

City of Bellingham
CITY COUNCIL AGENDA BILL

SUBJECT	FOR AGENDA OF	COUNCIL ASSIGNMENT	BILL NUMBER
Staff Update on the Birchwood-Meridian Corridor Analysis	09-08-08	TRANSPORTATION	018115
	TIME REQUIRED	DEPART. CONTACT	RECEIVED IN COUNCIL OFFICE
ATTACHMENTS Technical Memo Conceptual Sketch	5 minutes	Tom Rosenberg	SEP 02 2008
	CLEARANCES	INITIAL	DATE
	Dick McKinley, PW Director	<i>YAM</i>	29 Aug 2008
CATEGORY			
<input type="checkbox"/> Public Hearing <input type="checkbox"/> Other <input type="checkbox"/> Evening Presentation <input type="checkbox"/> Special Meeting <input checked="" type="checkbox"/> Committee Briefing Ordinance: <input type="checkbox"/> Mayor's Report <input type="checkbox"/> Briefing/Discussion <input type="checkbox"/> Consent Agenda <input type="checkbox"/> Introduction or Expedited	Legal	<i>JH</i>	8-29-08
	Mayor or CAO	<i>TGW</i>	9-2-08
SUMMARY STATEMENT:			
<p>The Birchwood Sidewalk project was originally budgeted in 2004 to construct pedestrian improvements on Birchwood Ave from Meridian Street west approximately 800 feet to the end of the existing sidewalk. As the design proceeded, it was determined that a right-turn lane and traffic signal upgrades were needed at the Meridian Street intersection, so additional funds were budgeted in 2006. Throughout this time, there have been discussions about the long-term viability of the rail line operated by Bellingham Cold Storage and the inefficiencies created by the proximity of the two traffic signals on Meridian Street (at Squalicum Parkway and Birchwood, respectively). When bringing the reappropriations forward to Council on 4/14/08, Public Works was requested to do a corridor analysis of the transportation options available prior to proceeding further with this sidewalk project. This session is being established for that discussion and direction.</p> <p>Previous Council Action: 2004, 2006 Budget, 4/14/08 Direction to staff to evaluate corridor alternatives</p>			
FISCAL IMPACT:			
<p>Total Fiscal Impact:</p> <p>\$22,933 has been spent on the evaluation being presented today, leaving approximately \$416,470.26 remaining in the budget for whatever action Council wishes us to take.</p> <p>Source of Funds: REET</p>			
RECOMMENDED ACTION:			
<input type="checkbox"/> Information only; no action required <input type="checkbox"/> Move to adopt ordinance or resolution <input type="checkbox"/> Other		<input checked="" type="checkbox"/> Provide direction to staff <input type="checkbox"/> Move to approve appointment <input type="checkbox"/> Award Bid to lowest bidder	
COMMITTEE RECOMMENDATION / ACTION:			
COUNCIL ACTION:			

MEMORANDUM

Date: August 14, 2008 TG: 05158.04

To: Tom Rosenberg, P.E. , City of Bellingham

From: Tim Hedges, P.E.

cc: Jon Pascal, P.E.

Subject: Meridian St. at Squalicum Pkwy. and Birchwood Ave.
Intersection Alternatives Summary

Executive Summary

This preliminary feasibility study was prepared at the request of the City of Bellingham to identify, analyze, and compare potential intersection and roadway approach alternatives aimed at improving transportation level of service and circulation and pedestrian safety at the existing back-to-back signalized intersections of Squalicum Way and Birchwood Avenue at Meridian Street.



Figure 1 above shows the existing intersection geometry and traffic signals

Following our review of the existing site/operations and estimating future traffic volumes, our team generated four initial geometric/operational alternatives to represent a “menu” of several

concepts and ideas which may be “mixed-and-matched” in various ways (Fig. 2a through Fig. 2d). Concepts represented by each alternative include:

Alternative Concept A

Concepts Represented:

- Two traffic signals replaced with single “oval” roundabout
- Birchwood/Squalicum operations combined via standard signalized intersection
- Primary west-leg operations combined onto Birchwood
- Supplemental (right in/out) operations remaining along Squalicum – south of roundabout

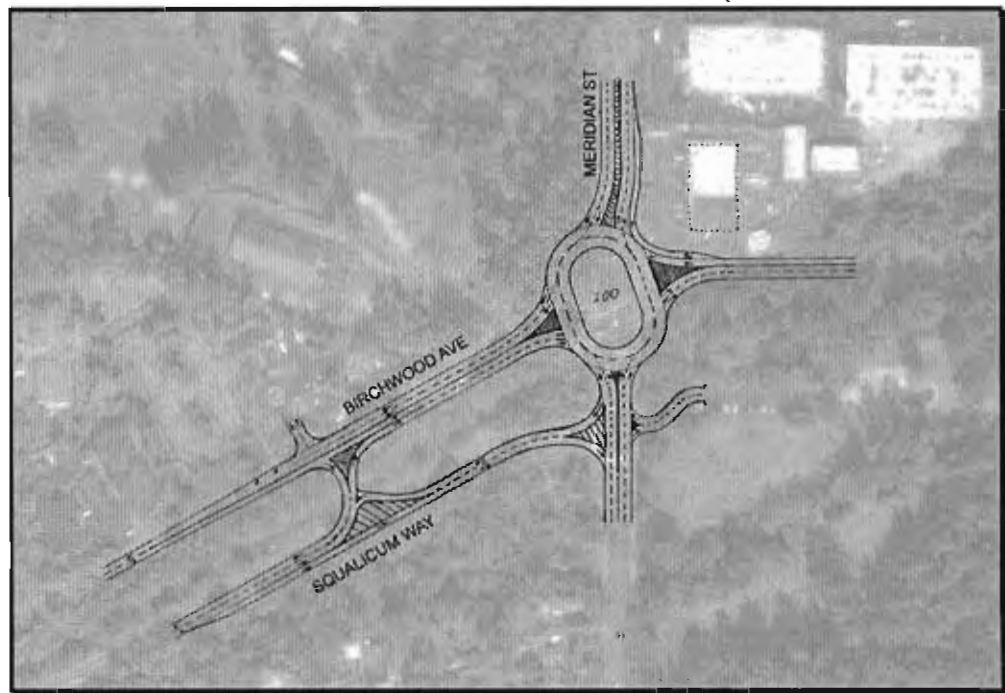


Figure 2a – Concept A

Notes:

- Eastbound operations from Birchwood/Squalicum not required to stop
- Westbound operations to Birchwood/Squalicum split between two connections
- Estimated roundabout level of service B
- May be possible to replace roundabout with standard intersection/traffic signal (LOS not yet estimated)
- Moderate project footprint
- Moderate environmental impact

Alternative Concept B

Concepts Represented:

- Two traffic signals replaced with two “circular” roundabouts
- Squalicum operations connect to southern roundabout
- Birchwood operations limited right in/out from each direction between roundabouts. Left-turn and through operations provided via roundabouts

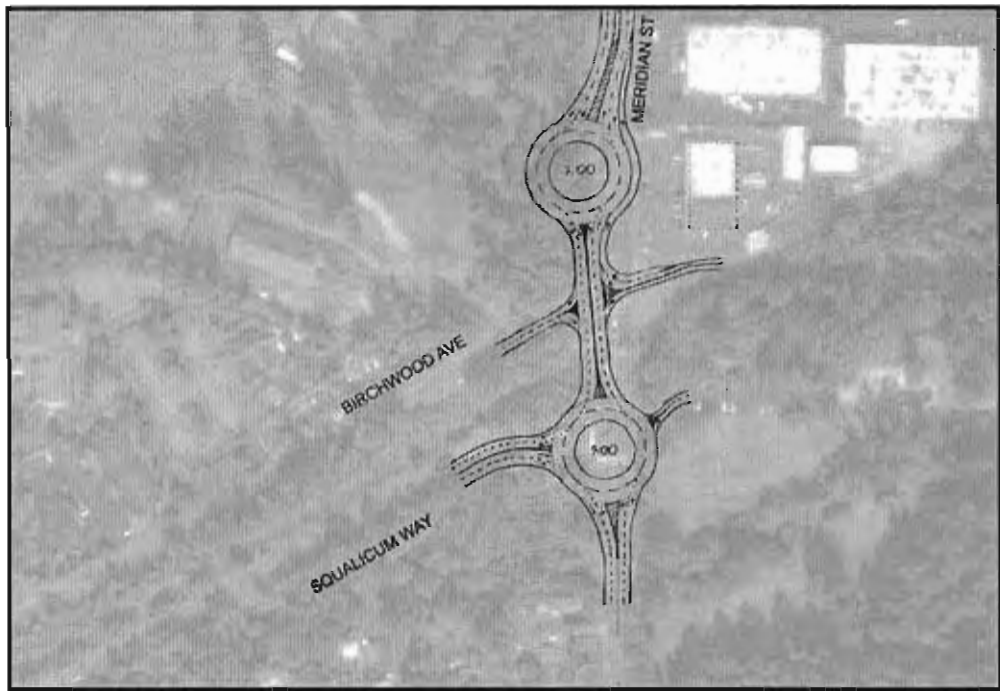


Figure 2b – Concept B

Notes:

- Approx. 320 feet of separation required between roundabouts
- No feasible opportunity to align eastern Birchwood approach with roundabout
- Option to combine Birchwood/Squalicum operations west of Meridian (one-way or two-way)
- Estimated roundabout level of service C
- Smaller project footprint
- Smaller environmental impact

Alternative Concept C

Concepts Represented:

- Two traffic signals replaced with single “peanut” roundabout
- Birchwood/Squalicum operations combined via roundabout
- Roundabout inter-connections provided via separated one-way ramps

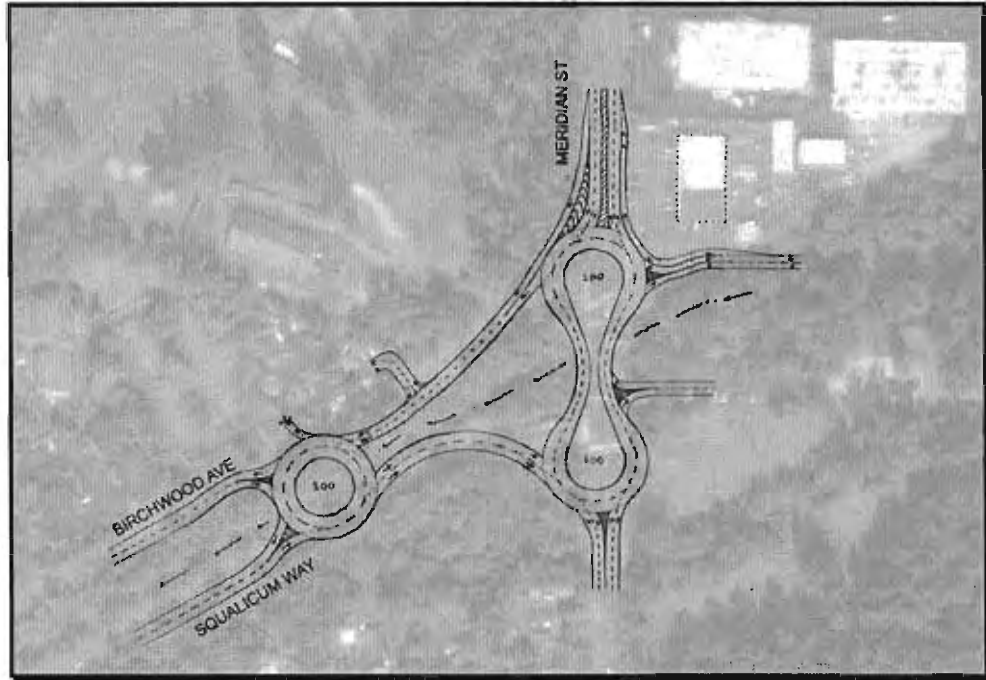


Figure 2c – Concept C

Notes:

- Approx. 400 feet of separation required between roundabouts
- Northern one-way ramp provides significant southbound to westbound roundabout bypass
- Estimated roundabout level of service B
- Larger project footprint
- Larger environmental impact

Alternative Concept D

Concepts Represented:

- Two traffic signals replaced with single “peanut” roundabout
- Birchwood/Squalicum operations combined via standard intersection (possible signal)
- Primary west-leg operations combined onto Squalicum
- Birchwood operations discontinued prior to roundabout

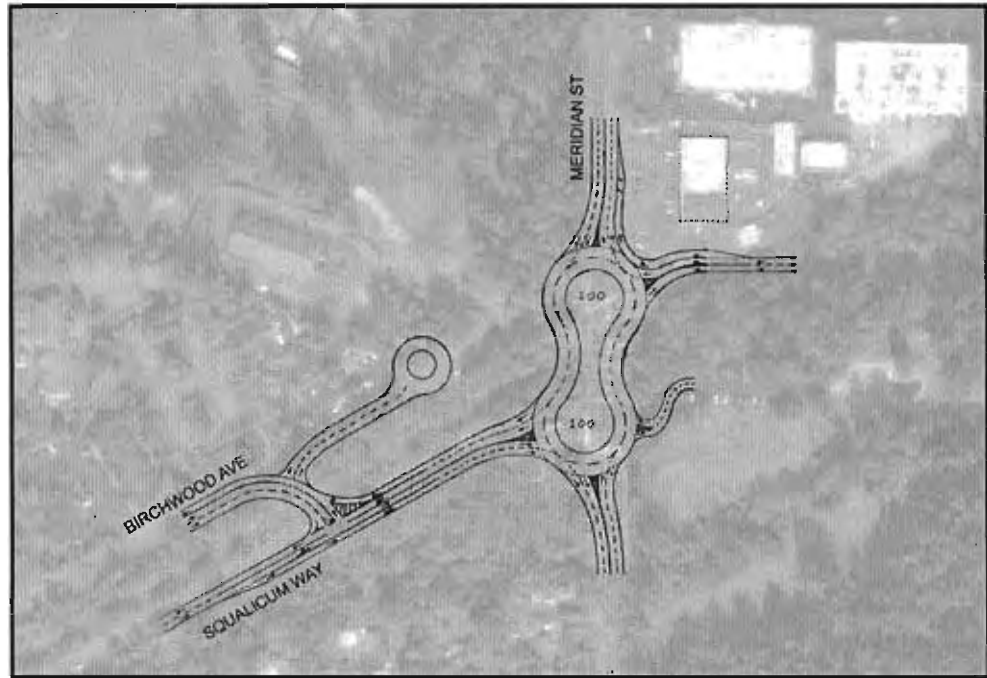


Figure 2d – Concept D

Notes:

- Approx. 400 feet of separation required between roundabout and intersection
- Estimated roundabout level of service B
- Moderate project footprint
- Moderate environmental impact

Following initial review of the alternatives by City of Bellingham’s staff, the following concepts were recognized as being of preferred or highest priority:

- A single roundabout on Meridian that would encompass all major legs of the intersections(s) with Birchwood and Squalicum; versus two separate roundabouts on Meridian

- Combining Birchwood and Squalicum operations west of Meridian, preferably onto/along the Squalicum leg, prior to intersecting with the roundabout on Meridian; thus eliminating one leg of operations from the roundabout
- Combining Birchwood and Squalicum operations by use of a second roundabout; versus a standard Tee-intersection or traffic signal

City staff also added the following suggestions for improvement:

- Bicycle and pedestrian passage through and around the intersection should be addressed as high priority
- Accommodation should be considered for the future Bay to Baker Trail improvements, connecting Little Squalicum Beach with Cornwall Park, currently aligned with the RR tracks
- Future traffic at the intersection should consider the future “east-west” Orchard Drive Extension
- Future elimination/redirection of Tributary “W”, currently passing below/between the two intersections through a box culvert, should somehow be considered

Preferred Alternative Concept E

After discussing the initial alternatives and comments, it was recognized that many of the concepts preferred by City staff were inherent in Alternatives C and D. These two alternatives were then mixed to form a fifth alternative incorporating the preferred concepts; and also supplementing with other desired components (*Figure 3*).



Figure 3 – Preferred Concept E

Concepts Represented – The features represented by *Preferred Alternative E* are as follows:

Meridian Roundabout

- Two existing traffic signals at Squalicum and Birchwood are replaced with single two-lane “peanut-shaped” roundabout.
- Two lanes are required within the roundabout to facilitate all turning operations, high volumes of through-traffic, and passage for large tractor-trailers; the roundabout is predicted to operate at level-of-service D.
- The peanut-shape is designed to add curvature and reduce speeds within the roundabout.
- The outside lane of the roundabout is 18 feet wide to allow passage of large trucks within their own lane. This also provides added width for bicyclists who may chose to utilize this lane.
- The perimeter of the roundabout is bordered by a 10-foot wide combined-use path for both pedestrians and bicycles – this is interconnected to the Bay to Baker Trail utilizing the abandoned portion of Birchwood Avenue.
- Pedestrian refuge islands are placed to allow pedestrian crossings at the southern Meridian approach, the eastern Birchwood approach, and the western Squalicum approach. Pedestrian crossing of the northern Meridian approach is purposely not encouraged, since this leg carries 1.5 to 3 times the amount of traffic of any other intersection approach – over 3,400 peak-hour vehicle trips.
- Future connection/passage for the Bay to Baker trail is designed to pass below the roundabout – taking some advantage of the natural ground topography. The under-crossing is located north so as not to interfere with existing Tributary “W”.
- Box culverts carrying Tributary “W” below the roundabout would need to be lengthened.
- The center of the roundabout can be utilized for sustainable drainage treatment/control and streetscape/landscape.

Squalicum Roundabout

- Birchwood and Squalicum operations are combined utilizing a single-lane circular roundabout placed approximately 500 feet west of Meridian Street.
- The roundabout is predicted to operate at level-of-service B.
- The inner circle of the roundabout is designed with an apron to allow passage for large tractor-trailers.
- Pedestrian connectivity to the Meridian roundabout and trail under-crossing is designed along the abandoned portion of Birchwood Avenue.
- Tributary “W” crosses below Squalicum Way east of this location.

Additional Considerations

Future Traffic

Traffic modeling for the project intersection(s) is based on year 2026 traffic projections – assuming Port of Bellingham Waterfront Redevelopment Alternative 3. Estimated traffic volumes flowing through the project limits are summarized below (Figure 4):

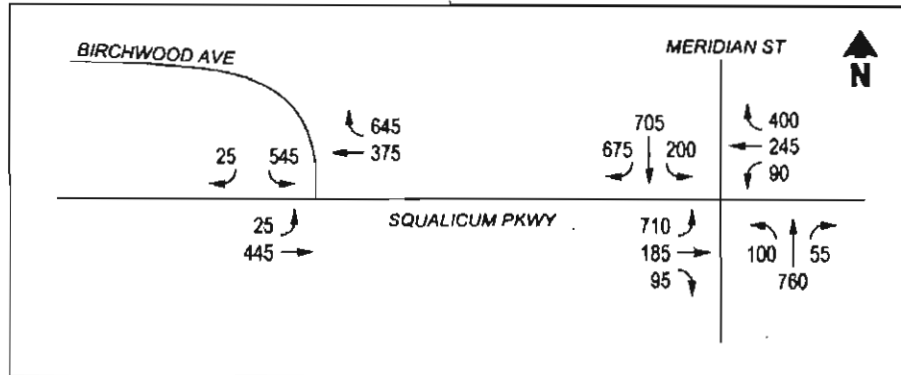


Figure 4 – 2026 PM Peak Traffic Volumes

Utilizing Synchro traffic modeling software, our team incorporated the future “east-west” Orchard Drive Extension to determine the sensitivity at this intersection. While the connection would add some traffic to Birchwood east of and through the intersection, it also has the effect of re-directing other traffic toward the northeast. Ultimately, the connection does not make a noticeable impact to the total traffic passing through the Squalicum/Meridian intersection in a way that will influence the construction of roundabouts at this location.

Utilizing these traffic volumes, our team used Sidra roundabout intersection software to estimate future level-of-service for each roundabout location separately. As previously summarized, the Meridian roundabout is estimated to function at level-of-service D, and the Squalicum roundabout is estimated to function at level-of-service B. Detailed results of the Sidra analysis for each roundabout are attached at the back of this summary.

One notable factor regarding the Sidra analyses is that Sidra does not have the capability of simultaneously analyzing the roundabouts and the effects they will have on one another. Of specific importance is the estimated length of queues approaching each leg of the roundabout – particularly relative to the length of legs connecting the two. It is noted in the Sidra calculations for the Meridian roundabout that the eastbound queue length along Squalicum is predicted at nearly 800 feet, while the length of the connection between the two roundabouts is only about 500 feet. The reason we are not overly concerned with this discrepancy at this early point is because the Sidra model does not take into account the “metering effect” that the Squalicum roundabout will most likely have on the eastbound queue. Based on our experience, we predict that that much of this queue will be detained approaching (west of) the Squalicum roundabout, and then slowly “metered” out; ultimately shortening the length of eastbound queues flowing into the primary Meridian roundabout.

Further Comments to be Addressed

Following City staff's review of Alternative Concept E, the following additional comments/questions were raised:

- Eliminate the westbound to northbound right-turn bypass. This will eliminate the need for a merge onto Meridian north of the roundabout. This would also reduce the potential impact to Cenex and increase the ability to safely cross pedestrians at the north leg of the roundabout.
- Further review the necessity for 18-foot travel lanes within the Meridian roundabout. The concern is that these large widths may cause traffic to flow faster than desirable within the roundabout.
- Need to address where the BGCC maintenance facility driveway gets its access – there is currently nothing shown.
- Increase the width of the shared-use path from 10 feet to 12 feet.

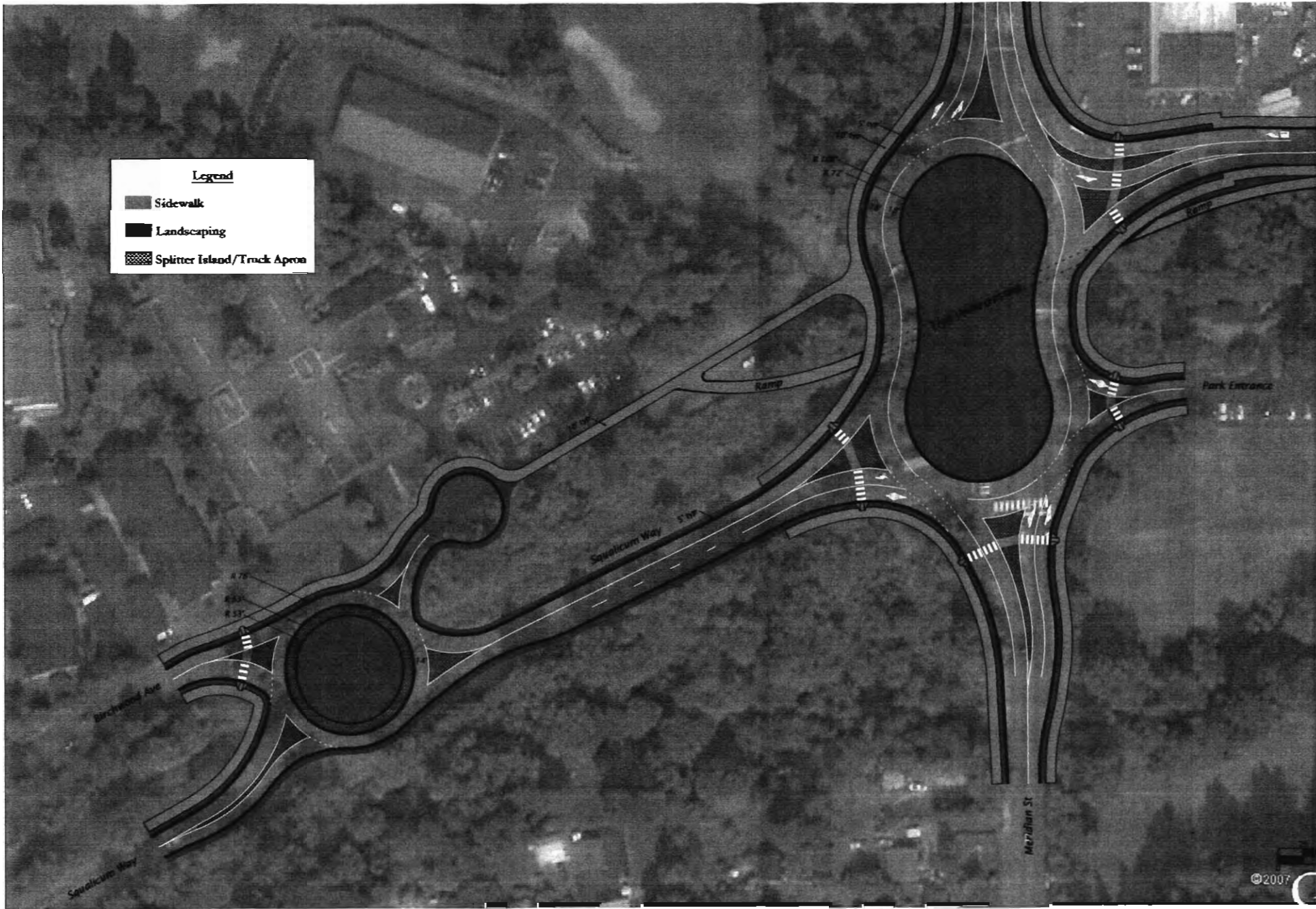
Upon review of these comments, our team agrees that each of these elements should be carefully considered when moving forward into the next stages of design.

Recommended Next Steps

- Additional traffic modeling/simulation utilizing Vissim (or similar software) should be considered to more positively identify and verify the inter-related queues and operations between the two closely-spaced roundabouts. This can also be utilized with project stakeholders to demonstrate and visualize just how traffic will flow through the roundabouts.
- Acquire more detailed (aerial or ground) survey of the project area. This will assist in accurately identifying topographic, property boundary, and environmental features which are important to more refined siting and layout of the roundabouts.
- Verify constructability of the Squalicum roundabout relative to topography, existing roads/access, and sensitive areas. The concern is that, at this location, Birchwood Avenue is noticeably higher in grade/elevation than Squalicum Avenue; with only about 100 feet between them. It will be important to perform a preliminary grading exercise to better understand how this can be accomplished, and to identify any substantial impacts or necessary mitigations.
- Additional focus on bicycle/pedestrian operations, particularly as they concern connectivity to the Bay to Baker Trail and Cornwall Park should be undertaken. The location currently shown for the trail undercrossing is somewhat of a "place-holder"; demonstrating one way this can be accomplished until more is known about exactly how and where this trail segment will interface with the ultimate trail plan.

Appendices

The following pages contain the results of Sidra roundabout analyses utilized for this preliminary feasibility study.



Meridian Street & Squalicum Way Roundabouts

City of Bellingham