Memorandum

To: Barbara Flemming, Senior Deputy Prosecuting Attorney

From: Bill Schultheiss, P.E. (WA. P.E. #46108)

Date: November 3, 2017

Re: East Lake Sammamish Trail Demand Analyses

This memorandum is in response to a request by King County for Toole Design Group (TDG) to respond to a critique submitted by Mr. Charles Alexander of Fehr & Peers, dated September 25, 2017. Mr. Alexander's critique pertains to a demand analysis completed by TDG for King County's proposed extension of the East Lake Sammamish Trail (ELST) between the towns of Redmond and Issaquah, dated June 20, 2017. The ELST is a critical linkage in the regional King County Trail network, providing a safe transportation linkage and recreational opportunity for the growing population centers in this part of the county.

One of the key outcomes of the previously submitted demand analysis is a conclusion that, due to anticipated demand levels, the proposed trail alignment warrants an 11 to 14 foot wide path to mitigate user conflicts and to safely serve pedestrians and bicyclists per design guidance in the AASHTO Bike Guide.

Mr. Alexander's criticism focuses on four aspects of our previously submitted demand assessment, which we will respond to in the order presented in his memo.

1. **The implied precision of forecast user volumes is unreasonably high.**

We agree that it is unreasonable to expect that 23 year forecasts of hourly user volumes can accurately predict to the individual user. This is true of any forecast, and it is implicit in discussing the values as forecasts. Further, rounding the forecast values would not change the conclusion of this analysis, as the rounded values would still be in excess of recommended thresholds for a wider path alignment.

2. **There is a discrepancy between forecasted growth in the average weekday, peak weekday, and peak weekend day traffic volumes, and no forecasted growth in the average weekend day and peak hour volumes (basically why are some future peak hour volumes projected to increase, while others are not projected to increase).**

This discrepancy is discussed in a footnote in the memo (see footnote 6, page 11). The approach taken in these traffic forecasts involved conducting a separate statistical analysis of trail volume determinants for each of the volume values of interest (e.g. average weekday, peak weekday, peak hour). Separate models were developed for each type of volume, with the understanding that different types of travel are likely occurring in each of these periods, and that therefore the determinants of traffic volumes might be different depending on the time period. For the volumes referenced above that do not have any predicted growth, population in the trail catchment area was not found to be a significant predictor of that particular aggregation of trail volumes. This is not to say that population density does not influence peak hour trail volumes, but that with the sample of observed data available at the time that the modeling was conducted, other variables were more predictive of peak hour volumes.

Across the models developed, higher population densities, trail connectivity (measured as mileage of trails in the surrounding area), and local street connectivity frequently emerged as significant predictors of demand. Even though individually these terms do not appear in all of the models developed, the fact that they were found to influence

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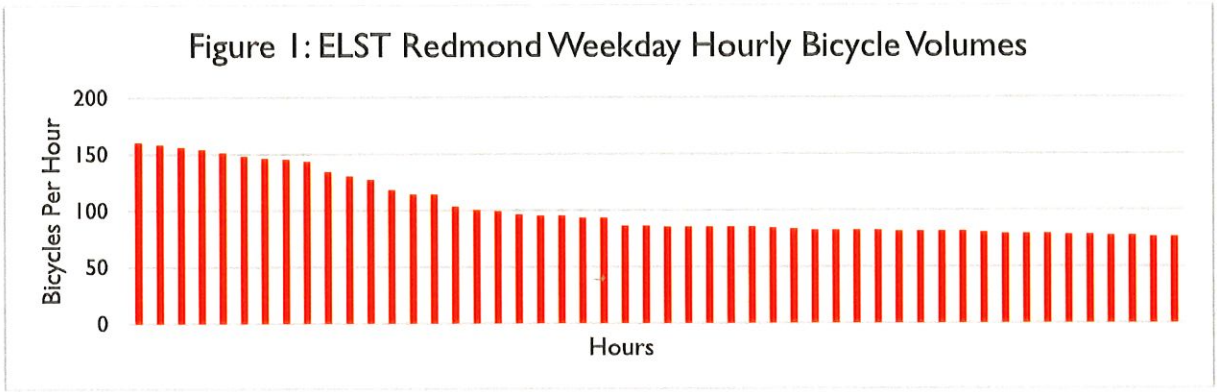
volume at multiple different aggregation levels suggests that they are generally strong predictors of growth in trail traffic volumes. The fact that the projected peak hour volume forecasts (which exceed 300 bicyclists per hour) do not depend explicitly on population growth makes them at worst overly conservative. Likewise, the fact that the forecast volumes do not take into account improvements in bicycle network connectivity, and the light rail extension into Downtown Redmond, despite these being known strong predictors of bicyclist and pedestrian activity, again makes all of the forecast values more conservative.

3. **It is unclear how many days can be expected to carry the peak weekday, peak weekend day, and peak hour volumes.**

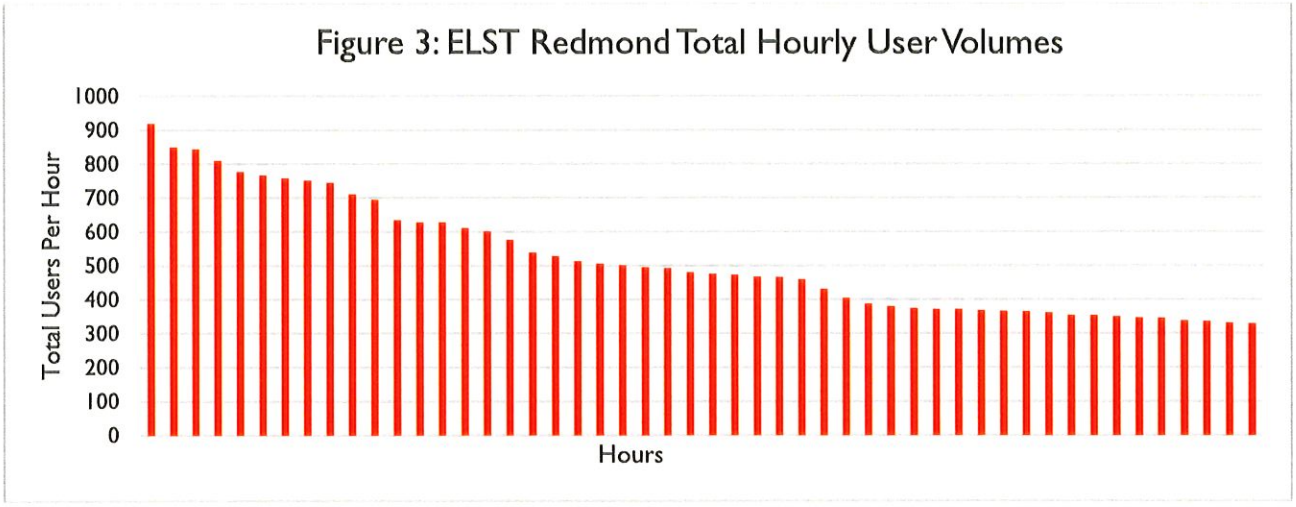
To respond to this, we pulled recent continuous count data from trails in the surrounding area to assess frequency of high volume events[1]. The relevant trail count locations are the Sammamish River Trail (SRT) and the East Lake Sammamish Trail in Redmond. The SRT counter is located between NE 85th St. and NE 90th St., and the ELST – Redmond counter is at the south end of Redmond, just south of the Marymoor Connector Trail. It is important to note that the ELST – Redmond counts, while they are along the same alignment as the ELST trail under discussion, do not represent the total volumes that can be anticipated once the trail extension is complete due to the added connectivity that this extension will allow, making it a viable transportation corridor.

Figures 1 and 2 plots show the highest hourly bicycle counts for the ELST – Redmond sites from the past year sorted by value separately for weekdays and weekends. The key message of these figures is to convey the number of hours in each year that experience high user volumes. These figures show the amount of bicycle traffic alone, as this is the basis for the original traffic forecasts. As can be seen, even with the incomplete trail that is currently in place, peak bicycle volumes exceed 140 users per hour. As the models for this corridor suggests, use of the trail is anticipated to grow as overall trail connectivity is improved.



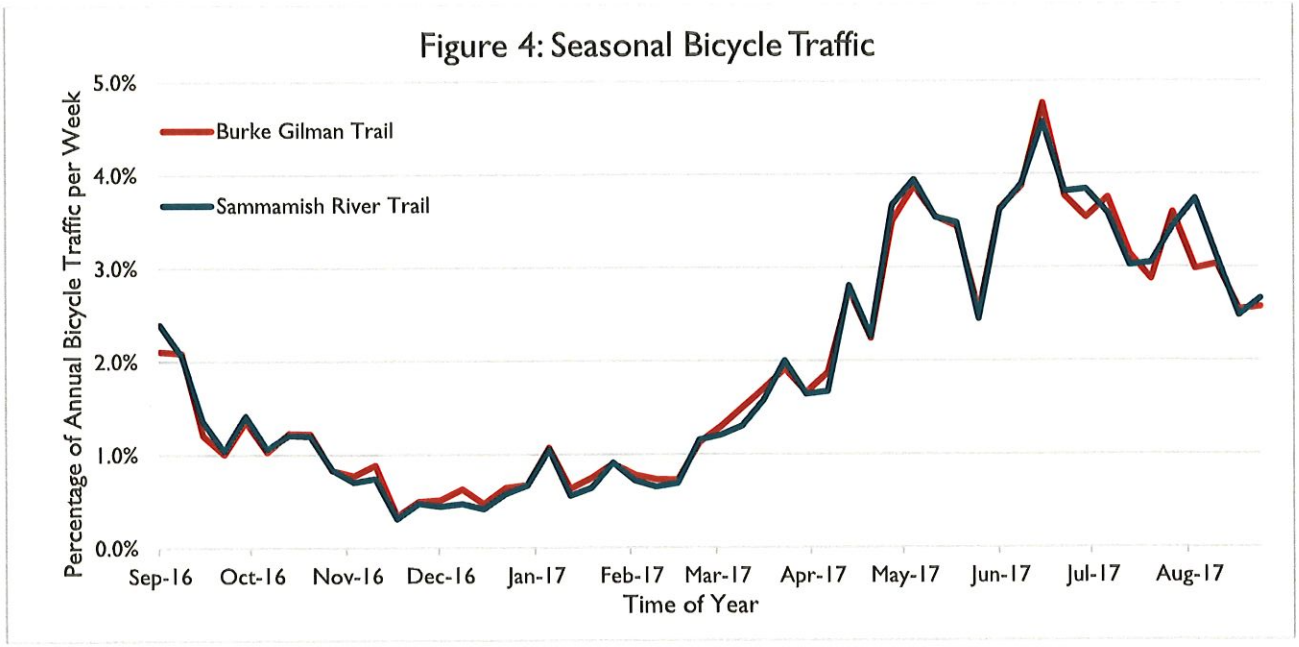
[1] Counts are from WSDOT's permanent counter program, available at wsdot.wa.gov/mapsdata/travel/bikepedcount.htm.

While the modeling here is based on estimating bicycle volumes and extrapolating to total user volumes accordingly, we can also inspect the total user volumes for the ELST – Redmond location for the past year as depicted in Figure 3. These numbers include both pedestrians and bicyclists on weekdays, and reveal that just this year, this location experienced over 50 hours with more than 300 path users per hour despite limited trail connectivity.



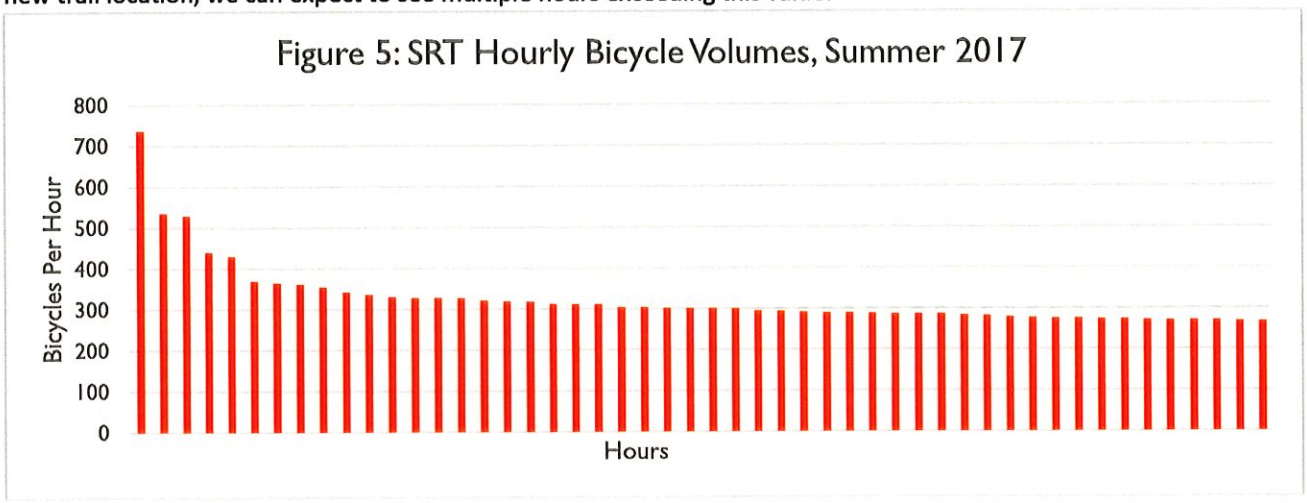
As these plots have shown, the newly constructed section of the ELST in Redmond is already seeing very high rates of usership, despite feeding into a gravel trail that does not serve the needs of those cyclists who are not comfortable riding on unpaved surfaces. Improving this network connectivity will increase the number of cyclists on the trail, as it will enable a vital connection between Redmond, Sammamish, and Issaquah.

For another perspective on this point, we can look to the seasonality of trail usage around King County. Figure 4 shows the weekly bicycle traffic volume on the Burke-Gilman Trail and the Sammamish River Trail as a percentage of annual traffic volume. This figure shows that while the heaviest periods of bicycle activity in the region are in the summer, the "shoulder season" extends into April and September, with activity throughout the year. Accordingly, while the design hours for this facility may be in the summer, the benefits of a higher quality user experience will extend to trail users year round.



4. **Related, it is unclear whether the data underlying the models presented has been filtered to omit special event traffic volumes.**

Mr. Alexander's memo also mentions the possibility that the demand model under discussion is affected by the presence of special events in the data, citing a half-marathon in Redmond that uses the SRT as an example. This particular event would not affect the data used in the demand analysis, as the volumes being modeled are bicycle volumes, which are then extrapolated to estimate total user volumes. Looking at the SRT bicycle volumes for Summer 2017 reveals that, while the peak hour may be an outlier in some ways, there are many hours with bicycle volumes approaching or exceeding 300 per hour. Considering that the predicted peak hour total volumes exceed 300 for the new trail location, we can expect to see multiple hours exceeding this value.



Conclusion

In conclusion, while there are some ways that the demand estimates presented in our original memo may be slightly optimistic by using the peak hour, the degree to which they are optimistic on that front is overstated by Mr. Alexander's supposition that hours of high volumes are a rare occurrence on King County regional trails. In fact, King

County trails have repeated high activity periods, and there is no reason to expect that the complete ELST will be an exception. In addition, there are many ways that the demand estimates and forecasts that we present are pessimistic. Historic predictions of trail use and population growth have proven to be lower than anticipated.

For example, the extension of light rail to Downtown Redmond will be both a major trip attractor for commuters in Sammamish and Issaquah, and will enable more Seattle residents to enjoy the recreational opportunity presented by the ELST. This increased accessibility is not accounted for in our forecasts. Further, as Mr. Alexander points out, the forecasts of peak hour traffic in the original memo do not account for population growth. As population is expected to grow in the region, we can likewise expect to see growth in trail volumes and consequently in peak hour volumes.

The King County Regional Trails Plan from 1992 and the 2004 King County Regional Trail Implementation Guidelines both discussed the challenges of 10-foot-wide trails contributing to "conflicts" and "over-crowding" which generate "frequent complaints" from the public as far back as 1985. King County's vision for over 25 years is for the ELST to be a key part of its "continuous network of high-volume, safe, and pleasurable" regional trail network. This network is to function as an equivalent to the "major arterials [for car traffic] in a street plan" providing recreational and transportation "opportunities for users with differing skills." The latent demand for a high-quality trail facility is evidenced the experience of the King County trails including the recently opened ELST in Redmond which connects to a gravel trail.

Finally, Mr. Alexander speaks to not engineering to the peak activity levels unless design guidance or research suggests otherwise. While there may not be extensive research on choosing an appropriate design hour for trails, it is common engineering practice to take the 30th highest hour of traffic as a reasonable hour to represent typical conditions to base the design of a roadway on (AASHTO defines this value as the "k" factor). We can reasonably expect that peak activity levels on Segment 2B – a flat lakefront trail connected the region's largest and most popular park will be comprised of a broad mix of user ages and abilities – the conditions leading to peak activity levels are those under which novice bicyclists are most likely to use the trail. Accordingly, responsible engineering judgment suggests that we should err on the side of caution in planning and designing for these conditions to mitigate user conflicts at the times of the week when the least experienced bicyclists are most likely to be using the ELST.