# SEATTLE'S GONDOLA AMBITIONS

A case study on how gondola technology has been considered in the Pacific Northwest

By Martin Pagel

## INTRODUCTION

The cities along the west coast of the United States are hemmed in by a coastal mountain range and most have various hills which make it challenging to connect all neighborhoods with rail lines. San Francisco California relied on their historic cable cars to get up its hills. Portland Oregon built an aerial tram, Vancouver, BC (Canada) and Los Angeles California are planning 3S gondolas, and San Diego California, Oakland California, and Seattle Washington have considered various gondola projects in the past. Sound Transit has focused on building light rail (aka Link) lines to connect Seattle with some cities across the Puget Sound region. They also run a few Express bus lines and soon bus rapid transit (BRT) (aka STRride) lines. Starting in 2021 a group called West Seattle SkyLink has been advocating for an urban gondola as an alternative to one of the light rail lines which would serve the West Seattle neighborhood. In addition, Kirkland, a city across from Lake Washington, is considering a gondola line to connect their STRide station with downtown. This article looks at these two opportunities to use aerial gondolas rather than traditional transit technologies and how gondolas may provide a better outcome.

## CASE 1: WEST SEATTLE LINK EXTENSION (WSLE)

When in 2014 Sound Transit considered its next set of Link extensions, Ballard (Northwest Seattle) was high on the list due to housing density and estimated ridership. Politicians from (South)West Seattle however didn't want to get left out and a 4.7 mile WSLE was added to the list of projects ultimately approved by the voters in the region in 2016 as part of the Sound Transit 3 (ST3) measure.

*Photo credit: Robert Ritchie, Seattle ,WA, 2021. https://unsplash.com/photos/a-view-of-a-city-with-a-tower-in-the-middle-of-it-JEicDFy5Cd8*

Even before the vote, Sound Transit had evaluated various high-capacity transit (HCT) modes: various bus technologies (Express, BRT), rail systems (streetcar, light rail, heavy rail, DMU, commuter rail, high speed rail or maglev), and more local solutions (people movers, gondola/aerial tram, personal rapid transit). They decided for their regional expansion efforts to continue with light rail as it fit in with the existing downtown tunnel and at-grade lines though they found that other technologies may have advantages as long as those lines were separate. However, when the WSLE was added, it was assumed that it would use light rail technology.

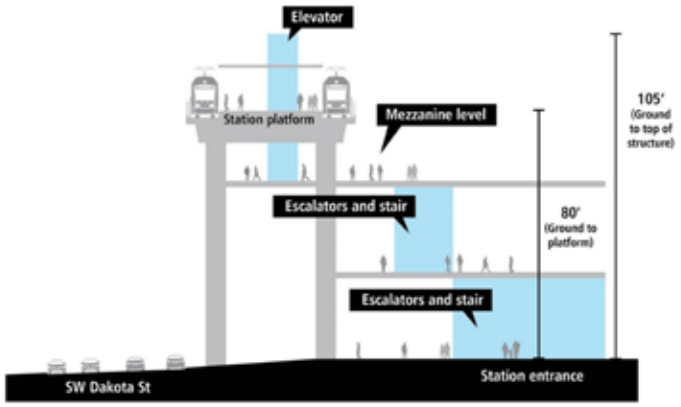


***Figure 1:*** *Delridge station (Source: Sound Transit WSBLE DEIS)*

***Figure 2:*** *SW Genesee St. with a rendering of the proposed light rail guideways (Source: Sound Transit WSBLE DEIS)*

Originally the light rail line was going to closely follow the route of the West Seattle Freeway but that would have made it difficult to provide decent access to the stations. When Sound Transit realized that more riders would arrive at light rail stations by bus rather than by walking, bus access became a priority which ultimately pushed the line further away from the freeway into the neighborhood. Sound Transit also realized that West Seattle has difficult terrain and surface obstacles: there are multiple rail lines, the West Seattle Freeway, a steel plant and the Port of Seattle with its freight rail and truck lines, the Pigeon Point hill and the Junction hill, the Duwamish Waterway, and various parks, wetlands, and tribal lands. At some point most of the light rail line was proposed to be elevated 80 to 160 feet up to get up to the Junction, and some of the stations were proposed to be more than 100 feet high requiring 3 levels of escalators. (Figures 1 and 2). There were no wide road corridors the extension could just follow. As Sound Transit requires clearing at least a 60-foot corridor for any rail line, it would have been necessary to take many businesses and residential units via eminent domain, including a major mental health facility and one of the largest childcare facilities in Seattle. Additional tunneling was proposed but ultimately not pursued as too risky and expensive.

Ultimately, in mid 2022 the Board decided to favor a route for the final Environmental Impact Statement (EIS) which reduces the impact on land taken somewhat though it also reduces the station walkshed. The end of the line with the Junction station will be tunneled which will increase the carbon footprint and cost not just for this project but will also make it more expensive to extend the line further South later. To mitigate the cost, Sound Transit is considering dropping the middle station. While Sound Transit originally planned ridership of 32,000 to 37,000, they reduced that estimate to 27,000 right before the pandemic and have not updated it since. But initially the line will only connect to the main North/South line; to reach any location outside of West Seattle riders will have to switch tracks (two escalator rides) and wait for a connecting train which may take up to 12 minutes. Sound Transit does not expect much ridership until it gets connected to the new downtown tunnel. This was anticipated for 2035, has already been delayed until 2037, and will probably slip further as the downtown route has not been finalized yet.


***Figure 3:*** *Source: Sound Transit*

While Sound Transit markets themselves as being the greenest transit agency in the U.S., (Figure 3) this only considers operational power needs, not overall carbon footprint. Once the line connects downtown, Sound Transit expects only 400 daily riders (see: DEIS Appendix N Table 2-9) to switch from cars to light rail going downtown. If they all sell their cars and switch to transit it may reduce carbon emissions by 1840 tons annually. Though Sound Transit's Draft EIS claims that the light rail line will reduce carbon emissions, it also estimates that construction will generate 614,000 tons of carbon (see: DEIS Appendix L4.6D). With only 400 new riders you may need to wait 300 years to realize the advantage (or longer with electric cars).

Currently, buses take riders straight from multiple locations in West Seattle on a freeway straight to downtown. Ultimately it is expected that buses will drop off riders at one of the light rail stations. For people walking to the station light rail may be slightly faster once it connects downtown directly, but not until then. For anybody who transfers from a bus, the total travel time will increase; if you have any mobility challenge, it may take a lot longer if they can make it all.

The cost estimates have more than doubled from originally $1.4 billion to $3 to 4 billion.

## WEST SEATTLE SKYLINK PROPOSAL

In 2021, a group of residents got together to urge the Sound Transit Board to study an urban aerial gondola line alternative (they called it SkyLink) to avoid the cost increase far beyond what was approved by the voters as well as to avoid massive destruction and construction impact of their neighborhood. A gondola line would be able to cross the waterways, hills, freeways, freight lines, and neighborhoods without building high guideways and bridges and destroying green spaces and tribal lands. (Figure 4.)


***Figure 4:*** *Author, West Seattle Light Rail Extension (Source: Sound Transit) with teal SkyLink overlay*

There would be far less loss of homes and businesses along the line because a gondola only needs a few towers, reducing the property acquisition cost, utility relocations, disruption to the neighborhood, and construction related carbon emissions, which would also help simplify the environmental impact study. (Figure 5.) A gondola could be planned and built within four years rather than requiring decades of planning, tunneling and guideway construction work. In addition, finishing a gondola this decade would allow for actual carbon reductions much sooner. Smaller stations could be built above roads or even intersections and buses could stop right underneath rather than having to divert to a larger light rail station underground or elevated high. Due to its high-frequency and automatic operation, a gondola line may speed up transfers and allow longer operating hours while reducing the annual operating budget to about a third ($12 million vs $40 million).

***Figure 5:*** *Similar view point of SW Genesee St but with SkyLink rendering (Source: framewiz.com)*

During an initial meeting, Sound Transit staff told the SkyLink proponents that the voters had approved the light rail transit mode and that it couldn't be changed; the SkyLink team, in turn, pointed out that the ballot measure had given the Board the ability to change the plan if it became infeasible or too expensive. After more than 1500 residents had signed a petition to ask Sound Transit to at least study the alternative and media coverage in various publications, Sound Transit agreed to do a study. However they didn't hire gondola experts for the study, but produced their own gondola feasibility study internally and provided it to the media without even discussing the gondola proposal with the SkyLink team. The SkyLink team pointed out that Sound Transit mostly relied on their High-Capacity Transit (HCT) mode study from 2014 and added a few new references (incl. a 2020 study by the World Bank) but didn't update their findings accordingly. Many details the Sound Transit author added demonstrate that he neither understood the systems he quoted (e.g., CableBus) nor urban gondola technology in general.

For example, while the report admitted that current demand could be met with a gondola with 2,500 passengers per hour per direction, it questioned whether a gondola system could meet future demand, failing to mention that the World Bank study listed existing gondola systems carrying 4,500 passengers (e.g., Santo Domingo, Colombia).

In most cases an urban gondola is not a substitute for a light rail line, but for West Seattle it is a feasible alternative due to the complex topographical challenges West Seattle presents and mid-level ridership as SkyLink advocates point out. While this may be the case, even in an otherwise progressive city like Seattle, approval and implementation of an aerial gondola very much depends on whether the local transit authority is open to the use of technologies they may not be familiar with. Though the Pacific Northwest has plenty of ropeway experience (e.g., SCJ Alliance) in both the recreational and urban use, it does not mean politicians and key decision makers take the technology seriously.

## CASE 2: KIRKLAND NE 85TH BRT STATION ON I-405

While Sound Transit is building out their light rail "spine" roughly parallel to I-5, it's also connecting it to the eastern

shore of Lake Washington over the I-90 bridge and across I-405 where they plan to operate their STRide BRT line. (Figure 6) It will run all the way from the light rail station in Lynnwood in the North via Kirkland and the Bellevue light rail station to Renton, the Tukwila light rail station to Burien in the South.

Downtown Kirkland is located along the shore of Lake Washington almost a mile apart from the huge 3-level station and intersection Sound Transit is building up the hill along NE 85th Street. City planners are trying to make the best out of it and upzoning the area around the station for transit-oriented development (TOD). Google already has two major facilities in Kirkland and was considering adding a 3rd next to the station.

Sound Transit had promised to help with improving access between the station and Kirkland's downtown transit center and the city was trying to tie the new urban TOD village to downtown and the other Google facilities to encourage the new residents to do business within the city rather than going elsewhere.

## KIRKLAND GONDOLA PROPOSAL

City planners determined that the grade and traffic along NE 85th is not conducive to people walking between downtown and the intersection and therefore started to look at high-frequency transit options to complement the buses along the road. They considered aerial tramways, gondolas and funiculars even though Sound Transit preferred adding more buses. The city finally contracted for a gondola feasibility study for a 2- or 3-station gondola line.

***Figure 7:*** *Proposed NE 85th Gondola line (Source: City of Kirkland)*

***Figure 6:*** *Rendering of NE 85th STRide Station on top/North (Source: Sound Transit)*

It would not only connect the freeway BRT station to the downtown transit center, but also stop at a business center midway which also houses one of the existing Google facilities, the other one is a bit further South from there. (Figure 7.)

The study was concluded in 2021 and showed that a monocable line could be built along the existing corridor without much interruption.

It could provide a convenient transit connection closing an important gap while avoiding the wait time typical for bus transfers. It would provide downtown residents with convenient access to regional transit connections. A 2-station line could be built for $47 million and 3-station line for $81 million in a relatively short time. Annual operating cost was estimated at $4 million vs $7 million. It would be a great way to connect the various facilities quickly and with a breathtaking view of the lake and may even attract additional visitors to the city.

The city is still working with the residents and interested developers on the scope of the TOD project. Depending on the number of housing units, the ridership demand may or may not justify the cost of the gondola. This January Google announced that they will not acquire the property next to the BRT station.

*Photo credit: Ian Sane, Follow Station Approach For Docking, 2016.* https://www.flickr.com/photos/31246066@N04/29994612241

## CONCLUSION

Both the West Seattle and the Kirkland lines are examples of how urban gondolas can be used to extend the reach of High-Capacity Transit (HCT) lines into neighborhoods close by, one driven by citizen advocates and one by open-minded city planners. (See sidebar for example of how aerial gondolas fit within a region's transportation goals and objectives. Both demonstrate that gondolas should be evaluated alongside bus or rail connections in situations where ground transportation faces any obstacles and where the length of the line is less than about 5 miles. Currently, in the Seattle area at least, gondolas don't seem to be taken seriously in the EIS process, as they are in Germany, France, Mexico, and many Central and South American and Asian countries. Furthermore, any feasibility study to evaluate the advantages and disadvantages of an aerial system in a particular setting should be conducted by ropeway experts, to ensure that aerial systems' capabilities and applications are assessed properly.

**For details:**
West Seattle and Ballard Link Extensions (participate.online)

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# SIDEBAR: HOW AERIAL GONDOLAS MEET GOALS AND OBJECTIVES

By Claudia Hirschey

Aerial gondolas, when considered in a technical evaluation of High-Capacity Transit (HCT) modal options, meet or exceed the performance of other HCT modes, especially over challenging terrain or waterways and other obstacles on the ground including multi-lane highways, rail corridors, nature preserves, and existing developments. The long-range plan goals and objectives of Sound Transit's Regional Transit Long Range Plan, adopted December 2014 (1), that were prepared to provide the ST3 Program to Puget Sound Voters are presented below, followed by an analysis of how gondolas help meet them.

## SOUND TRANSIT GOALS:

| Regional Transit Long Range Plan Goals (1) | How Aerial Gondolas Meet this Goal |
|---|---|
| Provide a public transportation system that helps ensure long-term mobility, connectivity, and convenience for the citizens of the Puget Sound region for generations to come. | Gondolas and their stations are equivalent to bus, bus rapid transit (BRT), light rail, and commuter rail. Connectivity is simplified compared to tunnels and elevated rail stations. High frequency and longer operating hours provides for increased convenience. |
| Preserve communities and open space. | Gondolas require much less right-of-way than rail and use much less street capacity than buses or BRT making it easier to add bike lanes. Gondolas keep neighborhoods livable and connected by reducing the negative effects of bus congestion on the street, or the complexities and safety issues of at-grade rail. |
| Contribute to the region's economic vitality. | Gondolas, providing high-capacity transit, would be equivalent to other HCT modes. |
| Preserve our environment. | Gondolas conserve land, have less of a carbon footprint for vehicle and facility construction, generate less emissions and consume less energy than other HCT modes, and as an HCT mode reduce greenhouse gas emissions equal to other HCT modes in as much as drivers shift to high-capacity transit. |
| Strengthen communities' use of the regional transit network. | Gondola stations would encourage the development, or redevelopment, of areas around transit stations and centers and park-and-ride lots providing opportunity for a mix of transit-oriented activities at a pedestrian scale. |

*Source:* [1] *https://www.soundtransit.org/sites/default/files/documents/2015123_lrpupdate.pdf*

## SOUND TRANSIT OBJECTIVES:

| Regional Transit Long Range Plan Objectives (1) | How Gondola Meet the Objectives |
|---|---|
| Keep the region moving. | Gondolas can run cost-effectively all day, seven days a week serving work and non-work trips. Gondolas have a competitive and predictable travel time with other HCT modes in exclusive right-of-way at higher frequency. Gondolas have better reliability during inclement weather. The small footprint of a gondola station allows for closer connections to other modes. |
| Offer cost-effective and efficient transportation solutions. | Gondolas cost much less to construct and operate than buses or rail. Gondola cabins and power cost much less than bus or rail propulsion. Gondolas are a cost-efficient mode to cross steep terrain or travel over waterways compared to building long bridges or tunnels. |
| Create a sustainable regional transit system that provides community, social, economic, and environmental benefits. | Gondolas surpass other HCT modes in maintaining open space and protecting natural resources. Gondolas are easy to reach on foot, by bicycle, on transit and by people with disabilities. The Gondola platform and floor provide level boarding. Gondolas use less energy, and consume less land. |
| Develop equitable transportation solutions. | Gondolas' efficient 24/7 operations provide reliable transit service for all trip types and income levels. |
| Create a financially feasible system. | Gondolas are more affordable to build, run, and use. |
| Offer regional services that work well with other transportation services. | Gondola stations and fare payment is completely comparable with the regional system. |

*Source:* [1] https://www.soundtransit.org/sites/default/files/documents/2015123_lrpupdate.pdf

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Claudia Hirschey, a licensed civil engineer and certified road safety-professional, has over 35 years of experience. She received her Master's Degree in Civil Engineering/Transportation at the University of Wyoming. She has significant project experience at the pre-design phase, where project implementation begins with alternatives analysis of mode and alignment, 30 percent design development, and environmental documentation.