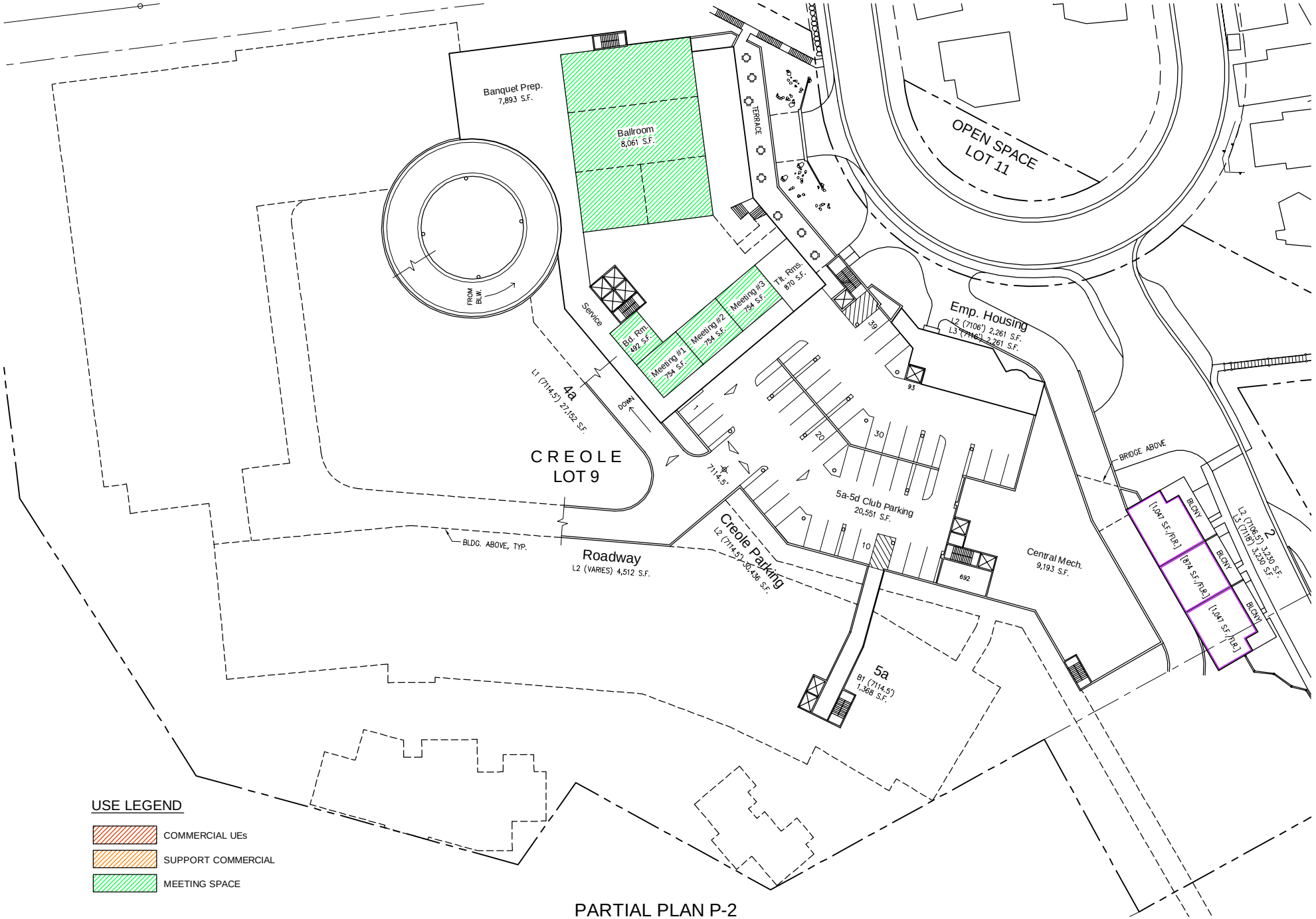
SUMMARY AND CONCLUSIONS

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.

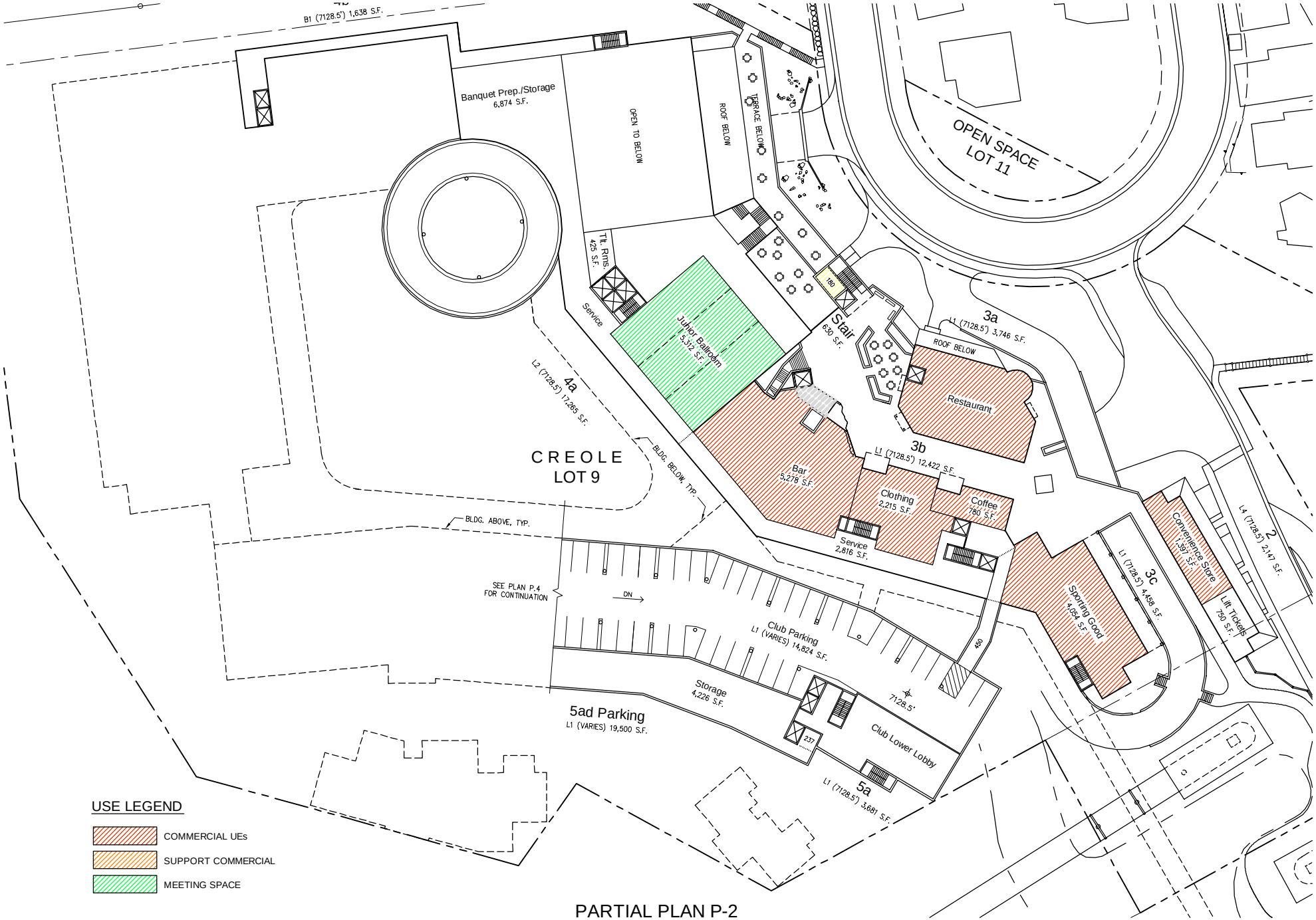
While the intersections and roadways can operate at an acceptable level of service with the Treasure Hill development by implementing the proposed traffic improvement measures, nonetheless, it is important to implement the TDM strategies as well. These strategies include:

- 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.

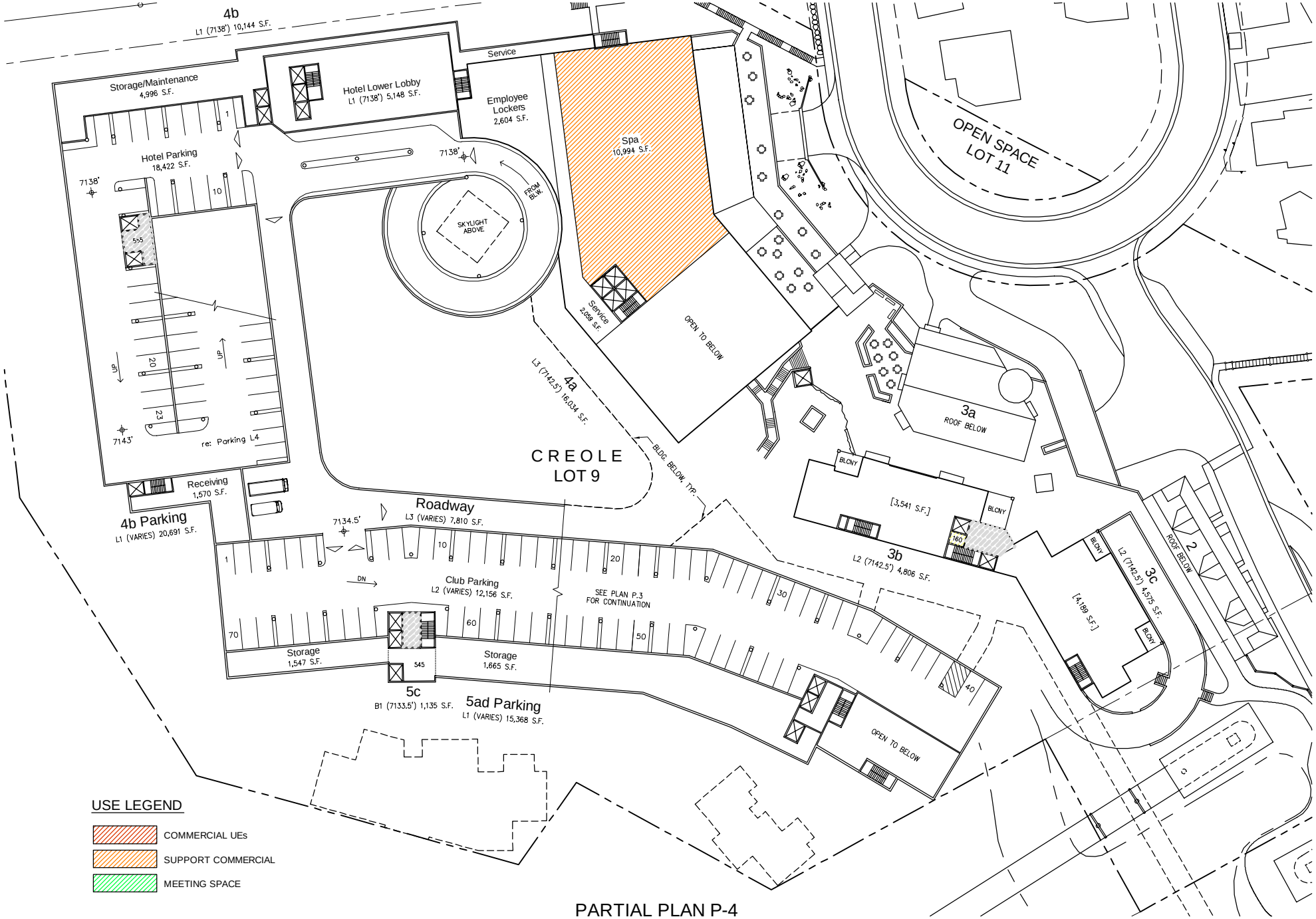
APPENDIX – Commercial Space Exhibit



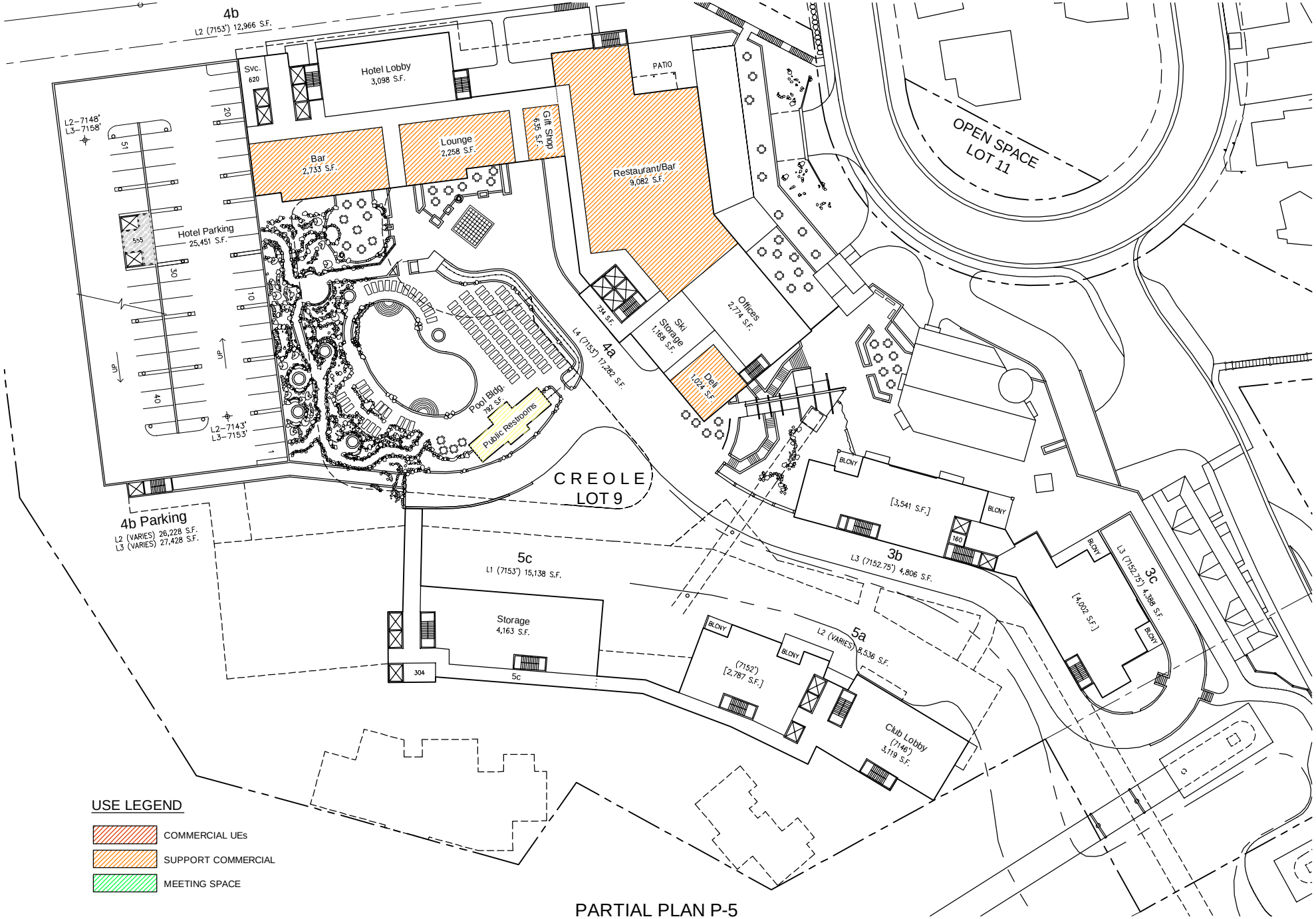
PARTIAL PLAN P-2



PARTIAL PLAN P-2



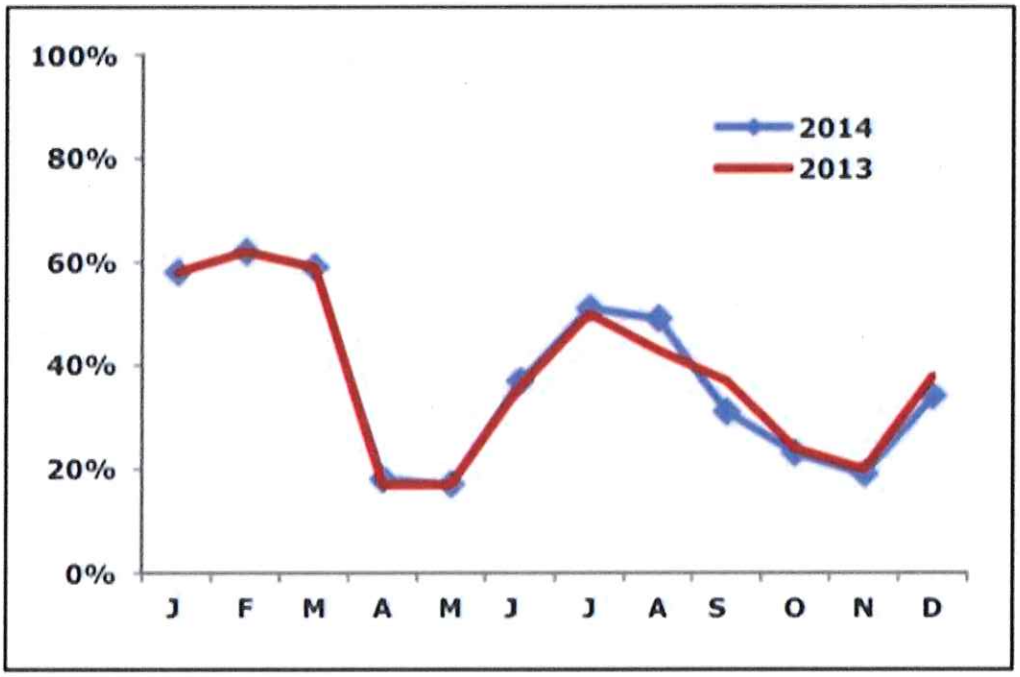
PARTIAL PLAN P-4



PARTIAL PLAN P-5

APPENDIX – Hotel Occupancy Rates

Summit County Hotel Occupancy Rates by Month



Source: DestiMetrics; Kem C. Gardner Policy Institute, University of Utah 2015 Utah Tourism Report

Data Current March 2016

APPENDIX – Existing Conditions Traffic Analysis

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

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			

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)	

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)			

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)			

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

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			

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)		

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)			

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)			

Intersection: 29: Empire Ave

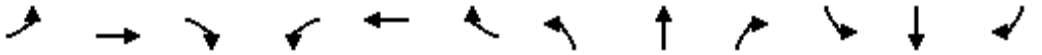
Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	64	9	66
Average Queue (ft)	31	0	11
95th Queue (ft)	57	4	42
Link Distance (ft)	392	332	167
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

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

Intersection Summary	
HCM 2010 Ctrl Delay	22.9
HCM 2010 LOS	C

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

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

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				

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)	

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)			

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)			

Intersection: 29: Empire Ave

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)			

Network Summary

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

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	

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)	

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)			

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)			

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

Intersection Summary	
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

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	

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)	

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)			

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)			

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

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			

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)	

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)			

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)			

Intersection: 29: Empire Ave

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)			

Network Summary

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
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

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

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)	

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)			

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)			

Intersection: 29: Empire Ave

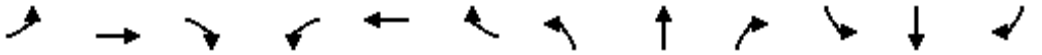
Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	83	61	112
Average Queue (ft)	35	4	22
95th Queue (ft)	68	31	73
Link Distance (ft)	391	332	165
Upstream Blk Time (%)			0
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 298

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

Intersection Summary	
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

Intersection Summary	
HCM 2010 Ctrl Delay	12.7
HCM 2010 LOS	B

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

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

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

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

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	

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)	

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)			

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	

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

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	-	-	None	-	-	None	-	-	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	EBLn1	WBLn1	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	NBR	WBLn1	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	-

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	-	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	-	-

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	-	-	None	-	-	None	-	-	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	EBLn1	WBLn1	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	0	38	0	113	38
Stage 1	-	-	-	-	38	-
Stage 2	-	-	-	-	75	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1572	-	884	1034
Stage 1	-	-	-	-	984	-
Stage 2	-	-	-	-	948	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1572	-	869	1034
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	0	40	0	1521	23
Stage 1	-	-	-	-	23	-
Stage 2	-	-	-	-	1498	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1570	-	130	1054
Stage 1	-	-	-	-	1000	-
Stage 2	-	-	-	-	204	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1570	-	69	1054
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						
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	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	461	1016	-
HCM Lane V/C Ratio	-	-	0.245	0.01	-
HCM Control Delay (s)	-	-	15.3	8.6	0
HCM Lane LOS	-	-	C	A	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

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)	16.7	10.6	1.6	1.1	8.4	1.8	2.7

Total Network Performance

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

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)		

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)			

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	

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

Francisco Astorga

From: Nicole Deforge <ndeforge@fabianvancott.com>
Sent: Friday, June 09, 2017 8:45 AM
To: Francisco Astorga
Cc: Charles Stormont
Subject: Treasure Hill
Attachments: Treasure Hill Traffic Study Review Memo-20170608.pdf

Dear Francisco,

THINC has commissioned a report from Ivan Hooper, a well-known traffic expert, to evaluate the traffic report submitted by Treasure Hill. A copy of that report is attached.

Mr. Hooper has identified a number of critical flaws in the Treasure Hill report, which we urge you to consider in preparing your staff report for the Planning Commission.

We very much appreciate your efforts in connection with this process. Please let me know if you have any questions.

Thanks.

Nikki

NICOLE M. DEFORGE
Attorney
FabianVanCott
215 South State Street, Suite 1200
Salt Lake City, UT 84111-2323
Phone: 801.574.2620
ndeforge@fabianvancott.com
www.fabianvancott.com

MEMORANDUM

To: THINC

From: Avenue Consultants

Date: June 8, 2017

Subject: Treasure Hill Traffic Studies Review

This memorandum describes the findings of a technical review by Avenue Consultants of the traffic studies performed for the proposed Treasure Hill development project located in Park City, with a particular emphasis on the Treasure Hill Traffic Study Draft Addendum #7, dated May 4, 2017 and prepared by Triton Engineering. Unless otherwise mentioned, all references to the "study" refer to Addendum #7.

Our biggest concern with the Treasure Hill study is the traffic analysis was only performed for intersections, which we don't feel is sufficient for the study area. In a typical location capacity is driven by the intersections; however, the Treasure Hill study area is decidedly non-typical due to the narrow width and steep grade of most roads in the study area. These non-standard features, especially when combined with heavy snowfall, on-street parking, lack of sidewalks, heavy truck traffic, and many pedestrians, create conditions where traffic capacity is dictated by mid-block locations where only one car in one direction can pass at a time, rather than by intersection performance. The study needs to consider these actual roadway-constrained conditions rather than the just the idealized intersection-constrained conditions.

The study area is also unique in that existing traffic volumes can vary greatly by season. Unfortunately, the times when traffic volumes are the highest (i.e., during good ski days) are also the times when roadway capacity is the lowest. Because the study fails to account for these non-standard factors, it does not accurately quantify the impact of the project on traffic.

There are other areas of concern as well. First, the study does not account for the lower than normal traffic volumes that were present on February 18, 2017 when traffic data was collected. We found that area traffic volumes that day were actually less than even a typical Saturday in February, let alone a holiday weekend. Second, the approach to estimating background future traffic volumes was unusual by basing it solely on citywide population growth rather than localized growth projections or outputs from the traffic model. Similarly, the study does not appear to properly account for future traffic volumes due to the Bamberger and Resort entitled developments. Third, the trip reduction rates applied in the study are highly speculative and overly aggressive

Beyond the failure to recognize the unique characteristics of the study area and analyze the area accordingly, the study also lacks detailed information regarding the analyses that were performed. Furthermore, the study does not discuss or reference any previous analysis regarding walkability/pedestrian safety, construction impacts, or delivery truck traffic or attempt to determine whether these decade-old studies are still appropriate under 2017 conditions. This is particularly pertinent given our understanding that the size and scope of the Treasure Hill project has increased substantially since the original study was completed in 2005.

Given these failures, it is our opinion that the study does not provide a reliable projection of the true impact of the Treasure Hill development on traffic in the affected study area.

The following sections summarize the findings of our technical review including recommendations.

1 EXISTING TRAFFIC VOLUMES

For its study, Triton Engineering selected President's Day weekend as the baseline for determining peak traffic volumes given that this is typically one of the busiest ski times and traffic volumes are generally higher than on a typical day. Past studies also used President's Day weekend as the baseline. However, it is our understanding that President's Day weekend this year was abnormally warm and rainy, resulting in less than ideal skiing conditions and therefore less than normal traffic volumes. Additionally, it is our understanding that this year President's Day weekend was a "black-out" period for the Epic Local Pass, which would likewise result in artificially low traffic volumes in the subject area at that time. The Epic pass was not available during prior years when earlier traffic studies were performed, resulting to an apples-to-oranges comparison between 2017 traffic volumes and volumes in prior years.

The Utah Department of Transportation operates a number of permanent traffic counters throughout the state. We examined the counter on SR-224, which is located just north of Canyons Resort Drive, to understand how traffic volumes on Saturday, February 18, 2017 compared to the rest of the month. We found that February 18 was actually the lowest volume Saturday of the month. The AM volumes reported in the study would need to be increased by 18% just to match the average of the other Saturdays in the month, while the PM volumes would need to be increased by 5%. Adjustments to account for the typical increase due to the holiday weekend would only increase those factors.

Also, with Saturdays not having much of an AM peak, we looked at how weekday AM peak volumes compare to Saturday AM peak volumes. Based on the data from the SR-224 station, an upward adjustment factor of 31% would be needed to bring the Saturday, February 18 AM volumes as reported in the study up to equivalent weekday AM values. This issue is less relevant for the PM peak where the Saturday volumes are larger than the weekday volumes.

Given that all of the analyses in the study build on the existing volumes, most of the conclusions drawn by the study are inherently unreliable. At a minimum, the study would need to incorporate the following recommendations to meet minimum traffic study requirements.

RECOMMENDATIONS

- Apply an adjustment factor to the existing traffic volumes to scale them up to average February Saturday values
- Provide the peak hours within the respective peak period counts to know the specific hour analyzed for the AM & PM time periods

2 FUTURE TRAFFIC VOLUMES

In the Future (2037) Traffic Volumes section of the study, it states that Summit County has created a traffic model to analyze future traffic conditions and that future traffic volumes are "based on demographics associated with land use plans approved by Park City and Summit County." However, the study then goes on to say that future volumes were estimated using anticipated 25.8% population growth of Park City rather than outputs from the traffic model. It is unclear why the traffic model itself wasn't used to develop the future traffic volumes instead of land use data that would be an input to the traffic model. With the 25.8% being a universal value, the localized impacts of growth are diluted. This is the benefit of using the traffic model, the volume increase occurs where the growth occurs.

Also, it is unclear if the population growth of 25.8% includes factor in the two entitled projects referenced in the study ("Bamberger" and "Resort") as the study provides insufficient detail. Although the study appears to show that the estimated trip generation falls within the growth at the Park Ave/Deer Valley intersection, which is the busiest study intersection, it does not compare the growth at any of the other study intersections that may be impacted due to the two entitled projects. For example, the intersection of Lowell Ave/North Star shows a PM peak hour growth of 12 vehicles per hour. The study then projects that the two developments will generate 332 to 462 additional PM peak hour trips. Although the study is unclear as to the location of the two developments, it appears that at least one of them would have access off the south end of Lowell Avenue. Out of 332 or more peak hour trips, it is unreasonable to assume that only 12 of them would use the Lowell Ave/North Star intersection. This illustrative of the point above about universal versus localized growth. Consequently, the study fails to properly account for the traffic from the Bamberger and Resort projects. Those volumes should be calculated and explicitly added to all study intersections.

RECOMMENDATIONS

- Use outputs from the traffic model in estimating future traffic volumes or provide an explanation of why using population growth projections is the preferred approach
- Provide trip generation tables for the Bamberger and Resort developments as well as what was assumed for the "variety of mixed land uses" when estimating the trip generation
- Add the new vehicle trips from the entitled Bamberger and Resort developments to all study intersections as part of the future traffic volumes

3 PROJECT TRAFFIC VOLUMES

3.1 Trip Generation

Based on inadequate information in the study, it is impossible to determine how trip generation data was calculated. Although the study described the ITE land use code that was used for each land use category of the proposed project, it doesn't describe specifically which chart or equations within those categories were used. It appears that the weekday AM & PM peak hour generator was used for all land uses. Given that the traffic volume data collection occurred on the weekend, Saturday trip generation rates should have been used where available. The study needs more explanation of why weekday trip generation values were used instead of Saturday. Analyzing AM and PM peak periods on Saturday creates difficulties in the analysis. Saturday ITE trip generation values, if provided at all, are only for the peak hour of generator rather than for the AM and PM periods. Daily vehicle trips should also be calculated and provided in the trip generation table.

From the study, it is unclear what the square footage and number of rooms of the proposed Treasure Hill hotel will be. According to the introduction, the hotel is 200,000 square feet (sq-ft) with 202 rooms. But in the Project Traffic Volume section it is stated that the initial trip generation rate for the hotel was calculated at 83% occupancy, which also uses a value of 202 rooms. As a result, it is uncertain if the hotel has a total of 202 rooms or if 202 rooms is the number of rooms at 83% occupancy. It is also uncertain why 83% occupancy was applied to reduce the projected traffic generation as this is not a recommendation in the ITE Trip Generation Manual, but rather an average occupancy rate of studies that provided information on occupancy rates at the time the ITE studies were conducted. It is interesting to note that the original study back in July 2004 assumed 100% occupancy, which is a good assumption for a winter holiday weekend. This study should also assume 100% occupancy.

Similarly, in the Project Traffic Volume section of the study, the employee housing number of units is said to be approximately 25 units. In Table 4 it shows 30 units for the employee housing land use; however, the trip generation appears to be based off of 25 units. It also appears that in the Parking Analysis section of the report 30 employee housing units was used to calculate the number of parking stalls. Therefore, there is inconsistency in the number of employee housing units between the trip generation and the parking generation. Using 30 units of employee housing when calculating trip generation rates would result in an increase of 2 AM trips and 3 PM trips.

We were also unable to replicate the trip generation values of 56 AM trips and 109 PM trips for the commercial land use in Table 4 using the ITE Trip Generation Manual, assuming 8,735 sq-ft of Specialty Retail and 8,735 sq-ft of Quality Restaurant. With the given information in the Treasure Hill study it is uncertain how these numbers were obtained. We calculated the trip generation values for the respective land uses assuming 8,735 sq-ft for both land uses using the weekday peak hour of the generator and the average trip rates for both AM and PM peak hours from the ITE Trip Generation Manual, which equated to 108 AM trips and 123 PM trips—a substantial increase over the number calculated in the study.

The use of weekday instead of Saturday trip generation data and lack of detail are concerning. The study would need to incorporate the following recommendations to meet minimum traffic study requirements.

RECOMMENDATIONS

- Perform the trip generation calculations using Saturday data where available
- Calculate and provide daily trips in the trip generation table
- Provide more detail regarding the actual rates or equations used in the trip generation process
- Provide clear and consistent assumptions regarding the size of the hotel and the number of employee housing units throughout the study
- Re-evaluate or state assumptions made for the commercial land use in Table 4 and separate the commercial land use into two separate land uses showing both the Specialty Retail and Quality Restaurant land use trip generation

3.2 Trip Reduction

As repeatedly acknowledged by the study's author during the recent Planning Commission meeting, some of the trip reduction percentages applied in the study are largely speculative. For example, the study improperly relies on old 2014 data from the Park City Chamber of Commerce Convention & Visitors Bureau Economic Profile to reduce hotel trip generation estimates based on a presumed 65% hotel occupancy rate. This is an overly aggressive approach. During President's Day weekend, it is far more likely that the hotel would be operating near or at capacity. As such, the hotel trip generation should be increased not decreased. The study also makes no effort to determine whether 2014 hotel occupancy rates are consistent with rates in 2017 or future projections, or if there were historic factors that resulted in suppressed rates during that time period.

There are also limited details on how the internal capture percentages provided in the Trip Reduction section were calculated. It appears that these percentages were derived from Table 7.1 or 7.2 in Volume 1 of the ITE Trip Generation Manual. If that is the case, those percentages were not applied correctly. They are not intended to be instant reductions at all. Rather, they are origin and destination percentages that are dependent upon the trips entering and exiting the different land uses. The ITE Trip Generation Manual Volume 1 shows how these internal capture percentages are to be applied on pages 89 – 100. The ITE manual also provides blank worksheets that allow for the calculation of trip reductions due to internal capture as seen in Figure 1.

The appendix of the study should include ITE worksheets or something similar showing how the internal capture percentages were calculated. Furthermore, ITE suggests that if the site has two or more buildings containing the same land use the land uses should be combined if they are situated within reasonable and convenient walking distance of each other when calculating internal capture. This methodology was not followed in the study. With the limited details provided in the study, it is uncertain how the internal capture percentages were actually obtained.

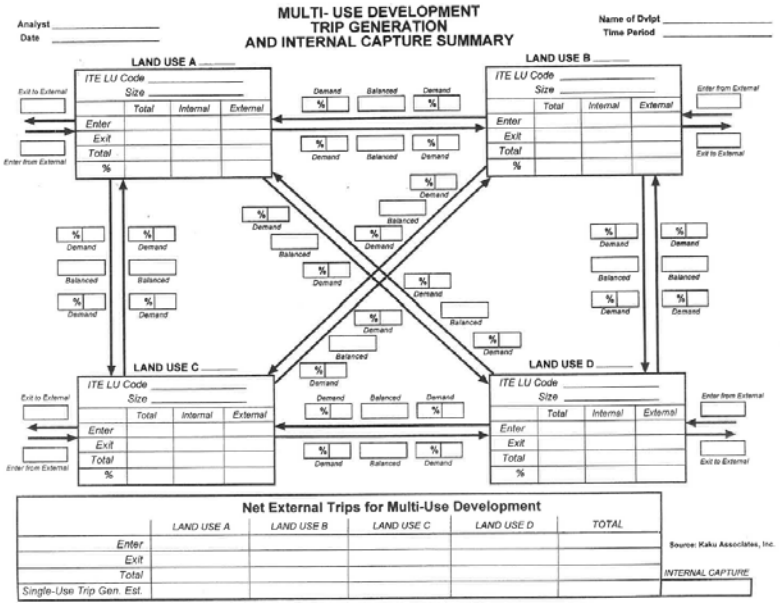


Figure 1: ITE Internal Capture Worksheet

Also, as noted in the study, internal capture information is not provided for the hotel land use. When this is the case, ITE recommends that either (1) local data be collected to establish an internal capture rate, or (2) no internal capture be assumed. The study takes neither approach and instead assumes a 16% trip reduction for the hotel use. Based on guidance from ITE, the 16% trip reduction assumed in the study for the hotel land use was improper.

When considering the trip reduction for the cabriolet, the study doesn't provide any details on why the 30% trip reduction was assumed. Again, the study's author expressly acknowledged that the reduction percentage was speculative. Although we acknowledge the difficulty in forecasting a reasonable value, a we believe a 30% rate is too high for this application. The best approach under the circumstances would be to perform sensitivity testing around the assumption to determine how important this assumption really is. Analyses could be performed with different cabriolet trip reduction factors (e.g., 15% or 0%) and then compared against the other scenarios to understand the related impacts to the roadway network. Under the circumstances, a smaller, more conservative trip reduction factor would be more reasonable.

RECOMMENDATIONS

- Eliminate the hotel trip reduction factor based on occupancy to be conservative or at least provide a detailed explanation of how the factor was applied
- Provide ITE internal capture worksheets or something similar showing internal capture calculations
- Show how each trip reduction factor was applied to each land use

- Perform sensitivity testing be performed for a range of cabriolet trip reduction percentages to determine the impacts associated with this assumption

4 TRAFFIC ANALYSIS

The most critical flaw in the study is that the traffic analysis section deals only with the intersections and not road capacity. Under typical conditions this approach might be appropriate, but in this non-standard study area capacity is governed far more by the width and grade of the roads, how that width is affected by snow banks, the number of heavy trucks and pedestrians, and the weather (see Figure 2). Under ideal conditions, a single lane can carry approximately 1,800 passenger cars per hour. The presence of traffic signals, stop signs, heavy vehicles, and roadway grades typically reduce this capacity by more than 50%. Here, even under ideal conditions, the study area roadways might have a one-way capacity of 600-700 vehicles per hour, which is probably achieved during summer. However, during winter conditions when the roadway width is reduced to one lane and vehicles must regularly yield to oncoming traffic or even back up to make way for another vehicle, the roadway capacity may reasonably be assumed to drop to as little as one-tenth of the ideal values, which would be only 60-120 vehicles per hour.

Figure 2: Study Area Roadways During Peak Conditions

A volume-to-capacity analysis using these types of values is therefore recommended and would be more representative of actual conditions in the study area. Of course, the challenge with this type of analysis is that it is unique, and capacity is not very easy to measure. However, field observations could be performed to see how

many vehicles are able to cross a point during peak winter conditions when capacity is low and volumes are high. The failure to consider mid-block roadway capacity in the study, away from intersections, renders the traffic analysis highly suspect and unreliable.

Another factor that should have been considered is the impact on quality of life for those that live in the area, especially on Lowell and Empire Avenues. It is important to understand, on a daily level, how much additional traffic will be on these roads in order assess this impact. Comparing existing daily volumes at several locations along these roads to what they would be with the proposed project would be vital. Just comparing existing to project volumes at the Lowell Ave/North Star intersection reveals that the project will increase PM peak hour volumes by more than 140%. Understanding these quality of life impacts along the Lowell and Empire corridors would be valuable for a complete understanding of the impact of the Treasure Hill project on the surrounding historic neighborhoods.

Independent of these new analyses, the study provided limited or no details regarding the details of the traffic analysis for the following items.

- Assumptions regarding heavy vehicles, roadway grades, or peak hour factors, nor are any details regarding the SimTraffic analysis, such as the number of runs that were performed
- Whether the mitigated level of service and delay results shown at the intersection of Empire Ave/Silver King are for a signal or roundabout
- Signal spacing, safety, or queuing concerns/issues with adding a signal to Empire Ave/Silver King
- Assumptions regarding left turn phasing at Empire Ave/Silver King
- Whether existing signal timing parameters were obtained for the signal at Park Ave/Deer Valley

The study also states that need for mitigation at the Empire Ave / Silver King intersection is due to background growth that would occur independent of the Treasure Hill development. However, that background growth occurs over a period of 20 years. It is possible that the Treasure Hill development may be built before the mitigation would be required. The study should consider existing traffic conditions plus the proposed project to determine if the traffic impacts of the development alone would require mitigation.

Furthermore, the study doesn't discuss or reference any previous analysis regarding walkability/pedestrian safety, construction impacts, or delivery truck and emergency vehicle traffic that would provide some information or detail about these items. Nor does it address which previous analyses are still appropriate under 2017 conditions, particularly given the significant increase in the size and scope of the project since the first studies.

RECOMMENDATIONS

- Provide a roadway volume-to-capacity analysis under constrained winter conditions where Lowell Ave and Empire Ave and any other impacted streets are reduced to a single lane
- Provide a comparison of daily volumes on Lowell and Empire Avenues and similarly-situated streets within and without the proposed project
- Provide additional details on the intersection analyses that were performed
- Perform a traffic analysis for existing plus project conditions
- Provide any updated information on walkability/pedestrian safety, construction impacts, and delivery truck traffic or reference previous analyses if such studies are still appropriate

5 PARKING ANALYSIS

It is not clear what the purpose of the parking analysis in the study is, but if it is to be used to determine how much parking should be provided, it will be important to consider reserved spaces. For example, residential units typically have a number of reserved parking spaces which are not available for use by business patrons. In such a condition, when calculating the total number of spaces needed, the weekday and weekend values may then be the same (depending on the number of reserved spaces), thereby increasing the number of required weekend parking spaces.

RECOMMENDATIONS

- Provide an explanation of the purpose of the analysis and, if necessary, account for reserved parking spaces in the calculation of total parking needs
- Use a consistent employee housing unit number throughout the study
- Show each parking reduction applied to each land use on a separate row to provide a better understanding of the degree of reduction for each land use

6 SUMMARY OF FINDINGS & RECOMMENDATIONS

In conclusion, the Treasure Hill study does not provide adequate detail or analysis to ultimately be able to determine the full impact the proposed project will have on traffic in the study area, much less determine mitigation measures that might address actual impacts. Most notably, because the Treasure Hill study area is non-standard due to the narrow width and steep grade of most roads in the study area, the failure to analyze traffic flow and capacity at mid-block locations under typical winter conditions undermines any conclusions as to impact. Additionally, as described in detail above, the Treasure Hill study is questionable in regards to existing traffic volumes, future background volume projections (including traffic from the Bamberger and Resort developments), trip reduction factors.

Overall, the study is often too basic and simplistic in nature and omits necessary detail to determine or replicate the analysis procedures and assumptions that were used. The study seems to be generally be conservative in estimating existing and future volumes for which the Treasure Hill would have no responsibility, but aggressive in reducing trips (and thereby impacts) that would be attributable to the development. The study also fails to discuss or reference any previous analyses regarding walkability/pedestrian safety, construction impacts, or delivery truck traffic. It is critical to know whether these items are still appropriate under 2017 conditions, particularly given what we understand to be a substantial increase in the scope and size of the project since the first study was prepared in 2004.

Our study recommendations are as follows:

- Apply an adjustment factor to the existing traffic volumes to scale them up to average February Saturday values
- Provide the peak hours within the respective peak period counts to know the specific hour analyzed for the AM & PM time periods
- Use outputs from the traffic model in estimating future traffic volumes or provide and explanation of why using population growth projections is the preferred approach
- Provide trip generation tables for the Bamberger and Resort developments as well as what was assumed for the “variety of mixed land uses” when estimating the trip generation

- Add the new vehicle trips from the entitled Bamberger and Resort developments to all study intersections as part of the future traffic volumes
- Perform the trip generation calculations using Saturday data where available
- Calculate and provide daily trips in the trip generation table
- Provide more detail regarding the actual rates or equations used in the trip generation process
- Provide clear and consistent assumptions regarding the size of the hotel and the number of employee housing units throughout the study
- Re-evaluate or state assumptions made for the commercial land use in Table 4 and separate the commercial land use into two separate land uses showing both the Specialty Retail and Quality Restaurant land use trip generation
- Eliminate the hotel trip reduction factor based on occupancy to be conservative or at least provide a detailed explanation of how the factor was applied
- Provide ITE internal capture worksheets or something similar showing internal capture calculations
- Show how each trip reduction factor was applied to each land use
- Perform sensitivity testing be performed for a range of cabriolet trip reduction percentages to determine the impacts associated with this assumption
- Provide a roadway volume-to-capacity analysis under constrained winter conditions where Lowell Ave and Empire Ave are reduced to a single lane
- Provide a comparison of daily volumes on Lowell and Empire Avenues and similarly situated streets within and without the proposed project
- Provide additional details on the intersection analyses that were performed
- Perform a traffic analysis for existing plus project conditions
- Provide any updated information on walkability/pedestrian safety, construction impacts, and delivery truck traffic or reference previous analyses if such studies are still appropriate.
- Provide an explanation of the purpose of the analysis and, if necessary, account for reserved parking spaces in the calculation of total parking needs
- Use a consistent employee housing unit number throughout the study.
- Show each parking reduction applied to each land use on a separate row to provide a better understanding of the degree of reduction for each land use.