Francisco Astorga

From: Nicole Deforge <ndeforge@fabianvancott.com>
Sent: Wednesday, August 09, 2017 2:09 PM
To: Francisco Astorga; Treasure Comments
Subject: THINC updated traffic study
Attachments: Treasure Hill Traffic Study Review Memo-20170809.pdf

Hi Francisco,

Attached is the updated traffic report review from Avenues Consultants which was commissioned by THINC. Please include this with the Treasure Hill comments and also make sure that the Planning Commission members have a copy in advance of tonight's meeting, if possible.

See you tonight.

Nikki

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MEMORANDUM

To: THINC

From: Avenue Consultants

Date: August 9, 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 July 26, 2017 and prepared by Triton Engineering. Unless otherwise mentioned, all references to the "study" refer to Addendum #7.

There are a number of flaws in the study that make it largely unreliable and speculative. First, the Treasure Hill study does not properly quantify the current capacity of the surrounding neighborhood streets much less attempt to quantify or analyze the projected impact of the development on the limited capacity of these narrow, historic streets. Instead, the study proposes to mitigate that unknown impact by transforming Lowell Avenue and Empire Avenue into one-way streets during the winter. Yet, this proposed mitigation measure would create a number of different impacts to resident and visitor convenience and safety, and to management of the facility that merit a more detailed analysis than what is presented in the report. If the proposed one-way streets were rejected as mitigation, then the study would lack any analysis of the true roadway capacity based on width, vertical grades, and snow/weather at any time of the year.

Second, the study fails to project or analyze the total number of new daily vehicle trips that would be added to the existing roadway network and their effect on the quality of life of the neighborhood residents. The study does not provide any information as to construction truck traffic, shuttle traffic, or delivery traffic. These impacts are particularly pertinent given that the size and scope of the Treasure Hill development has increased substantially since the original study was performed in 2005. Even the limited trip generation information that is provided in the study with respect to employee and visitor traffic is based on unrealistic assumptions and improper classifications and calculations.

Third, the approach to estimating background future traffic volumes improperly relies solely on citywide population growth rather than localized growth projections or outputs from the Summit County travel model. Similarly, the study does not appear to properly account for future traffic volumes due to the Bamberger and Resort entitled developments.

Fourth, the hotel trip reduction rate is unreasonable and overly aggressive and do not follow ITE recommended practice.

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.

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

1 TRAFFIC ANALYSIS

The traffic study does not quantify the current or projected capacity at any time of the year on the narrow, historic roads surrounding the development. Instead, it tacitly acknowledges that roadway capacity is greatly restricted in the study area during the winter when snow is on the ground, without quantifying or analyzing the impact, and then proposes to mitigate whatever impact that might be by transforming Lowell and Empire into one-way streets during wintertime only. However, that mitigation proposal would have substantial impacts in its own right and therefore needs far more analysis and discussion than the few paragraphs in the traffic study.

The biggest impact would likely be to the residents and neighbors who would certainly object to the change.. Although the study states that the additional travel time "could be up to 30 seconds." This is an unreasonably low estimate. With no connections between Lowell Avenue and Empire Avenue from Manor Way to the "loop" connection, there is the potential for out of direction travel in excess of 4,500 feet (nearly one mile). At the posted speed limit of 20 mph, that 4,500 feet represents an additional travel time of over 150 seconds (2.5 minutes) under ideal conditions. This would be a unique situation to have such a long pair of one-way roads without intermediate turn-around locations on such a low speed road. The delay would be longer during difficult winter conditions, on garbage days, and during emergencies. The study does not accurately represent these impacts, nor propose any mitigation for them.

In addition to out of direction delay, the one-way street concept would increase traffic in the study area, particularly at the top of the hill. Currently vehicles going to a house or business south of Manor can come and go without affecting people higher up the hill. With one-way streets every vehicle going to that same location would have to travel the full loop one time, thereby adding traffic to Lowell and Empire that wasn't previously there.

The one-way street concept that would only be in place during the winter would also present serious communication and public safety challenges. For example, would road signs be changed every winter and spring to convey the current traffic pattern? How would vehicle navigation services be updated to accurately reflect the changes? Are there likely to be more accidents due to drivers being accustomed to two-way traffic not realizing that the road has changed to one-way traffic? There are a whole host of challenges associated with the proposed seasonal one-way road mitigation measure that the study does not even attempt to address much less mitigate.

It is also important to note that even with the proposed one-way street mitigation in winter and the intersection upgrades, the intersection at Park Avenue/Deer Valley Drive is expected to operate only at LOS E. Contrary to the study's claims, LOS E is typically not considered acceptable. The report states that further improvements to the intersection would likely be too impactful, but the reality is that Treasure Hill is expected to increase PM peak hour delay by at least 10% beyond the 2037 background delay (which itself is projected to have 35% more delay than existing conditions) and nothing that the study proposes for mitigation will improve the subject intersection beyond LOS E. Consequently, this is a significant, unmitigated traffic impact.

If Park City chooses not to accept the one-way road mitigation, then the study does not accurately reflect Treasure Hill's true impact on the transportation system during winter since the study focuses only on intersections and not road capacity. If the City rejects the one-way road mitigation measure for the reasons set forth above, then Treasure Hill must address roadway capacity and how it is affected 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.

There is no quantification of current or projected capacity, impact of the development on capacity, or mitigation options for addressing lack of capacity. 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.

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. A volume-to-capacity analysis using these types of values is therefore recommended if the one-way road mitigation is not accepted by Park City and would be more representative of actual conditions in the study area.

Another factor that must be considered in the study is the quality of life impact on 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 to assess this impact. Our independent analysis says that about 2,600 new daily vehicle trips would be added to the roadway network. We estimate that Lowell and Empire Avenues currently have 800 to 1,400 vehicles per day. This means that the Treasure Hill development would roughly double the existing volumes on Lowell and Empire. 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 135%.** 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 analyses, the study provides 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. 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 discussion) regarding construction impacts or delivery truck and emergency vehicle traffic issues that are relevant to the study area.

RECOMMENDATIONS

- Provide a comparison of daily volumes on Lowell and Empire Avenues and similarly-situated streets within and without the proposed project and with and without the proposed mitigation

- If the seasonal one-way road mitigation measure is not approved by Park City, provide a roadway volume-to-capacity analysis under constrained winter conditions
- Provide additional details on the intersection analyses that were performed
- Perform a traffic analysis for existing plus project conditions
- Provide information on construction impacts, delivery truck traffic, and emergency vehicles

2 EXISTING TRAFFIC VOLUMES

For its study, Triton Engineering selected the Saturday of President's Day weekend as the baseline for determining peak traffic volumes since it is typically one of the busiest ski days of the year and traffic volumes are usually higher than 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 study acknowledges that traffic volumes were low during their traffic data collection and adjusts them upwards by 12.8% to be representative of the "85th percentile winter ski day" based on data obtained from a Utah Department of Transportation permanent traffic counter on SR-224 just north of Canyons Resort Drive. However, it is interesting that apparently a daily adjustment factor was applied to peak hour volumes when a more rigorous and technically accurate approach would be to calculate and apply peak hour adjustment factors. Our independent analysis of the UDOT data from December 2016 through March 2017 suggests that the AM adjustment factor would be 37%, while the PM factor would be 11% and the daily factor 15%

We also note that the appendix only contains UDOT traffic data for February 2017 and not for the entire 2016-2017 winter period used for the analysis. Providing the full data set would allow for verification of the adjustment factor(s) without the reader having to look up the data themselves.

RECOMMENDATIONS

- Apply independent peak hour adjustment factors separately to the existing AM and PM traffic volumes to scale them up to "85th percentile winter ski day" values
- Provide the full four-month set of UDOT data used in calculating the volume adjustment factor(s)

3 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.

The study attempts to circumvent the localized growth issue by saying that the 25.8% includes the two entitled projects referenced in the study ("Bamberger" and "Resort") because the trips from those development "fall well within the anticipated range of growth." However, the study then goes on to say that the previous statement

does not apply to the PM peak, but essentially says that it doesn't matter because the other developments are speculative. The problem with this approach (besides the obvious discarding of the PM growth discrepancy) is that the comparison is made with the Park Ave/Deer Valley intersection, which is the busiest study intersection. The study does not compare 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/Manor Way shows an existing volume of 654 vehicles during the PM peak hour. The "Bamberger" and "Resort" developments are expected to generate 595 to 944 additional PM peak hour trips. Virtually all of those trips would go through the Lowell Ave/Manor Way intersection, resulting in an volume increase of 90 to 140%, which is far more than the 25.8% assumed in the study. This is illustrative of the point above about universal versus localized growth. If there were one-way streets then all of the exiting "Bamberger" and "Resort" trips would traverse the Lowell/Empire loop, adding even more traffic that would need to be considered. Consequently, the study fails to properly account for the traffic from the other planned projects in the area. Those volumes must be calculated and explicitly added to all study intersections in order to present an accurate picture of future traffic volumes.

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

4 PROJECT TRAFFIC VOLUMES

4.1 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.

The study assumes that the hotel is 85% occupied for trip generation purposes, based on data from the Canyons ski resort regarding hotel occupancy for the 2016-2017 ski season. This is not a conservative assumption as there will be many days during the ski season when the hotel would reasonably be full. This approach is contrary to the original study from July 2004 that assumed 100% occupancy, which is a good assumption for a winter holiday weekend. This study should also assume 100% occupancy.

The study assumes the Resort Hotel ITE Land Use (330) for the trip generation calculations because it is expected to primarily cater to the "tourist and vacation industry…rather than convention and meeting business." However, the hotel is planned to have over 16,000 square feet of meeting space, which would be large enough to accommodate gatherings of over 1,000 people. With a meeting space of that size, to the study should use the Hotel ITE Land Use (310) which has higher trip generation.

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 6 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 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
- Use the Hotel ITE Land Use (310) for hotel trip generation
- 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

4.2 Trip Reduction

For the hotel, the study assumes a trip reduction of 43% based on assumptions regarding the average number of ski days per visitor stay and where those ski days might occur. This is a very faulty assumption because it presupposes that all hotel trips are ski trips, which is obviously not reasonable. For hotel trip reductions, ITE recommends that either (1) local data be collected to establish an internal capture rate or (2) no internal capture be assumed, neither of which was done for this study. The 43% assumption made in the study is very high and, based on ITE guidance, was improper.

The study assumes that no trips related to employee housing will be made during the peak hours. This is an unreasonable assumption, especially since in the Traffic Mitigation section it says that "work shifts will begin and end outside the AM and PM peak hour(s)." This means that employees who live on site would not be working during the peak hours and would therefore be free to do whatever they want during peak hours, which would certainly involve trips away from Treasure Hill.

The appendix of the study includes an ITE worksheet showing how the internal capture percentage of 11% was calculated for the AM peak hour, but doesn't include the same information for the 20% used for the PM peak hour, so it is impossible to know how that value was obtained.

RECOMMENDATIONS

- Eliminate the 43% hotel trip reduction factor
- Provide an ITE internal capture worksheet for the PM peak hour
- Include employee housing related trips in the project trip generation calculations

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 residential parking requirements may be the same for weekdays and weekends (depending on the number of reserved spaces), thereby increasing the number of required weekend parking spaces and presumably the total parking requirements.

The parking analysis states that for the hotel that the "20% reduction applied in the trip reduction was also applied in the parking generation analysis." However, in the trip generation section hotel trips were reduced by 43%. It's not clear if the 20% reduction for parking was an oversight or acknowledgement that parking reduction factors are not as high as trip generation, as mentioned in the parking analysis section.

The parking analysis says that for parking generation that 30 units of employee housing were assumed, but for trip generation purposes 25 units were assumed.

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
- 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
- Use a consistent employee housing unit number throughout the study

6 SUMMARY OF FINDINGS & RECOMMENDATIONS

The Treasure Hill study recommends a mitigation measure (seasonal one-way roads) that is speculative and would result in substantial additional impacts. If the one-way roads are not approved, then the study doesn't provide any analysis of the true roadway capacity in the study area and the impacts that Treasure Hill would have on those roads. Additionally, as described in detail above, the Treasure Hill study is questionable in regard to future background volume projections (including traffic from the Bamberger and Resort developments) and hotel trip reduction factors. [more here?]

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 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 construction impacts or delivery truck traffic. It is important to consider these items, particularly in light of the substantial increase in the scope and size of the project since the first study was prepared in 2004.

Our study recommendations are as follows:

- Provide a comparison of daily volumes on Lowell and Empire Avenues and similarly situated streets within and without the proposed project and with or without the proposed mitigation
- Analyze and mitigate the impacts of the proposed one-way road mitigation proposal
- Provide additional details on the intersection analyses that were performed
- Provide information on construction impacts, delivery truck traffic, and emergency vehicles

- Apply independent peak hour adjustment factors separately to the existing AM and PM traffic volumes to scale them up to "85th percentile winter ski day" values
- Provide the full four-month set of UDOT data used in calculating the volume adjustment factor(s)
- 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
- Use the Hotel ITE Land Use (310) for hotel trip generation
- 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 43% hotel trip reduction factor
- Provide an ITE internal capture worksheet for the PM peak hour
- Include employee housing related trips in the project trip generation calculations
- If the seasonal one-way road mitigation measure is not approved by Park City. provide a roadway volume-to-capacity analysis under constrained winter conditions
- Provide an explanation of the purpose of the analysis and, if necessary, account for reserved parking spaces in the calculation of total parking needs
- 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
- Use a consistent employee housing unit number throughout the study