



April 7, 2017

Mr. David Linehan
Kenyon Disend
11 Front Street South
Issaquah, WA 98027

Subject: Review of East Lake Sammamish Master Plan Trail, South Sammamish Segment B

Dear Mr. Linehan:

I have completed my review of the East Lake Sammamish Master Plan Trail, South Sammamish Segment B (Segment 2B) 60% review submittal. Per your request, I have focused my review on the trail's cross-sections and aspects of its horizontal alignment. This letter summarizes the findings of my review.

RELEVANT DESIGN GUIDANCE

The Project Narrative for Segment 2B states that the trail's design was prepared in accordance with guidance from the American Association of State Highway Transportation Officials (AASHTO). AASHTO guidance for trail design is contained within the *Guide for the Development of Bicycle Facilities, Fourth Edition* (2012). Therefore, I used these guidelines in completing my review.

CROSS-SECTION

The Typical Section for Segment 2B (Sheet CS2 of the 60% review submittal) features a paved width of 12 feet and crushed rock shoulders on each side that are two feet wide. Where fences or retaining walls are required, the Typical Section includes an additional clear zone of one foot between the outside of the shoulder and the fence or retaining wall.

This letter addresses these elements separately (paved width and shoulder/clear zone).

Paved Width

The AASHTO *Guide for the Development of Bicycle Facilities, Fourth Edition* (2012) states the following:



- The minimum paved width for a two-directional shared use path is 10 feet. It also states that widths typically range from 10-14 feet with the wider values applicable to areas with high use and/or a wider variety of user groups (bicyclists, pedestrians, skateboarders, etc.).
- A reduced width of eight feet may be used in very rare circumstances (low use, limited user groups, frequent passing opportunities, etc.) or for short distances where physical constraints exist (environmental features, built environment features, etc.).
- Wider paths are necessary to provide an acceptable level of service when used frequently by pedestrians and wheeled users; wider paths (11 to 14 feet) are recommended in locations that are anticipated to serve a high percentage of pedestrians (30 percent or more of the total pathway volume) and high user volumes (more than 300 total users in the peak hour).
- 11 foot pathways are needed to enable a bicyclist to pass another user going the same direction at the same time a path user is approaching from the opposite direction.
- A solid yellow centerline stripe may be used to separate two directions of travel where passing is not permitted, and a broken yellow line may be used where passing is permitted.

Given the forecasted volume of trail users (above 300 users per hour when the trail is complete according to Toole Design Group's technical memorandum to Barbara Flemming dated May 19, 2016) and anecdotal descriptions of likely users including a mix of bicyclists (including bicycle trailers, recumbent bicycles, hand bikes, and adult tricycles), pedestrians (including strollers, and leashed dogs) and other users, I am supportive of striving for a paved width of 12 feet where constraints do not exist or can be easily mitigated. However, lesser paved widths are reasonable where constraints exist that are challenging to mitigate. According to AASHTO, a paved width of 11 feet would enable a bicyclist to pass another user going the same direction at the same time a path user is approaching from the opposite direction. The AASHTO recommended minimum paved width for a two-directional shared-use path is 10 feet; this should be considered the minimum width for long distances of the trail. A paved width of eight feet should only be applied for short distances at spot locations of a physical constraint. Segment 2B can be designed with varying areas of solid yellow centerline stripe and broken yellow lines to indicate where passing is permitted, based on available path width or horizontal sightline offset (HSO) for passing sight distance.



Shoulder & Clear Width

The AASHTO *Guide for the Development of Bicycle Facilities, Fourth Edition* (2012) states the following:

- At a minimum, a two foot graded area should be provided for clearance from lateral obstructions such as bushes, large rocks, bridge piers, abutments and poles; the *Manual on Uniform Traffic Control Devices, 2009 Edition* requires a minimum two foot clearance to post-mounted signs or other traffic control devices.
- Where "smooth" features such as bicycle railings or fences are introduced with appropriate flaring end treatments, a lesser clearance (not less than one foot) is acceptable.

The two foot crushed rock shoulders featured in Segment 2B's Typical Section are consistent with AASHTO's recommendations. In addition to providing clear width from lateral obstructions the shoulders can be used by users who prefer to travel on an unpaved surface (such as some runners).

Where fences or retaining walls are required, the Typical Section includes an additional clear zone of one foot between the outside of the shoulder and the fence or retaining wall. Providing the one foot clear zone in addition to the two foot crushed rock shoulders is above the minimum recommended by AASHTO. I am generally supportive of striving to provide the two foot shoulder and one foot clear zone where constraints do not exist. However, applying the AASHTO minimum (one foot clearance) to fences or retaining walls is reasonable where constraints exist. Where it occurs attention should be paid to obstructions or fence elements that could "grab" a handlebar of a passing bicycle. One benefit of maintaining the additional one foot clear zone between the outside of the shoulder and the fence or retaining wall is that it allows for the opportunity to accommodate drainage features such as a swale to avoid erosion of the crushed rock shoulder.

Horizontal Alignment

According to the *East Lake Sammamish Trail Sight Distance Triangles* report dated July 2015 the trail's design speed is 18 miles per hour (MPH), which is consistent with AASHTO *Guide for the Development of Bicycle Facilities, Fourth Edition* (2012) recommendations for design speeds of paths in relatively flat areas. The AASHTO *Guide for the Development of Bicycle Facilities, Fourth*



Edition (2012) recommends a minimum horizontal curve radius of 60 feet for a bicyclist design speed of 18 MPH.

Where necessary, horizontal curves can be used along the Segment 2B trail to realign the trail to avoid constraints or to provide sight distance benefits at driveway or street crossings. While there may be locations where it is necessary to design to the minimum horizontal curve radius of 60 feet, it is preferable to incorporate larger but regularly occurring curves into the trail's design (either to avoid constraints or otherwise). Larger but regularly occurring curves will set consistent expectations for travel speeds on Segment 2B. Additionally, long stretches of trail with little to no curvature with intermittent segments of trail designed to the minimum horizontal curve radius may cause safety hazards as these curves could be unexpected by bicyclists.

Overall Alignment

During our site visit on April 5, 2017, we observed the existing unpaved trail's location within the right-of-way. Many adjacent property owners have made improvements in the right-of-way (including landscaping and structures); changes to these improvements affect Sammamish residents' perceived quality of life and jeopardize community support for the trail. And, according to other City experts several environmental constraints, stormwater/drainage infrastructure constraints, water/electrical/gas utility constraints or other constraints exist within the corridor. It is reasonable for the City to request drawings/designs that clearly show the proposed trail in relation to these constraints and in relation to the existing trail. Additionally, it is reasonable for the City to request technical justification where the proposed trail does not avoid constraints or where the proposed trail deviates significantly from the existing trail.

Respectfully,

FEHR & PEERS

Charles Alexander, PE, AICP
Senior Associate

DN17-0563



September 25, 2017

Ms. Kim Adams Pratt
Kenyon Disend
11 Front Street South
Issaquah, WA 98027

Subject: Review of East Lake Sammamish Trail Segment 2B – Applicant Response to City First Review

Dear Ms. Adams Pratt:

I have completed my review of the East Lake Sammamish Trail Segment 2B Applicant Response to City First Review. I have focused my review on Toole Design Group's memorandums dated June 20, 2017 regarding trail demand analysis and minimum trail width.

TRAIL DEMAND ANALYSIS

Toole Design Group's June 20, 2017 memorandum regarding minimum trail width summarizes a direct demand model developed to forecast user volumes on the East Lake Sammamish Trail Segment 2B. The direct demand model forecasts user volumes on the East Lake Sammamish Trail based on counts collected elsewhere in the Seattle region.

A key detail for identifying the minimum trail width is the forecast user volume. The AASHTO Bike Guide recommends 11 to 14 foot paths on trails that are anticipated to serve high user volumes (more than 300 total users in the peak hour).

Toole Design Group's memorandum provides forecasts for an average weekday, average weekend day, peak weekday, peak weekend day and peak hour. Several aspects of the forecasts are worth questioning.

First, by forecasting to the nearest one user 23 years into the future, the forecasts imply a level of precision that is not reasonable.

Second, the forecasts suggest that at both the Inglewood Hill and Segment B locations, average weekend day and peak hour volumes will not increase between 2017 and 2040 while increases are expected on an average weekday, peak weekday and peak weekend day (Page 12, Table 3). Forecasts that suggest that average weekend day and peak hour volumes will not increase by one



user in 23 years, while average weekday, peak weekday and peak weekend day volumes do increase, are contrary to engineering judgment and common sense.

Third, it is unclear based on the information provided how many days per year are expected to carry the peak weekday, peak weekend day and peak hour volumes. Does the peak hour only occur once per year? Does it occur every day? What about the peak weekend day, is that only observed once per year?

Based on the information provided, and assuming that the peak hour forecasts will occur during the peak weekend day, the peak hour volume represents approximately 10 percent of the peak weekend day volume. Applying 10 percent to the average weekday, average weekend day and peak weekday suggests that average weekend day peak hour volumes (which will be larger than the average weekday peak hour and the average weekday peak hour volumes) will be approximately 160 users per hour, well below 300 users. This suggests that the forecasted peak hour volumes represent events that would only rarely ever occur.

Forth, it is unclear whether the counts collected elsewhere in the Seattle region were filtered to eliminate programmed special events for which permits could be restricted on East Lake Sammamish Trail Segment 2B. A quick Web search revealed at least one half marathon whose route uses the Sammamish River Trail in Redmond; additional running races were also noted on the Burke Gilman Trail (Attachment A). Removing these data points from the direct demand model may show that events above 300 users may never or only rarely occur on the East Lake Sammamish Trail Segment 2B.

Understanding the frequency of events above 300 users is critical to informing whether a path wider than the AASHTO Bike Guide's recommended minimum (10 feet) is necessary. Given the current questions on the forecasts, it is possible that the trail may never or only rarely experience 300 users per hour. It is difficult to justify a 12-foot trail along the entire length of East Lake Sammamish Trail Segment 2B if the demand only warrants it a few days per year. Designing the trail to a width to serve peak hour volumes experienced regularly (for instance, the peak hour volume experienced most weekend days per year) is more consistent with standard transportation engineering practices. If events above 300 users per hour never or only rarely occur, and unless design guidance or research suggests that volume exceeding capacity for even a few days really substantiates a safety hazard, it is justified that the trail can be narrowed in locations to avoid physical constraints.



MINIMUM TRAIL WIDTH

Regarding trail width, I agree with Mr. Schultheiss regarding the recommendations of the AASHTO Bike Guide. However, I believe that Mr. Schultheiss' evaluation muddles the difference between standards and guidance. The AASHTO Bike Guide provides guidelines and recommendations which inherently provide flexibility; the AASHTO Bike Guide is not a set of standards. Although Mr. Schultheiss is clear to state that AASHTO's language is in the form of "recommendations", his evaluation suggests that the AASHTO Bike Guide's recommendations are absolute standards that shall apply without flexibility or context-sensitivity. The AASHTO Bike Guide provides ample guidance that paths less than 12 feet may be used due to physical constraints. Unfortunately, the definition of physical constraints is a grey area and the crux of the engineering judgment debate at hand.

This is a common issue in designing trails, or for that matter roadways. As engineers, we strive to design facilities to meet guidelines whenever possible. However, it frequently occurs that meeting all desirable guidelines comes at a great cost and results in other impacts including to private property, environmental resources or other resources. When this occurs, we make case-by-case decisions whereby we weigh the costs (dollars, property, environment, etc.) against the risks (safety, level of service, etc.). There is no clear process for doing this but the County's position as suggested by Mr. Schultheiss is that the risks of any narrowing of the trail outweigh all of the possible costs. They have altogether omitted any case-by-case analysis. More research is necessary to say conclusively how even minor trail narrowing in short segments results in risks to trail user congestion, comfort or safety, but it is unreasonable that the risks will outweigh all of the costs as conclusively as suggested by Mr. Schultheiss.

Respectfully,

FEHR & PEERS

Charles Alexander, PE, AICP
Senior Associate

DN17-0563

Exhibit 66
SSDP2016-00415
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